Libyan Journal of Medical Research

Official journal of the National Medical Research Center, Libya
A refereed scientific research journal issued biannually

volume 9, number 2, year 2015

General Director of
National Medical Research Center
Khaled A. Abdulmola

Editor-in-chief
Fathi M. Sherif

Advisory Board
Aboulgasem E. El-Gerbi, Taher A. Suliman, Yousef A. Taher,
Yousif A. Saleh Ali A. Lahresh and Mehdi M. Khamas

Journal office
Belgassem S. Fazzani
Mabrouk B. Gihwash

Technical board
Salem D. Amer, Raad A. Mohamed

Copyright by the National Medical Research Center,
The scientific matter of this publication is copyright with all rights reserved.
No part may be borrowed without prior consent of the Editor-in-Chief

Correspondence should be addressed to
Editor-in-Chief
P.O. Box 15583, Zawia, Libya, Fax: 00 218 23 762 9007
LJMR.com.ly

Results or opinions expressed by the authors are their responsibility and publication of the
National Medical Research Centre does not necessarily endorse such results and opinions
Instructions to authors

Manuscripts submitted for publication in Libyan Journal of Medical Research (LJMR) can be review articles, original articles, short communications or case reports. The manuscript should carefully be prepared, double-spaced and pages numbered. Generally, original articles should not exceed 3500 words or 10 printed pages. Manuscripts must be submitted as electronic using the web of the journal.

Submitted manuscripts should be accompanied by letter from the corresponding authors indicating that no part of the submitted work has previously been published (in print or electronic format) or is not under simultaneous consideration by another publication or electronic medium. Under no circumstances will any manuscript be considered for publication in LJMR that contains any data that have been published or submitted for publication elsewhere.

Manuscripts reporting studies involving human subjects must be accompanied by a statement from the main author confirming that informed consent was obtained from all subjects involved. This statement must also appear in the materials and methods section of the manuscript. Manuscripts reporting studies involving live animals (vertebrates) must be accompanied by a statement from the main author confirming that experiments were performed in accordance with relevant national guidelines and regulations. The contents of the manuscript should be arranged under the following headings: abstract, introduction, materials and methods, results, discussion, conclusion, acknowledgments, references, figures and tables.

The first page should comprise: Title of the paper, name(s) of the author(s), Affiliations, the exact contact information of the author must be given in detail at the end of the page. Title: should occupy no more than three lines. Title should clearly convey the conceptual significance of the paper to a broad readership. Authors/Affiliations: Author name(s) should be written as Ali M. Zorgani. Affiliations should contain the following core information: department(s), institution(s), city, country. Contact Information: Contact line should include the e-mail address the corresponding author.

Abstract: should be composed of a single paragraph of no more than 250 words. It should contain a brief background of the question, a description of the results without extensive experimental details and a summary of the significance of the findings. Introduction: should be concise, with no subheadings and should present the background information necessary to provide a logical context for the results. Materials and methods: This section needs to include sufficient details so that readers can understand how the experiments were carried out. This section should also include a description of the statistical methods employed in the study. Results: This section should be divided into subheadings, so the reader can follow the logic of results development. Discussion: should explain the significance of the results and place them into a broader context. It should not be redundant with the results section.

References should include only articles that are published or in press. Please use the following style for references: References in the text should be numbered consecutively in their order of appearance. "Unpublished observations" and "personal communications" may not be used as references but may be inserted in parentheses in the text. Reference list format is as follows: Zorgani A.M., Salem M.I. and Shaibani R.S. (1995) Libyan dates as management of cancer patients. Nature 98, 342-349. Ramadan, M.A. and Slaiman, M.O. (1992) Structure of cell wall. In: Molecular Biology of the Cell Wall (ed. S.A. Gawas and M. Muhsen) pp. 567-574. Tripoli: Naser Press Ltd.

Use system international (SI) measurements throughout the manuscript. Use generic names of drugs, unless the trade name is directly relevant to the discussion. Acknowledge all illustrations and
tables or long annotation taken from other publications and submit written permission to reprint from the original publishers. Do not use abbreviations in the title or abstract section.

All submissions are initially evaluated by the editorial board. Papers that do not conform to the general format mentioned above will be returned to the authors for reformatting. Papers not accepted before refereed are returned within four weeks of acknowledgment of receipt. Encouraging papers are refereed by two referees in addition to a statistical referee if needed and if not accepted are returned within two weeks. Papers accepted are sent back for revision on the bases of comments received. Authors should give such revision priority and reciprocate with the journal to take a final decision by sending back the revised version and one of them should annotate to show where changes have been made. Also, provide a covering letter indicating detailed responses to reviewer’s comments.

Authors are advised to keep raw data stored up to five years because at any time after publication of a research paper you may be asked to submit these data to the journal. Cover letter statement for transfer of copyright ownership: “In consideration of the National Medical Research Centre taking action in reviewing and editing this submission, the author(s) undersigned hereby transfer(s) all copyright ownership to the Centre in case this work is published by LJMR.”

Signature of all authors in the following format is to be submitted with the manuscript: “I declare that I participated in the design, execution and analysis of the paper by -------- and colleagues entitled ---- and I have seen and approved the final version. I here also declare that I have no conflict of interest in connection with this paper, other than any noted in the covering letter to the editor”. Correspondence should be addressed to the editor-in-chief of Libyan J. Med. Res., www.LJMR.com.ly
Study the prevalence of overweight and obesity among Libyan children in relation to their socioeconomic level status and fast food meals

Fawzi Ammar Elabani and Josef Kure
Masarykova University, Faculty of Medicine, Kamenice 753/5, Bohunice, 625 00 Brno 25, Brno, Czech Republic
Correspondence to f_huria6@yahoocom

Abstract: The highest prevalence rates of childhood obesity have been observed in developed countries, however, its prevalence is increasing in developing countries as well. To assess the prevalence of obesity and overweight among Libyan children aged from 3 to 19 years and to estimate risk factors of obesity and overweight, defined by body mass index (BMI). A retrospective study was carried out in (245) Libyan children (93 males, 152 females) were recruited with age ranging from (3-19yrs), at Tripoli pediatric central hospital-Libya during the 12 months commencing July 2014. The questionnaire including questions related to socioeconomic status, lifestyle (eating habits), anthropometric measurements were performed by trained nutritionist or physical education teachers, Body mass index (BMI) was calculated using the formula: weight (kg)/height(m²). Two hundred and forty five Libyan children participated in this study. Prevalence of overweight and obesity as a whole was higher in girls (26.1%) than boys (19.2%). More details in results with respect to both risk factors Socioeconomic level Status (SELS), and fast food meals were obtained. This study found a relatively high prevalence of overweight and obesity among Libyan children aged 3-19 years, and alarming for both sex. Eating habits like fast food meals remarkable effect on prevalence on overweight and obesity among low to high SELS group. The study also suggested that under nutrition rates remain a problem in children. Therefore special attention has to give for their overall nutrition.

Keywords: Obesity, Overweight, Body Mass Index (BMI), Risk factor

Introduction

Obesity is becoming a worldwide problem affecting all levels of society and is thus being described as a global epidemic [1]. The prevalence of overweight and obesity among children and adolescents has increased significantly in the developed countries during the past two decades [2,3],and similar trends are being observed even in the developing world [3]. The World Health Organization has warned of the escalating epidemic of obesity that could put the population in many countries at risk of developing non-communicable diseases. Available studies in Eastern Mediterranean countries indicate that obesity has reached an alarming level among both children and adults. Consequently, the incidence of non-communicable diseases is also very high, and represents more than 50% of total causes of death [5, 6]. The numerous psychological, physical and economic consequences of obesity are well known.
Childhood obesity affects self-esteem and has negative consequences on the cognitive and social development [7, 8].

Conditions as type 2 diabetes mellitus, hypertension and hypercholesterolemia which were noted primarily in adults, are becoming more common among children with the increase in the prevalence of obesity [9]. Because childhood obesity often persists until adulthood, an increasing number of adults will be at an increased risk of these conditions as well as of cardiovascular disease, osteoarthritis and certain types of cancer [10, 11]. The mechanism of obesity development is not fully understood and it is confirmed that obesity occurs when energy intake exceeds energy expenditure. There are multiple etiologies for this imbalance, hence, the rising prevalence of obesity cannot be addressed by a single etiology. Genetic factors influence the susceptibility of a given child to an obesity conducive environment. However, environmental factors, lifestyle preferences, and cultural environment seem to play major roles in the rising prevalence of obesity worldwide [12, 13]. In a small number of cases, childhood obesity is due to genes such as leptin deficiency or medical causes such as hypothyroidism and growth hormone deficiency or side effects due to drugs (e.g. steroids) [14]. Overall, the obesity epidemic results in a substantial decrease in the quality of life and life expectancy, and it accounts for heavy expenditure in provision of health care [15]. Due to difficulty in the treatment of obesity in adults and the many long-term adverse effects of childhood obesity, prevention of childhood obesity has now been recognized as a public health priority [16].

In many developing countries, the progression of nutritional transition has been detected, characterized by a reduction in the prevalence of nutritional deficiencies and the more expressive occurrence of overweight and obesity not only in the adult population but also among children and adolescents[17]; these characteristics are fundamentally associated with changes in lifestyle and eating habits [15]. Food intake has been associated with obesity not only in terms of the volume of food ingested but also in terms of the composition and quality of diet. Furthermore, eating habits have also changed and current habits include low consumption of fruits, green vegetables, and milk; increasing consumption of snacks, sweets, and soft drinks; and skipping breakfast; these eating habits result in continuous increase in adiposity among children [17]. Eating habits in addition to environmental differentials represent the most dominant determinant in increasing the tendency of overweight and obesity among children [18], and a modification in the eating habits may be singleton tactic strategy to a more appropriate weight control [19]. Childhood obesity is increasingly being observed with the changing lifestyle of families with increased purchasing power, increasing hours of inactivity due to television, video games, and computers, which are replacing outdoor games and other social activities [20]. The objectives of this study were to assess the magnitude of obesity among male and females Libyan children (3-19 years) and to find a possible association between obesity and fast food meals and socioeconomic level status among them.
Materials and methods

A retrospective study was conducted on a sample of Libyan children who attended government hospital (Tripoli pediatric central hospital) in Libya. From out-patients clinic, 245 (93 males and 152 females) subjects were recruited with age ranging from (3-19 years). Children with chronic illness as well as those on corticosteroid therapy or growth hormone replacement therapy and children with chromosomal disorders were excluded. The data were collected in a time period of about 12 months commencing July 2014. All children selected for this study had Libyan nationality, the questionnaire was a face-to-face interview to assess the children’s lifestyle and health status. The questionnaire was filled in the hospital by the assistant, including personal information: age, grade, gender, date of birth, in addition to anthropometric measurements, frequency of eating fast food and socioeconomic status of family.

Researchers took anthropometric measurements, such as weight in kilograms (kg) and height in centimeters (cm), weight and height were taken using standard procedure. All measurements were performed by trained nutritionists or physical education teachers. The anthropometric measurements were conducted according to the Anthropometry Procedures Manual proposed by the National Health and Nutrition Examination Survey 2002 [21]. For measuring weight, each examiner was supplied with weighing scale with height bars attached to it on which weight was measured in kilograms using a standardized procedure (lightly dressed, without shoes). Subjects stood in the center of the scale platform facing the recorder, hands at side, looking straight ahead. The recorder took the measurements to the nearest 0.1 kilograms. Height was measured by stadiometer in centimeters with subjects asked to stand up straight without shoes and with head pointing straight forward. Subjects were asked to remove any accessories such as jewelry and hejab (covering) from the top of the head in order to properly measure stature. Subjects were asked to stand on the floor with the heels of both feet together and the toes pointed slightly outward at approximately a 60º angle. After making sure that the body weight was evenly distributed with both feet flat on the floor, proper heel position, and the buttocks, shoulder blades, and back of the head in contact with the vertical backboard, the recorder, at eye level of the headboard, took the height to the nearest 0.1 centimeter and this values was converted to meters.

Body Mass Index (BMI) variable was calculated using the following formula:

\[ BMI = \frac{Weight\ (kg)}{Height\ (m^2)} \]

The BMI values were calculated for each gender and age. BMI: Calculating body mass index by dividing weight in kg by square height in meters [22].

By plotting BMI against standard percentile for each sex; overweight was defined as BMI more than 85th and less than 95th percentile for age and sex, and obesity was defined as BMI more than 95th percentile for age and sex compared to standard growth charts instructed by National Research Center (2000 CDC BMI-age growth charts). Data was computerized and analyzed using SPSS statistical package.
Results

A total number of (245) subjects with age group between (3-19 years), were screened for their height, weight and body mass index. Out of 245 children 93 (38.0%) were boys and 152 (62.0%) were girls. The BMI were higher in girls than boys, however, these differences were significantly different with respect to gender. Among the 245 subjects, the males were found 8.6%, 19.2%, 5.3% and 4.9% as overweight, obese, normal and underweight respectively. For the females it has been found 31.4%, 26.1%, 3.7%, and 0.8% as overweight, obese, normal and underweight respectively as shown in table 1 and figure 1.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>BMI category</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Under-Weight</td>
<td>Normal</td>
</tr>
<tr>
<td>Gender</td>
<td>Female</td>
<td>2</td>
</tr>
<tr>
<td>% of Total</td>
<td>0.8%</td>
<td>3.7%</td>
</tr>
<tr>
<td>Male</td>
<td>Count</td>
<td>12</td>
</tr>
<tr>
<td>% of Total</td>
<td>4.9%</td>
<td>5.3%</td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td>14</td>
</tr>
<tr>
<td>% of Total</td>
<td>5.7%</td>
<td>9.0%</td>
</tr>
</tbody>
</table>

Table 1: Overweight /obesity of subjects on the basis of gender and BMI categories

Figure 1: Relationship of sex of Libyan children with BMI
Table 2 and figure 2 show the relation between the risk factor (socioeconomic level status), weight category, and their effects on prevalence of overweight and obesity among 3-19 years Libyan children. In this table it has been found that 25.7% (39/152) females classified (categorized) as low standard level, among them 0.7% (1/152), 3.9% (6/152), 14.5% (22/152), and 6.6% (10/152) their weight categories were underweight, normal, overweight, and obese respectively. It has also been observed that 28.9% (44/152) were grouped as middle standard level, among them 0.7% (1/152), 1.3% (2/152), 16.4% (25/152), and 10.5% (16/152) their weight categories were underweight, normal, overweight, and obese respectively. It has also been found that a 45.4% (69/152) grouped as high standard level, among them 0.0% (0/152), 0.7% (1/152), 19.7% (30/152), and 25.0% (38/152) their weight categories were underweight, normal, overweight and obese respectively.

**Table 2: Risk factor (socio-economic level) for weight category / female**

<table>
<thead>
<tr>
<th>Socio-Economic Level</th>
<th>Gender</th>
<th>Weight category</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Under-Weight</td>
<td>Normal</td>
</tr>
<tr>
<td>Low Standard Level</td>
<td>Female</td>
<td>Count</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>% of Total</td>
<td>0.7%</td>
</tr>
<tr>
<td>Middle Standard Level</td>
<td>Female</td>
<td>Count</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>% of Total</td>
<td>0.7%</td>
</tr>
<tr>
<td>High Standard Level</td>
<td>Female</td>
<td>Count</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>% of Total</td>
<td>0.0%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>Count</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>% of Total</td>
<td>1.3%</td>
</tr>
</tbody>
</table>

**Figure 2: Risk factor (socio-economic level) for weight category / female**
Table 3 and figure 3 show that 26.9% (25/93) males classified as low standard level, among them 6.5% (6/93), 5.4% (5/93), 5.4% (5/93), and 9.7% (9/93) their weight categories were underweight, normal, overweight and obese. It has also been found 26.9% (25/93) were grouped as a middle standard level, among them 4.3% (4/93), 4.3% (4/93), 6.5% (6/93) and 11.8% (11/93) their weight categories were underweight, normal, overweight, and obese whereas 46.2% (43/93) grouped as high standard level, among them 2.2% (2/93), 4.3% (4/93), 10.8% (10/93), and 29.0% (27/93) their weight categories were underweight, normal, overweight and obese, respectively.

### Table 3: Risk factor (socio-economic level) for weight category / male

<table>
<thead>
<tr>
<th>Socio-Economic Level</th>
<th>Gender</th>
<th>Weight Category</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Under-Weight</td>
<td>Normal</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Standard Level</td>
<td>Count</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>6.5%</td>
<td>5.4%</td>
</tr>
<tr>
<td>Middle Standard Level</td>
<td>Count</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>4.3%</td>
<td>4.3%</td>
</tr>
<tr>
<td>High Standard Level</td>
<td>Count</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>2.2%</td>
<td>4.3%</td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>12.9%</td>
<td>14.0%</td>
</tr>
</tbody>
</table>

**Figure 3: Risk factor (socio-economic level) for weight category / male**
Table 4 and figure 4 show the relationship between the risk factor (fast food meals), weight category, and their effects on prevalence of overweight and obesity among (3-19 yrs.) female Libyan children. The table demonstrates 13.2% (20/152) females classified (categorized) as do not eat fast food meals, among them 0.7% (1/152), 2.0% (3/152), 6.6% (10/152) and 3.9% (6/152) their weight categories were underweight, normal, overweight and obese respectively. Also, 24.3% (37/152) were grouped (classified) as once/week eating fast food meals, among them 0.0% (0/152), 1.3% (2/152), 15.8% (24/152), and 7.2% (11/152) their weight categories were underweight, normal, overweight, and obese. It has also been found that 62.5% (95/152) grouped as more than once/week eating fast food meals, among them 0.7% (1/152), 2.6% (4/152), 28.3% (43/152), and 30.9% (47/152) their weight categories were underweight, normal, overweight, and obese respectively.

**Table 4: Risk factor (fast food meals) for weight category /female**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Weight category</th>
<th>Count</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Under-Weight</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do not eat Fast Food Meals</td>
<td>1</td>
<td>0.7%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Normal</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>2.0%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Over-Weight</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>6.6%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Obese</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>3.9%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>13.2%</td>
<td></td>
</tr>
<tr>
<td>Once/Week</td>
<td>Count</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>Under-Weight</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>0.0%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Normal</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>1.3%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Over-Weight</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>15.8%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Obese</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>7.2%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>37</td>
<td>24.3%</td>
<td></td>
</tr>
<tr>
<td>More than Once/Week</td>
<td>Count</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>Under-Weight</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>0.7%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Normal</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>2.6%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Over-Weight</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>43</td>
<td>28.3%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Obese</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>47</td>
<td>30.9%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>95</td>
<td>62.5%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>1.3%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>5.9%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>77</td>
<td>50.7%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>64</td>
<td>42.1%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>152</td>
<td>100.0%</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 4: Risk factor (fast food meals) for weight category / female**
Table 5 and figure 5 shows that 16.1% (15/93) males classified as do not eat fast food meals, among them 2.2% (2/93), 5.4% (5/93), 4.3% (4/93), and 4.3% (4/93) their weight categories were underweight, normal, overweight, and obese. Also 22.6% (21/93) were classified (grouped) as once/week eating fast food meals, among them 4.3% (4/93), 2.2% (2/93), 7.5% (7/93) and 8.6% (8/93) their weight categories were underweight, normal, overweight, and obese respectively. It has also been found that a 61.3% (57/93) grouped as more than once/week eating fast food meals, among them 6.5% (6/93), 6.5% (6/93), 10.8% (10/93), and 37.6% (35/93) their weight categories were underweight, normal, overweight, and obese respectively.

Table 5: Risk factor (fast food meals) for weight category / male

<table>
<thead>
<tr>
<th>Gender</th>
<th>Weight Category</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Under-Weight</td>
<td>Normal</td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do not eat</td>
<td>Count</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>2.2%</td>
</tr>
<tr>
<td>Once/Week</td>
<td>Count</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>4.3%</td>
</tr>
<tr>
<td>More than Once/Week</td>
<td>Count</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>6.5%</td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>12.9%</td>
</tr>
</tbody>
</table>

Figure 5: Risk factor (fast food meals) for weight category / male
Discussion

Economic development of State of Libya during the last 3 decades has changed the nutritional and lifestyle habits, food has become more affordable to a larger number of people with the substantial decrease in the price relative to income, and the concept of food has changed from a means of nourishment to a determinant of lifestyle and a source of pleasure, coupled with physical inactivity have likely contributed to the increase in the prevalence of overweight and obesity in the children. As observed in the results, especially tables 2, 3, 4, and 5 prevalence of overweight and obesity increases as risk factors (SELS and Fast food meals) increases among males and females, this means that in lower income countries like Libya, peoples with higher socioeconomic level status were more likely to be obese, this is because the higher SELS group consuming high calories foods and avoiding physical tough tasks. An important finding of this study is an ever burgeoning prevalence of obesity among the Libyan children. This study has shown higher figures which is suggestive of the obesity epidemic in 21st century. The prevalence of overweight and obesity was significantly higher among girls in the present study, which is comparable with figures reported for other developing countries [23, 24].

Gillis and Bar [25] reported that obese children and adolescents consume significantly more servings of meat and alternatives, grain products, fast foods, sweetened soft drinks and potato chips, which contribute to increased deposition of calories, fat and sugar intake than that in no obese children and adolescents. Similar studies [26, 27] have reported that overweight and obese children consumed more fats and less vegetables, fruits, legumes and dairy products.

Our study reported a significant difference between obese and overweight children and the lean children with regard to the frequency of consumption of fast food. A clear socioeconomic gradient in the prevalence of overweight and obesity was observed in the present study, which is consistent with those earlier studies who reported that BMI is influenced by different SES backgrounds [28]. The finding of present study showed significantly positive correlation between BMI and excessive food consumption. This agrees with a study done by Thompson et al. [29] where they reported that the frequency of eating quick food was positively associated with BMI z-score in their longitudinal study among girls at Massachusetts institute of technology. Present study focused their analysis on type of diet (junk food, frequency of eating pattern etc. because that they have special role in obesity. The dietary indulgence in high fatty foods intake and sedentary life styles in the high socioeconomic group are well known causes for overweight and obesity. This study has thus highlighted the need to not only improve the awareness on prevention of obesity among children but a need to motivate and reinforce them to practice healthy lifestyle is utmost essential.

In conclusion: The combined prevalence of overweight and obesity among both sex of Libyan children is increasing and is comparable to that found in the developed countries. Less healthy dietary habits, poor
selection of food and socioeconomic status may be associated with the problem of obesity and overweight among the Libyan children. The study also suggested that under nutrition rates remain a problem in children, therefore special attention has to be given for their overall nutrition. Increased awareness about childhood overweight/obesity through publications and symposia for parents is important.

References

Simulation of SAR and temperature distributions in 3D model of the human head exposed to mobile phone radiation at 900 MHz

Mohamed T. Saeid¹, Farag M. Ali¹ and Ahmed E. Mohamed²
Departments of ¹Optometry, Faculty of Medical Technology, Surman and ²Environmental Engineering, Sabratha, Faculty of Engineering, University of Zawia, Zawia, Libya

Abstract: In this study, using the finite element method via comsol multiphysics software package, specific absorption rate (SAR) distributions and temperature increase are simulated in 3D human head model exposed to the field radiated from cellular phone which consists of square patch antenna. Both Maxwell and bioheat equations with suitable boundary conditions are solved to find SAR and temperature distributions. The maximum log scale of SAR calculated was of the 0.6 while the maximum temperature increase was 0.3 °C for 900 MHz from the antenna.

Introduction

As a result of the significant increase in portable phones use in recent years it has become the subject of research and studies. These studies indicated a potential health hazards owing to the absorption of radio frequency (RF) radiation emitted by portable telephones. RF waves emitted by these mobiles have been linked to brain cancer, salivary gland tumors, behavioral problems, and migraines. These risks have been shown to be higher in people who have used cell phones for at least ten years [1]. However, studies on brain cancer cast doubt on these results since it is difficult to accurately assess risk factors in humans [2].

It is broadly accepted that mobile phones cause heating of the human organ exposed to their radiation and specifically the human head. The current exposure limits are based on Specific Absorption Rate (SAR) of the exposure heat. The SAR parameter has been widely used to determine the possibility of health hazards in the human head because of radio frequency (RF) radiation [3, 4]. A SAR limit of 2W/kg averaged over any contiguous 10 g head tissue was recommended by the Council of European Union [5] for the general public. Some significant thermal damage can occur in sensitive organs under conditions of partial body exposure to RF electromagnetic waves. Mobile phones are electromagnetic radiation devices, which may be harmful to human health from their radiation. Thus, it is interesting to analyze the heat transfer in the human head due to electromagnetic wave exposures. In accordance with the development of the computer and numerical analysis techniques, an anatomical human head model can be incorporated into simulated studies. Recently, the modeling of heat transport in human tissue has been investigated. Pennes bioheat equation, introduced by Pennes [6] based on the heat diffusion equation, is frequently used for analysis of heat transfer in human tissues. In respect to the electric field and SAR distribution. Nevertheless, they have not
been considering heat transfer in their model during exposure to electromagnetic fields. That leads to an incomplete analysis. Therefore, to approach reality, modeling of this work, it prefers a real link between the heat transfer and electromagnetic radiation. Therefore, in order to provide information on levels of exposure and health effects from mobile phone radiation, it is important to simulate both electromagnetic field and heat transfer within an anatomically based human head model to represent actual processes of heat transfer within the human head. In this study, a three-dimensional human head model was used to simulate the SAR distribution and the temperature distribution over the human head. The 900 MHz frequency was chosen for the simulations in this study, as it is used frequently in the areas of cell phone usage.

Methods and models

The human head geometry is the same geometry (SAM Phantom) provided by IEEE, IEC, and CENELEC from their standard specification of SAR value measurements. Geometrical data file was created from a magnetic-resonance image (MRI) of a human head; these images contain 109 slices, each with 256-by-256 voxels (7). The model comprises four types of tissue including skin, fat, skull, and brain. These tissues have different dielectric and thermal properties (8, 9). Finite element method (FEM) via COMSOL™ MULTIPHYSICS version 5.1 carries out this study. In this study, a square patch antenna is considered as a source of electromagnetic radiations and is placed at the left side of the head model at a distance of one cm. Figure 1 shows a three-dimensional finite element mesh of the human head model exposed to radiations from a mobile phone which consists of square patch antenna.

Mathematical modeling

**Governing equation of electromagnetic wave propagation:** Mathematical models are developed to predict the electric field and SAR with relation to temperature gradients within the human head. The electromagnetic wave propagation in a
human head is calculated using Maxwell’s equations [10, 11]. The general form of Maxwell’s equations is simplified to illustrate the electromagnetic field penetrated in human head as the following equation:

$$\nabla \times \frac{1}{\mu_r} \nabla \times E - k_0^2 \varepsilon_r E = 0 \quad \text{………………………………………………. (1)}$$

where $E$ is electric field intensity (V/m), $\mu_r$ is relative magnetic permeability, $\varepsilon_r$ is relative dielectric constant, and $k_0$ is the free space wave number ($\text{m}^{-1}$).

**Boundary condition of wave propagation:**
As the electromagnetic energy is emitted from the patch antenna and interact with the human head with a particular radiated power, the lumped port is used to define a voltage drop in microstrip patch antenna. Therefore, the boundary condition for solving electromagnetic wave propagation, is described as shown in Figure 2.

$$n \times (\nabla \times E) - jk n \times (E \times n) = -n \times (E_o \times jk(n - k)\exp(-jk \cdot r))$$

$$n \times (k \nabla T) = 0$$

$$n \times (E_1 - E_2)$$

$$n \times E = 0$$

$$n \times (k_u \nabla T_u - k_d \nabla T_d) = 0$$

$$Z_{in} = \frac{V_1}{I_1} = \frac{E_1 l_1}{I_1} \quad \text{…………………………………………….……………….(2)}$$

Where $Z_{in}$ is the input impedance ($\Omega$), $V_1$ is the voltage along the edges (V), $I_1$ is the electric current magnitude (A), $E_1$ is the electric field along the source edge (V/m), and $l_1$ is the edge length (m). The perfect-electric-conductor boundary condition along the patches on the antenna is considered

$$n \times E = 0 \quad \text{……………………………………………………………………… (3)}$$

Boundary conditions along the interfaces between different mediums, for example, between air and tissue or tissue and tissue, are considered as continuity boundary conditions

$$n \times (E_1 - E_2) \quad \text{……………………………………………………………………… (4)}$$
The outer sides of the calculated domain, i.e., free space, are considered as scattering boundary conditions [10]

\[ n \times (\nabla \times E) - jkn \times (E \times n) = -n \times (E_0 \times jk(n - k)\exp(-jk\cdot r)) \]  .. (5)

where \( k \) is the wave number (m\(^{-1}\)), \( \sigma \) is the electric conductivity (S/m), \( n \) is the normal vector, \( j = \sqrt{-1} \) and \( E_0 \) is the incident plane wave (V/m).

**Equation of heat transfer:** The temperature distribution within the human head is obtained by solving Pennes’ bioheat equation [10,12], the equation can be written as

\[ \frac{\rho}{\partial t} = \nabla \cdot (k\nabla T) + \rho_b C_b \omega_b (T_b - T) + Q_{\text{met}} + Q_{\text{ext}} \]  .. (6)

where \( \rho \) is the tissue density (kg/m\(^3\)), \( C \) is the heat capacity of tissue (J/kg K), \( k \) is the thermal conductivity of tissue (W/m K), \( T \) is the tissue temperature (°C), \( T_b \) is the temperature of blood (°C), \( \rho_b \) is the density of blood (kg/m ), \( C_b \) is the heat capacity of blood(3960 J/kg K), \( \omega_b \) is the blood perfusion rate (1/s), \( Q_{\text{met}} \) is the metabolism heat source (W/m\(^3\)), and \( Q_{\text{ext}} \) is the external heat source(electromagnetic heat-source density) (W/m ). The heat conduction between tissue and blood flow is approximated by the blood perfusion term, \( \rho_b C_b \omega_b (T_b - T) \). The external heat source term is equal to the resistive heat generated by the electromagnetic field (electromagnetic power absorbed), which is defined as [10].

\[ Q_{\text{ext}} = \frac{1}{2} \sigma_{\text{tissue}} |E|^2 = \frac{\rho}{2} \cdot \text{SAR} \]  .. (7)

Where \( \sigma_{\text{tissue}} = 2\pi f\varepsilon_r\varepsilon_0 \). Where SAR is the energy of electromagnetic wave propagation absorbed by the tissue. The specific absorption rate is defined as power dissipation rate normalized by material density [10, 13]. The specific absorption rate is given by

\[ \text{SAR} = \frac{\sigma}{\rho} |E|^2 \]  .. (8)

**Boundary condition of heat transfer:** Heat transfer is considered only in the human head, which does not include parts of the surrounding space. As shown in Fig. 2, the outer surface of the human head corresponding to assumption (3) is considered to be a thermally insulated boundary condition

\[ n \cdot (k \nabla T) = 0 \]  .. (9)

It is assumed that no contact resistant occurs between the internal organs of the human head. Therefore, the internal boundaries are assumed to be a continuous

\[ n \cdot (k_u \nabla T_u - k_d \nabla T_d) = 0 \]  .. (10)

**Results and discussion**

In this study, the mathematical model of bio heat transfer and electromagnetic wave propagation performed for a mobile phone consisting of a patch antenna radiating maximum 1W power at 900 MHz.. For the simulation, the dielectric and thermal properties are directly taken from [8, 9], respectively. The exposed radiated power used in this study refers to ICNIRPstandard for safety level at the maximum SAR value of 2 W/kg [20].
**SAR Distribution:** The results of the simulations performed with COMSOL™ MULTIPHYSICS are shown in Figs. 3-5. It has been shown in Fig. 3, the maximum amount of SAR locates on the ear region and also it has the value of (0.603-0.654) W/kg. It is obvious that the regions near the antenna have the largest SAR values and by keeping away from these regions the SAR values diminish. Figure (4) show the distributions of the local SAR, at the y=0 plane; in xz plane in (W/kg), on the human head. It is evident from these results that the dielectric properties, [8, 9], become significant to SAR distributions in human tissue when electromagnetic energy is exposed in these tissues. The magnitude of dielectric properties in each tissue will directly affect the amount of SAR within the human head. Comparing these results to the ICNIRP limit of SAR value (2W/kg), one sees that the resulting SAR from this study does not exceed the limit value.

Temperature distribution: Electromagnetic wave propagation and unsteady bioheat transfer are coupled together to study the heat transfer within the human head. Due to these coupled effects, the electric field distribution in the head is converted into heat by absorption of the tissues. Simulations to obtain the temperature distributions using 900 MHz are depicted in Figures 6-8.
The temperature is highest closest to the antenna. The maximum temperature increase from 37 °C is approximately 0.3 °C, and drops rapidly inside the head. The obtained results confirm the importance of performing a thermal analysis together with the dosimetric one. SAR levels in the tissues are less than the safety limit recommendations [3, 5, 15]. However, it is found that the induced temperature elevation in the brain, in all the examined conditions, never exceeds 0.4 °C. The obtained results were very close to those presented in the literature using more sophisticated models [10, 12].

References

Estimated Risk of Radiation from Cardiac Nuclear Medicine Imaging
Mohamed A. Ejoumaal$^1$ and Mona Koshlaf$^2$

$^1$Department of Biomedical Engineering, Libyan academy, Tripoli and $^2$National medical research center, Zawia, Libya

Correspondence to m.amer@alacademia.edu.ly

Abstract: in light of the rapidly increasing frequency of cardiac nuclear medicine examinations and as a part of a nationwide survey to estimate patient exposure to radiation from diagnostic nuclear medicine at Tripoli Medical Center. The purpose of our study was to assess the effective dose and cancer risks attributable to radiation from heart scanning. Organ effective doses and cancer risk factor for males and females as a function of different doses for three hundred cases for different cardiac protocols (rest and stress) using $^{99m}$Tc-SistaMIBI were estimated by using RADAR and Olinda software package. The results indicate that the collective effective dose for the female and male cases were 15.35 human-Sv, 12.23 human-Sv respectively, while the effective dose and cancer risk factor were:20.2mSv, 10.1 and 19.23 mSv, 9.23 respectively.

Keywords: Nuclear medicine, cancer, cardiac, sistMIBI, RADAR, effective dose.

Introduction

Several different radiopharmaceuticals have been used in recent years for cardiac imaging in nuclear medicine. The dosimetry (i.e., published doses) of these agents may be quite different, and dosimetry issues for several of these agents have generated some confusion and concern. Here the technical basis for the dose estimates for various agents used in nuclear cardiology is described and differences in the dosimetry of the agents are discussed. Product package inserts, limited dose compendia, and other sources sometimes have presented conflicting and confusing information about the dosimetry of these agents. Practitioners sometimes have expressed concern about how differences in radiation dosimetry may affect the choice of a radiopharmaceutical. The dosimetry (organ absorbed doses and effective doses) of radiopharmaceuticals currently used in nuclear cardiology is reviewed, and uncertainties in the dose estimates are discussed. Relative radiation risks for these radio-pharmaceuticals also are discussed. The principal motivation for this effort was to address questions from nuclear cardiologists about whether a particular radiopharmaceutical is preferred over another on the basis of their respective radiation risks. In addition, I describe an analysis demonstrating that the differences in most radiation dose estimates for the agents in question are small compared with the absolute uncertainties of these estimates. The use of risk models in evaluating the radiation risks of diagnostic studies also is briefly discussed. In the absence of universally accepted standard son cardiac radiopharmaceuticulad ministered doses, practivevaries widely across Nuclear medicine center in Tripoli. To obtain objective data regarding the effective dose and radiation risk factor on such variations, we surveyed mainly Tripoli medical center where most of nuclear medicine diagnosis are performed.

Materials and methods

Tc-Mo generator with total activity 500 m Ci was imported regularly from France from
Biosis company, pharmaceutical kits (Methoxyisobutylisonitrile MIBI) from the same source. The imaging tool was dual head gamma camera from Philips company, the full description and pacifications mentioned below. The dual head skylight gamma camera was installed at T.M.C on (26/9/2006). The Sky light Dual Head gamma camera features two detector heads, each consisting of remove able Low Energy High Resolution (LEHR) collimator, a NaI (TI) (sodium iodide doped with thallium) scintillation crystal, a light guide and an array of 55 photo multiplier tubes PMTs). The LEHR collimate or features parallel holes (2.45 cm height, 0.16 mm septal thickness) with hexagonal cells of 1.11 mm diameter and issued with low energy sources such as $^{99m}$Tc. The NaI (TI) scintillating crystal was a 9.5 mm thickness single planar crystal with a light yield of about 40000 photons per MeV of deposited energy and an emission spectrum peaked at 415 nm. The sky light gamma camera has resolution of approximate 5 mm (intrinsic resolution), the standards of ware provides filtered back projection (FBP) (OSEM) (Internal). This dissertation was conducted specifically on this camera. Sky light camera canals have ability to image wide variety of patient son many types of bed sin variety of positions, there will also behigh through put capability with fully automate acquisition work flow for all procedure types, and dual planar simulate eosin mating of two patient son one system. Sky light cameras unique architecture allows gamma detectors to be mounted directly into room's structure; creating gantry- free or” open floor” design by removing the limitations associated with conventional floor-mounted systems, Sky light can image awed orange of patient son many types of bed sin variety of positions.

Sky light camera allows clinicians to image two different patients simulate oily, off erring unparalled efficiency gains for busy image Nuclear Medicine departments.

**Patient data and preparations:** This study included data from 379 cases (187 male,192 female; age range 35-72 years, mean: 42 years) that were referred from different cardiology departments in Libya to Tripoli Medical Center for nuclear medicine scan. Different can protocols have performed (rest and stress) for the above mentioned cases, the full procedures for each scan will be mentioned bellow in details.

**$^{99m}$Tc-sestamibi**

Myocardial Perfusion Imaging with $^{99m}$Tc Labeled Radiopharmaceuticals (Sestamibi) Two-Day Protocol. Two-day protocols are best in terms of taking advantage of the physical properties, pharmacokinetics, and acquisition, processing, and display parameters of $^{99m}$Tc-labeled agents. Typical doses for 1- and 2-d protocols are shown in Table 3. The advantages of 2-d protocols are as follows: flexibility of scheduling stress–rest imaging; better patient flow; ability to image obese patients; higher dose; better gated rest–stress imaging; no cross talk or cross contamination; optimal defect contrast with minimal background activity; elimination of day 2 study if stress study is normal; and high accuracy for detecting coronary artery disease in patients with a low likelihood of coronary artery disease. The disadvantages of 2-d protocols are as follows: the need for 2 d; inconvenience for patients; delay in diagnosis; and camera time relative to that used for dual-isotope simultaneous acquisition, which is not recommended because of energy window cross talk. Imaging Protocol for $^{99m}$Tc-Labeled Agents. For stress imaging, 555 MBq–1.11 GBq (15-30 mCi) is injected at peak exercise. Gated SPECT is performed from 15 min to2 h after injection, preferably within 15-30 min, to
maximize stress myocardial defect contrast and minimize hepatobiliary and gastrointestinal interference. For rest imaging, 555 MBq–1.11 GBq (15–30 mCi) is injected at rest. Gated SPECT is performed within 45–60 min after injection. A 60 min delay is optimal for adequate hepatobiliary clearance of the radiotracer. Imaging too soon after injection will result in increased residual liver activity and increased counts in the adjacent inferior wall because of scatter and scaling. Waiting too long will decrease total myocardial count density and increase gastrointestinal interference. The optimal imaging window is when radiotracer activity has cleared from the liver and not concentrated in the gastrointestinal tract, that is, loops of bowel and the stomach (retrograde flow). In the event that there is a significant splanchnic or bowel overlap with the inferior wall, various maneuvers, such as drinking water or milk or eating fatty food, can be tried to alleviate the problem before repeating delayed imaging. One-Day Rest–Stress or Stress–Rest Protocol Performed with Sestamibi . The rest–stress sequence is significantly better than the stress–rest sequence in terms of detecting the reversibility of stress-induced perfusion deficits. With the stress–rest sequence, the rest activity obscures some of the stress defect, resulting in the degradation of image contrast and a reduction in the detection of true reversibility. With the rest–stress sequence, there is a greater difference in counts between normal and abnormal areas of the myocardium on stress images. This difference results in better normalization of the abnormality on rest images. A 3- to 4-h delay between rest imaging and stress imaging allows radioactivity to decay by 29%–37%, thereby providing better image contrast (7 - 9). However, the American Society of Nuclear Cardiology guidelines (10) offer the option to proceed immediately from rest imaging to stress imaging during a 1-d protocol as long as the higher dose is 3.5–4.0 times the lower dose. Images from a 2-d protocol and images from a 1-d (rest-stress) protocol are shown in Figure 1. Both studies are normal. The studies were obtained with the same camera. The images from the studies are very comparable in features and quality.
Figure 1: (a) Images obtained with 2-d $^{99m}$Tc-sestamibi protocol. Findings are normal.
(b) Images obtained with 1-d $^{99m}$Tc-sestamibi protocol. Findings are normal.
Table1: Injected doses for some female and male patients for cardiac scan with $^{99m}$Tc-SESTAMIBI

<table>
<thead>
<tr>
<th>sex</th>
<th>age</th>
<th>Weight(kg)</th>
<th>Dose in stress (mCi)</th>
<th>Dose in rest (mCi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>73</td>
<td>109</td>
<td>35</td>
<td>30</td>
</tr>
<tr>
<td>F</td>
<td>57</td>
<td>77</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>F</td>
<td>56</td>
<td>82</td>
<td>25</td>
<td>30</td>
</tr>
<tr>
<td>F</td>
<td>72</td>
<td>75</td>
<td>15</td>
<td>38</td>
</tr>
<tr>
<td>F</td>
<td>60</td>
<td>49</td>
<td>13</td>
<td>38</td>
</tr>
<tr>
<td>F</td>
<td>65</td>
<td>97</td>
<td>13</td>
<td>30</td>
</tr>
<tr>
<td>F</td>
<td>44</td>
<td>85</td>
<td>16</td>
<td>25</td>
</tr>
<tr>
<td>F</td>
<td>66</td>
<td>76</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>F</td>
<td>50</td>
<td>55</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>F</td>
<td>80</td>
<td>75</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>F</td>
<td>47</td>
<td>76</td>
<td>15</td>
<td>39</td>
</tr>
<tr>
<td>F</td>
<td>68</td>
<td>79</td>
<td>13</td>
<td>30</td>
</tr>
<tr>
<td>F</td>
<td>79</td>
<td>79</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>F</td>
<td>35</td>
<td>76</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>M</td>
<td>58</td>
<td>103</td>
<td>30</td>
<td>15</td>
</tr>
<tr>
<td>M</td>
<td>57</td>
<td>73</td>
<td>30</td>
<td>16</td>
</tr>
<tr>
<td>M</td>
<td>42</td>
<td>86</td>
<td>35</td>
<td>12</td>
</tr>
<tr>
<td>M</td>
<td>44</td>
<td>77</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>M</td>
<td>49</td>
<td>75</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>M</td>
<td>49</td>
<td>76</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>M</td>
<td>49</td>
<td>75</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>M</td>
<td>55</td>
<td>105</td>
<td>33</td>
<td>30</td>
</tr>
<tr>
<td>M</td>
<td>51</td>
<td>49.5</td>
<td>16</td>
<td>35</td>
</tr>
</tbody>
</table>

Software used

OLINDA (Vanderbilt University, 2003) perform internal dose calculations, principally for radiopharmaceuticals, using the RADAR method of dose calculations and RADAR dose factors. RADA Ris the Radiation Dose Assessment Resource, which his a working group that maintains resources for internal and external dose calculations, but also in a number of open literature publications. The Organ Level Internal Dose Assess men code, OLINDA, implements the dose factors from the RADAR web site in a code that permits users to enter kinetic at a for radiopharmaceuticals (or fit them from time-activity data). A number of models are provided, established by various authors in the literature.

Results and discussion

Figure 1.1 shows the relationship between the injected dose (mCi) and effective do seinfemale cardiac scanning using Sistamibi
labeled with $^{99m}$Tc for different age groups. Figure 1.2 shows the relation between the injected dose and risk factor for the same group of female patients. The trend shows linear or relation between effective dose and risk factor for different age groups. The results also indicate the same trend between injected dose and risk factor. Its of ten the case that an increase in injected dose will improve the image quality at the expense of higher effective dose and consequently higher risk factor swell. Conversely, when the injected dose is reduced as shown in Figures 1.1 and 1.2, the effective dose and risk factor will decrease dramatically.

**Figure 1.1**: Relationship between Injected dose and effective dose in female cardiac patients scanned with $^{99m}$Tc-Sistamibi

**Figure 1.2**: Relationship between injected dose and risk factor percentage per 10000 cases in female cardiac patients scanned with $^{99m}$Tc-Sistamibi
These potential risks of low-dose radiation must be weighed against the benefits of cardiac imaging. For this discussion, we will focus on single-photon emission computed tomography (SPECT) because it has the most substantial evidence base among the high-dose, rapid-growth cardiac imaging modalities. Conceivable benefits of cardiac imaging include correct diagnosis, accurate prognostication, and improvement of patient outcomes. Such outcomes could include appropriate refocus on therapeutic cardiac diagnoses (e.g., in patients with chest pain and normal SPECT studies), improved quality of life (e.g., attributable to relief of chest pain), and improved survival. Patients with high risk of disability and death from cardiovascular disease have the greatest potential absolute gain from appropriate diagnosis and management. This risk varies with age, cardiovascular risk factors, symptoms, and previous evidence of coronary artery disease (CAD) (i.e., myocardial infarction or revascularization) (11, 12). In symptomatic patients, the ability of stress (either exercise or pharmacologic) SPECT myocardial perfusion imaging (MPI) to diagnose potentially treatable coronary artery disease is well established. For example, in patients who have uninterruptable baseline electro-cardiograms as the result of pre-excitation or left bundle branch block, there is a class I recommendation for SPECT MPI (evidence and/or general agreement that the procedure is beneficial, useful and effective) in the American College of Cardiology Foundation (ACCF) /American Heart Association (AHA) Guidelines for the management of chronic stable angina. The use of SPECT MPI also can help establish the prognosis of patients with CAD. For example, the risk of cardiac death or myocardial infarction increases as the overall size of myocardial perfusion defects on SPECT MPI increases and left ventricular ejection fraction (which can be determined from gated images) decreases (13). The ACCF/AHA guidelines include several class I indications for the use of SPECT MPI for risk stratification (14). However, the detection of diagnosis or prognosis does not necessarily imply improved outcomes inters of patient survival, except in certain subgroups of patients. A potential survival benefit conveyed by cardiac imaging is very relevant to our discussion because it must be balanced against the projected risk of reduced longevity from cancer. Although some radiation-related cancers (leukemia, thyroid cancer, bone cancer) can have short latency periods of 2 to 5 years, most solid cancers have latency periods of 10 to 40 years.

In comparison, approximately one-half of patients with 3-vessel CAD and abnormal left ventricular function will die within 5 years with medical therapy. Because these patients would not otherwise survive the latency period of a radiation-induced cancer, cardiac imaging with ionizing radiation can be used to identify these patients and thereby improve their management and longevity. The probabilities of either adverse outcome will vary greatly for septic clinical scenarios, but in the short-term (e.g., 5 years) the risk from CAD is generally far greater than the risk from radiation induced cancer.

In conclusion, Radiation dose estimates for radiopharmaceuticals used in nuclear cardiology may vary, depending on the source of data used in their generation. Uncertainties in applying dose estimates to individual subjects or populations are considerable because of the use of standardized biogenetic and anatomic.
models. Considerations such as diagnostic accuracy, ease of use, image quality, and patient comfort and convenience should generally dictate the choice of radiopharmaceutical, with radiation dose being only a secondary or even a tertiary consideration. Counseling of nuclear medicine patients who may be concerned about exposure should include a reasonable estimate of the median dose for the type of examination and administered activity of the radiopharmaceutical; in addition, it should be explained that the theoretic risks of the procedure are orders of magnitude lower than the actual benefits of the examination.
References

1. Sjoreen AL (1994) Reconstruction of the RADRISK Database, Oak Ridge National Laboratory, Oak Ridge, TN.
A comparative efficacy of fluconazole to itraconazole in treatment of pityriasis versicolor

Nasruddin E. El-Reyani*, Huda D. Abuhjar1, Huwaida D. Abuhjar1, Mahran J. Tarabi2 and Bashir M. Al-Zandah2
1Department of Pharmacology and Clinical Pharmacy, Faculty of Pharmacy, University of Tripoli and
2Department of Dermatology, Tripoli Medical Centre, Tripoli, Libya
*Correspondence to N.ElReyani@uot.edu.ly

Abstract: Pityriasis versicolor is a benign superficial fungal infection. Topical drugs are often effective in treatment of limited lesions while in extensive case systemic drugs are more suitable. The new oral antifungal drugs triazole, itraconazole and fluconazole showed remarkable promising results at different dose schedules. This study was aimed to compare the efficacy and safety of two oral antifungal drugs; fluconazole and itraconazole on the progression of Pityriasis Versicolor after two and four week’s interval. Sixty patients with extensive Pityriasis Versicolor were assigned for treatment with either two doses of 300 mg fluconazole once weekly for two weeks (FTP), a single dose of 400 mg of itraconazole (ITP 1) and two doses of 400 mg itraconazole with one week interval for two weeks (ITP 2, n = 20 patients each group). All patients were clinically investigated by wood’s lamp and mycologically by 10% potassium hydroxide. Four weeks after treatment the improvement rate and side effects were evaluated. Our results showed that 83.3%, 41.2%, and 52.6% of respectively pretreated FTP, ITP1 and ITP2 groups were significantly became wood’s lamp and potassium hydroxide negative at the end of four weeks. In addition, fluconazole was found more complied by Pityriasis Versicolor infected patients compared to itraconazole treated patients. The present findings showed that fluconazole is clinically preferred than itraconazole in cure of Pityriasis Versicolor.

Keywords: Pityriasis Versicolor, fluconazole, itraconazole, wood's lamp

Introduction

Skin disorders are worldwide health problem that represent a group of exhausted diseases with different causes. A fungal infection, in particular Pityriasis Versicolor (PV), is one of these disorders that have a special concern on patient’s satisfaction. In the tropics and temperate climates, it representing a common superficial fungal skin infection caused by lipophilic fungi of the Malassezia type. The three kinds most commonly related to this disease are: M. furfur, M. globosa and M. sympodialis (1-3). It has been reported that PV infected all age groups with peak age-specific prevalence is among young adults of 20 - 40 years old (4). PV disease usually appears as hypopigmented or hyper-pigmented slightly scaling macules limited to the upper trunk and neck (5, 6). Studies have indicated that PV treatment is sought only for cosmetic reasons. As spontaneous improvement is mostly uncommon the majority of patients require further treatment. In general, treatment is simple but relapse is a common problem. Clinical studies have indicated that topical treatment, ranging from selenium sulphide to imidazoles,
were effective in managing PV but found time consuming, messy and inadequate especially for large areas (7). Orally, ketoconazole was the first antifungal drug used in treatment of PV, but its use was limited due to its hepatic toxicity and possible endocrine effects. Newer triazoles like itraconazole and fluconazole have improved the treatment of PV. The advantages are their safety, better cure rate and infrequent relapses (8). Furthermore, itraconazole solution form and capsule permits its usage in various regimens and dosage (9, 10). As the drug achieves higher concentrations in the stratum corneum and persists for 3 - 4 weeks after discontinuation of therapy single-dose regimen was found remarkably effective (11, 12). In addition, in plasma itraconazole was found with an approximately equal concentration of its biologically active metabolite hydroxyl itraconazole (10, 13). Whereas, fluconazole concentration was 10 times higher than the concentration in the stratum corneum and persists for about two weeks. So it is expected to be effective in similar fashion with a single dose (14). Moreover, it is readily diffuses into body fluids with significant first pass metabolism (15). Therefore, the present study was aimed to clinically compare the efficacy and safety of fluconazole versus itraconazole, administered orally, in the treatment of PV.

Materials and methods

Patients: a multicenter designed study for PV patients was performed. Three main hospitals, at Tripoli city, were selected to incorporate patients with confirmed diagnosis of PV and only those patients with extensive lesions of PV were eligible in the study. Accordingly, sixty patients of either sex and with an average age of 29.1 ± 8.3 years were randomly recruited. Patients were requested to follow-up for four weeks. The main point of the study was to measure the drug effectiveness at different dose regimens. The patients were divided into three groups (n = 20 patients per group). The first served for fluconazole and represented fluconazole treated patients (FTP), the second served for itraconazole with a single dose and represented itraconazole treated patients (ITP1), and the third group was served the itraconazole with two dose-regimens, itraconazole treated patients (ITP2).

Dose regimen: after a verbal consent of the enrolled patients in this study the following regimen was designed. For FTP group, the patients were asked to take their medication in a range of two doses of 300 mg/week for two consecutive weeks. ITP1 participants were asked to take their medication as a single dose of 400 mg for one week. ITP2 were treated by two doses of 400 mg of itraconazole once weekly for two weeks. None of the regimens designed for these patients was set for pulse therapy.

Exclusion criteria: patients were excluded from the study if were on multiple therapies for more than one disease, those with systemic mycosis, those with history of hepatic and renal diseases, pregnant and lactating mother and those patients on systemic steroids, anti-mitotic and immunosuppressive drugs. Moreover, patients are excluded if had receive any topical or systemic antifungal therapy for at least two months prior to the study. Consequently, two patients from FTP group (10%), three patients from ITP1 group (15%) and one patient (5%) from ITP2 group were excluded from the study.

Patient examination: after detailed history was taken from each patient, clinical examination and investigation using wood’s lamp were done
at first visit and rechecked weekly for four consecutive weeks. At baseline investigation, skin scraping for potassium hydroxide (10%) examination was taken from the lesions to confirm the diagnosis and continued to be reinvestigated to the end of the study. Routin investigation on baseline haemogram parameters including complete blood picture and liver and renal function tests were done in all patients and repeated weekly throughout the study. Variable parameters for clinical evaluation were presence of itching, scaling and over pigmentation and drug side-effects if any were noted. Irrespective to residual dyschromia patients who became KOH negative were considered to be cured.

**Statistical analysis:** The differences between and within treatment groups were analyzed by means of analysis of variance ANOVA followed by *post hoc* Tukey’s test. Values are presented as mean (±SD). All analyses were performed with SPSS for Windows version 20.0 (IBM SPSS Inc., Chicago, IL, USA). Differences were considered to be significant at *P* < 0.05.

**Results**

Four weeks before starting treatments all patients (100%) were arrived to hospitals with skin scaling. Among patients treated with fluconazole, nine patients showed 50% reduction in scaling compared to baseline observation (Fig. 1). After four weeks of fluconazole therapy 15 patients displayed significant disappearance in scaling by 83.3% (*P* < 0.05) compared to day zero. ITP groups, ITP1 (eight patients) and ITP2 (seven patients), showed remarkable reduction in scaling by respectively 41.2% and 37% compared to baseline remarks. After four weeks 10 patients (52.6%) showed significant reduction in scaling compared to baseline records (*P* < 0.05, Fig. 1).

**Figure 1:** Effects of fluconazole and itraconazole treatment (single dose or two doses) in reduction of scales. Numbers indicates percentage reduction, *P* < 0.05.

FTP = Fluconazole treated patients (300 mg), ITP 1 = Itraconazole treated patients (group 1, single dose 400 mg), ITP 2 = Itraconazole treated patients (group 2, two doses 400 mg).
In addition, all patients displayed entire relieve of itching irrespective to while color that remained without significant changes. The mycological assessment, at the end of the four weeks, developed negative KOH results in all treated patients. The differences among these groups were statistically significant compared to their correspondent baseline values. Fifteen FTP showed 83.3% in mycological reduction, seven ITP1 showed 41.2% reduction in mycological assessment and ten of ITP2 showed 52.6% reduction in mycological evaluation \( (P < 0.05, \text{Fig. 2}) \). Moreover, two weeks floconazole therapy has resulted in more significant improvement compared to four weeks itraconazole therapy \( (P < 0.05, \text{Figs. 2 and 3}) \). The present study showed that there is no significant changes in the haematological and biochemical data among all treated patients. In spite of this, one patient treated by floconazole showed gradual elevation in liver enzyme (ALT) activity that returned to normal value after two months.

**Figure 2:** Effects of fluconazole and itraconazole on the progress of mycological cure. Numbers indicates percentage reduction, *P*< 0.05.

FTP = Fluconazole treated patients (300 mg), ITP 1 = Itraconazole treated patients (group 1, single dose 400 mg), ITP 2 = Itraconazole treated patients (group 2, two doses 400 mg).
**Figure 3:** Effects of fluconazole and itraconazole on fate of mycological cure after four weeks treatment. Numbers indicates percentage reduction, * P <0.05.

FTP = Fluconazole treated patients, ITP = Itraconazole treated patients
Discussion

Pityriasis Versicolor is a benign super facial fungal infection more commonly caused by *M. furfur*. In some studies *M. globosa* and *M. sympodialis* were the most common isolates from patients with PV (6-8). PV can be effectively treated by topical medication, but has a very high propensity for recurrence. Systemic therapy has a definite role in such cases (16). Itraconazole and fluconazole have been successfully used in the treatment of extensive and recurrent PV. Both these drugs have been tried in different dosages for varying periods. Several studies have indicated that itraconazole is recommended at a dose of 200 mg/day for 7 days (17). Recently two doses of 300 mg of fluconazole with one week interval for two weeks has also been tried in different studies (18, 19), and it has been found to be as effective as other treatment given for longer duration. Since itraconazole is known to achieve higher concentration in the stratum cornum which persists for 3-4 weeks even after discontinuation of drug. This coincides with our results which showed that single dose of 400 mg itraconazole once a week has significantly resulted in mycological cure compared to its baseline parameter. Despite that two doses of 400 mg itraconazole for two weeks have reached significant differences however, when compared to one dose regimen the drug was devoid from such effect. Moreover, despite that the significances have been reached by fluconazole and itraconazole in the two doses regimens, fluconazole had higher significance effect than itraconazole.

The most other distressing symptom in patients with PV is cosmetically unacceptable pigmentation (mostly hypopigmentation), scaling and itching. Itching was the first symptom disappeared in most patients. Next to be controlled was scaling which cleared earlier and in a higher number of patients after fluconazole than itraconazole.

Residual dyschromia even after successful treatment is a well-known problem (1, 20-21). So in the present study the complete normalization of the color was not observed, because skin color alterations usually resolve within a few months of treatment. Fluconazole has shown to be significantly better than itraconazole regarding the mycological cure in the treated patients. Our findings coincide with others studies that reported mycological cure in patients treated for two weeks with fluconazole (17, 22). In itraconazole groups, the observed mycological cure was comparable with their baseline parameters. The safety of both drugs are well documented in the literature (21, 23 - 24). Moreover, the short term influence of fluconazole on the mycological as well as scaling disappearance placed the drug on the top promising agents in controlling early and late symptoms. Most common side effects noted with these drugs are mild gastrointestinal disturbances (10, 16, 23-26).

In this study, only one patient in the fluconazole group showed gradual elevation in liver enzyme (ALT) which then returned to the normal level after two months of treatment. On the other hand, patients’ compliance with short term treatment compared with long one has contributed largely on the early cure of the symptoms. This is true with fluconazole but not with itraconazole. It has been postulated that one dose fluconazole therapy for two weeks has resulted in
significant mycological cure (21). Moreover, one week of one dose itraconazole has also reached significant cure. However, many studies have conflict results on short term and long-term effectiveness of both drugs. In this study, single dose fluconazole produced higher efficacy than itraconazole. Our findings confirmed the efficacy of single short term effectiveness of fluconazole and it significantly reduces the expenditure of costs regarding long drug use.

In conclusion: This study concluded that despite the diversity in their actions, fluconazole at 300 mg once weekly for two weeks was found more effective and complied by patients compared to itraconazole. In addition, both drugs were safe in regard to their lab investigation.

Acknowledgments: The authors appreciates the financial contribution of The National Center for Medical and Pharmaceutical Research and the stock supply of fluconazole from S. A. I. Ph. Company for Pharmaceuticals. The authors would also like to thank the nursing and medical staff members at Tripoli Medical Center for their valuable contribution.
References


Humoral responses toward cercarial secretions of *Schistosoma Mansoni*: a relationship with age, sex and prevalence of infection

Fawzia Shawesh¹, Jan A. Bradley², Altayeb Elazomi¹-³, Hatem Khpiza¹, Mike Doenhoff²
¹Faculty of Medical Technology, Zawia University, ³National Medical Research Centre, Zawia, Libya and ²School of Biomedical Sciences, The University of Nottingham, Nottingham, UK

Abstract: Exposure to mercurial secretions induces specific antibody responses, which can be useful to evaluate exposure to *S. mansoni* infection. This paper describes work designed to measure the anti-CTF response (IgG1, IgG4 and IgE) in individuals from a schistosomiasis endemic area of Piida village, Uganda. The predominant anti-CTF antibodies in sera were IgG1 and IgG4. IgG4 specifically recognized antigens at approximately 30 kDa, 46 kDa and 58 kDa molecules. In addition, IgE antibody weakly recognized some molecules of CTF at approximately 22 kDa, 58 kDa and 80 kDa. The effects and the interactions of age, sex, prevalence and intensity of infection on specific antibody levels were also assessed. This study demonstrated that there were different responses in sex dependent age groups. In addition, the anti-CTF IgG1, and IgG4 responses were significantly higher in the age groups of 10-14 and 20-24 years. There was however, no remarkable effect of age on IgE anti-CTF. In addition, there were significant positive correlations between egg-count and the anti-CTF antibody isotypes responses. This study also investigated the relationship between anti-CTF and antibody responses to other *S. mansoni* antigens, including adult (AWA), egg (SEA) and whole cercarial homogenate. Most of these antibodies were strongly correlated with each other. These results suggest that the anti-CTF antibody response appears a reliable indicator of exposure to *S. mansoni* in endemic areas, and might also be exploited for schistosomiasis epidemiological studies.

Key words: *Schistosoma Mansoni*, Schistosomiasis, immune responses, ELISA, SDS-PAGE.

Introduction

Schistosomiasis infection with any of the five species that infect man causes a range of immune-related events at the site of infection in general, and in particular, stimulate antibody production (1). Animal models were often used to study immune responses, but they had many strict limitations. Therefore, recent studies had focused on *in vitro* investigations using sera from people living in endemic areas (2-5). In the endemic areas, the population was exposed to the *Schistosoma* infection from a very early age (6). Researchers pointed out the importance to investigate factors affecting the immun-epidemiology in these areas such as age, sex and the intensity of infection (3, 5, 7, 8). There was evidence of earlier changes in the equilibrium of antibodies in more intensely infected populations (9, 10). The protective immunity appeared to increase slowly and the susceptibility to decrease in older children or adults, in spite of evidence that some people were repeatedly infected from a young age (10). It was pointed out that some people were more susceptible to re-infection, while others appeared resistant after treatment for schistosomiasis but the reasons behind these observations were not known (11). The heterogeneous nature of the human exposure to contaminated water was perhaps one
reason; therefore to be able to discriminate between lack of cercarial exposure and acquired resistance would be helpful (5). Several studies reported that the IgG1 and IgG4 were the predominant anti- *S. mansoni* isotypes induced in the sera of infected humans (12, 13). Seroepidemiologic studies in Kenya (14) and in Brazil (15) indicated that the early and high levels of production of IgG4 against adult and egg antigens of *S. mansoni* may block the activity of IgE (16). Accumulating evidence also indicated that the levels of IgE against worm and egg antigen tended to increase with age (3, 5, 17). IgG4 and IgE antibodies had been characterized as markers for developing protection to infection, as well as a risk for immuno-pathology (18).

People’s contact with water containing cercariae had been extensively studied and had been shown to correlate negatively with age (10, 19).

In *S. mansoni* endemic areas, the intensity of infection peaked between 6-20 years of age and declined rapidly after this age suggesting that the adaptive immune response increased (5, 10). The difference in the intensity of *S. mansoni* infection between the genders from the same community was highlighted, females being with lower intensity of infection than males (3, 20). This was related to different sex behavioural and/or different social culture factors (18, 20, 21). However, a study in mice illustrated that the gender difference might be due to the difference in susceptibility to infection, and due to decreased immunity to infection amongst males (23). Webster *et al.* (7) suggested that the difference in the infection rate between the sexes could be dependent on hormone changes around puberty. The skin penetration process was facilitated by the cercarial transformation fluid secretions (CTF) containing molecules that induce cellular and humoral immune responses (24, 25). Although, antibody responses had been studied intensively to *S. mansoni* adult and egg antigens (4, 5), schistosomula tegument extract (26) and cercarial homogenate antigens (17), the antibody response to CTF was not investigated in detail. Few studies reported that anti-CTF antibody was considerably more specific than anti-SEA antibody for antibody detection diagnostic test in endemic area (27-29). The main objective of the present study was to measure the antibody response to CTF antigens in humans residing in high endemic area of *S. mansoni* in order to answer the main question: Does anti-CTF antibody responses predict exposure to *S. mansoni* infection?.

**Materials and methods**

*Preparation of cercarial transformation fluid (CTF) from *S. mansoni*: *The CTF that was used for the present experiments was provided by Prof. Mike Doenhoff, University of Nottingham. The material was prepared as follows: B. glabrata snails with patient *S. mansoni* infections were placed in distilled water in glass beakers and incubated under a 60 watt tungsten light to induce the snails to shed cercariae into the distilled water. The cercariae were concentrated over a glass fiber filter into a smaller volume of water (approximately 10 ml) and placed in ice to cause sedimentation by gravity. The supernatant was discarded and the cercarial pellet was resus-pended in an appropriate volume of PBS, approximately 5 ml PBS per ml of gravity-packed cercariae and the larvae were mechanically stimulated to release the components of their acetabular glands and break off their tails by drawing the suspension through a 20 G needle approximately 15 times. Larval bodies and tails were incubated at 37 °C in a 10 cm diameter plastic Petri dish for 2*
hours after which the suspension was centrifuged at 2000 g for 10 min. CTF was collected and stored at -80 °C.

**Human sera and population**

The human sera were kindly donated by Prof Dunne from Cambridge University. Two hundred ninety nine sera, of persons aged 5 to 60 years old and described by Kebatereine and others (30), were kindly provided. The sera were randomly collected from people infected with S. mansoni in North-western Uganda. No schistosomiasis treatment had been offered to the population before the sera collection. Parasitological status was assessed by analyzing three stool samples collected on three successive days. For each individual, eggs were counted using the microscope, while personal data was also recorded.

**Immunoassay ELISA**

Nine of the 384 well flat-bottom microlon 600 high binding plates were coated with CTF diluted in a coating buffer at a final concentration of 5.0 µg/ml. Following the blocking of nonspecific binding sites of the plates with a blocking buffer for 1 hour at room temperature, human infected and uninfected sera were diluted 1: 20 for detecting parasite specific IgE and 1:200 for detecting IgG1 and IgG4 with dilution buffer and incubated overnight at 4°C. The following day, the plates were probed with monoclonal biotinylated mouse anti-human IgG1, mouse anti-human IgG4 and mouse anti-human IgE at 0.5 µg/ml and were diluted with an incubation buffer and incubated for 2 hours at room temperature with gentle shaking. Poly-HRP streptavidin complex was added to each plate at a dilution of 1:3000 and incubated for 2 hours at room temperature. After each step described above, the plates were washed with washing buffer 5 times for 15 min. The reaction was then visualized by adding substrate solution for 10-30 minutes. The reaction was stopped by addition of a stopping buffer; the absorbance was read at a test wavelength 450 nm, and reference wavelength 630 nm. A total of 299 individuals’ sera samples were used for measuring antibody responses towards CTF.

**Western immunoblotting**

Cercarial transformation fluid at final concentration of 2.0 mg/ml was analyzed by Sodium dodecyl sulphate- polyacrylamide gel electrophoresis (SDS-PAGE), following the method proposed by previously by Laemmli and others. Thus, the CTF molecules of the four sections of the gel were transferred onto a nitrocellulose membrane (NCM). Immunoblotting followed the method developed by Towbin and others. Sera from healthy European volunteers were used as negative controls. Seventeen human sera from the S. mansoni endemic area in Uganda were randomly selected for the test.

**Statistical analysis**

The statistical analyses were performed using SPSS version 19. The data included sex, age categories and egg-count as independent variables, and immunological parameters (antibody response) as dependent variables. The intensity of infection was analyzed using the Hierarchical Loglinear function. Quantitative analysis of egg-count was done by age and sex based on general linear models (GLIM), and the residuals were indicated if the egg-count was not normally distributed (31-33). The statistical analysis of the effect of sex and age in the prevalence of infection were performed by a full factorial model. The population was divided into 7 age classes (1 = 5-9 years, 2 = 10-14 years, 3 = 15-19 years, 4 = 20-24 years, 5= 25-29 years, 6=30-39 years, and 7= 40-60 years). The intensity of infection
was analyzed in the seven age groups and in two age groups, the age group 20-24 years old and all other age groups as the second age group. A non-parametric model (Kruskal-Wallis test) was used to analyze two or more groups. The Mann-Whitney U test was used to determine variation within two groups. It was further analyzed by categorizing the intensity of infection into 7 groups according to the egg load in the faecal samples. These were: group 1 = 0 egg-count, group 2 = 1-200 egg-count, group 3 = 201-400, group 4 = 401-800, group 5 = 801-1200, group 6 = 1201-2000, and group 7 = 2001-8000.

In order to characterize the relationship between age and IgG1, IgG4 and IgE antibodies specific to CTF from *S. mansoni* infected sera, the individuals were divided into five age groups. The effect of sex, age categories and egg-count on antibody responses were analyzed using GLIM, multivariate and univariate approaches. The distribution normality of 12 immunological parameters was tested. These parameters were reduced by the Principal Component Analysis into four groups. The antibody response to CTF was component 1, response to AWA was component 2 and response to SEA was component 3. The intensity of parasite infections with these principal components was examined for potential effects of age, sex and egg-count, using a non-parametric model (Kruskal-Wallis test). The four principal components were employed as dependent variables and the age (7 levels) and the sex (2 levels) were used as main factors. Pearson’s correlation coefficients were used to evaluate the relationships between IgG1, IgG4 and IgE antibody responses to CTF, and between the four antigens of *S. mansoni*. Significance was indicated at the 5% level.

**Results**

The study group is described in

, including the parasitological characteristics as measured by the antibody responses to CTF

<table>
<thead>
<tr>
<th>Number of Individuals</th>
<th>Age</th>
<th>Sex</th>
<th>Prevalence</th>
<th>Intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>299&lt;sup&gt;a&lt;/sup&gt;</td>
<td>5/60&lt;sup&gt;b&lt;/sup&gt;</td>
<td>134/165&lt;sup&gt;c&lt;/sup&gt;</td>
<td>266&lt;sup&gt;c&lt;/sup&gt;</td>
<td>0-8226&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup>Numbers and ranges of study group, <sup>b</sup>Percentage of infected people (different genders) and prevalence of infections. <sup>c</sup>Mean of egg-count (eggs per gram of faeces) of individuals.
Age and gender-profiles of intensity and prevalence of infection

Although age was significantly related to the intensity of infection, the parameters of infection of *S. mansoni*: the intensity and the prevalence, did not show any significant differences between the genders (*P* > 0.05). However, females had a slightly higher intensity of infection than males in the (5-9) and (20-24) age groups, and it was higher in the males in the (10-14), (15-19), (20-24) and (25-29) age groups (Figure 1). In both genders, the intensity of infection was high around the age group of 20-24. The analysis of the intensity of infection in the two age groups (20-24 and all other age groups) confirmed that the parasite egg yield dramatically increased in the 20-24 years old and that during all other age groups the egg-count decreased or stable (Kruskal-Wallis test, $X^2 = 6.194$, *P* = 0.013). The prevalence of infection by age and sex (Figure 2) showed a similar trend to that of intensity of infection.

Figure 1: Intensity of infection by age group and sex

Red symbols represent the means ± SD of females, while the blue symbols represent means ± SD of males in each age group (5-9, 10-14, 15-19, 20-24, 25-29, 30-39 and 40-60. The standard error bars show the range of egg-count data, excluding extreme values.

Figure 2: Relationships between age-prevalence of *S. mansoni* and sex in North-western Uganda
Blue symbols represent males, while the red symbols represent females in 7 age groups (5-9, 10-14, 15-19, 20-24, 25-29, 30-39, and 40-60).

**IgG4 and IgE antibodies specifically recognize antigens of S. mansoni CTF by sera of the residents in an endemic area**

Figure 3A characterizes the molecules of CTF recognized specifically by anti-IgG4 and anti-IgE antibodies in the sera from 17 residents infected with *S. mansoni* by the Western blotting analysis. The figure shows that IgG4 antibody specifically recognized antigens with approximately 30 kDa, 46 kDa, and 58 kDa molecules. On the other hand, the IgE antibody weakly recognized some molecules of CTF at approximately 22 kDa, 58 kDa, and 80 kDa.

**Figure 3**: Characterisation of specific antigens of CTF recognised by IgG4 antibody (A) and by IgE antibody (B) from human infected sera

Lanes 1 to 17 represent sera from infected individuals living in a parasite endemic area. Lane 18 represents negative control (healthy European volunteers). Lane MW/kDa presents molecular weights of protein standards in kDa.
Specific antibody levels from human infected and uninfected sera in response to CTF

The mean of different isotypes, anti-CTF IgG1, IgG4 and IgE levels, in the infected and un-infected human sera are shown in Figure 4. The comparison of antibody responses between the age groups demonstrated that for both IgG1 and IgG4 very similar levels were observed in infected and un-infected sera. This corresponded to the prevalence of infection. There was a noticeable increase of antibody responses, particularly in the age groups (10-14) and (20-24), Figure 4. A and B but no such increase was observed with the level of IgE antibody (Figure 4 C).

**Figure 4:** Distribution of sero-positive of infected and uninfected people sera

Infected sera are represented as orange, squares, and uninfected human sera (Blue, squares) according to antibody levels in each age group (5-9, 10-14, 15-19, 20-24, 25-29, 30-39 and 40-60). The horizontal lines indicate the arithmetic means with SD. A. IgG1, B. IgG4 and C. IgE antibodies response to CTF.

Relationship of CTF specific IgG1, IgG4 and IgE antibodies with age: Comparing the antibody responses between the five age groups, the IgG1 and the IgG4 showed very similar levels (Figure 5 A and B). The specific antibody responses to CTF demonstrated an age related increase over all the age groups with the exception of the 10-14 and 20-24 age groups, which showed remarkable increase in the level of response (Figure 5A and B). The age profiles of anti-CTF IgG1 and anti-CTF IgG4 reflected the levels of prevalence and intensity of infection. However, anti-CTF IgE responses were low in all the age classes (Figure 5). The effects of gender on CTF-specific IgG, IgG4 and IgE antibodies were examined but there was no significant difference in response with sex. Females presented a slightly higher response than males in the (30-39) and (40-60) age groups for IgG1, and in the age group (5-9) IgG4 response was high. In the age groups (5-9) and (15-19) the IgE responses were high. Males were somewhat higher than females in all the other remaining age groups. The IgG4 and IgE responses in males showed increase with age, especially from 20 years old (Figure 5B and C).
Figure 5: Relationship between CTF specific IgG1, IgG4 and IgE antibodies with age and sex

A. IgG1, B. IgG4 and C. IgE antibodies’ response to CTF over age profile for endemic S. mansoni area; data points are optical density (OD) values at 450 nm. The horizontal lines indicate the arithmetic means with SD. Pink symbols represent females, while the blue symbols represent males.

Comparison of serum antibody levels towards S. mansoni antigens: Pearson’s correlations test indicated a significant positive correlation between the different antibody isotypes (IgG1, IgG4 and IgE) towards CTF (Error! Reference source not found.). Individual responses to CTF, AWA, SEA and cercariae antigens showed positive and highly significant correlations for IgG1, IgG4 and IgE levels (Table 2: Characterisation of the relationship between different antibody isotypes to CTF, plus the correlation between levels of IgG1, IgG4 and IgE antibodies to CTF. Table 3). (r (299) = 0.402, P = 0.000).

<table>
<thead>
<tr>
<th>Correlation</th>
<th>Pearson’s R</th>
<th>P- Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTF-IgG1XCTF-IgG4</td>
<td>0.319**</td>
<td>0.000</td>
</tr>
<tr>
<td>CTF-IgG1XCTF-IgE</td>
<td>0.229**</td>
<td>0.000</td>
</tr>
<tr>
<td>CTF-IgG4XCTF-IgE</td>
<td>0.372**</td>
<td>0.000</td>
</tr>
</tbody>
</table>
Table 3: The relationship between different antibody isotypes to some S. mansoni antigens

<table>
<thead>
<tr>
<th>Correlation</th>
<th>Anti-body isotype</th>
<th>Pearson’s R</th>
<th>P- Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTF X AWA</td>
<td>IgG1</td>
<td>0.441</td>
<td>0.000**</td>
</tr>
<tr>
<td></td>
<td>IgG4</td>
<td>0.239</td>
<td>0.000**</td>
</tr>
<tr>
<td></td>
<td>IgE</td>
<td>0.173</td>
<td>0.003**</td>
</tr>
<tr>
<td>CTF X SEA</td>
<td>IgG1</td>
<td>0.542</td>
<td>0.000**</td>
</tr>
<tr>
<td></td>
<td>IgG4</td>
<td>0.114</td>
<td>0.050</td>
</tr>
<tr>
<td></td>
<td>IgE</td>
<td>0.227</td>
<td>0.000**</td>
</tr>
<tr>
<td>CTF X Cercariae</td>
<td>IgG1</td>
<td>0.390</td>
<td>0.000**</td>
</tr>
<tr>
<td></td>
<td>IgG4</td>
<td>0.144</td>
<td>0.013</td>
</tr>
</tbody>
</table>

Antibody levels specific for CTF, AWA, SEA and cercariae were measured by ELISA and correlated with one another using Pearson’s rank correlation model.

S. mansoni antigens specific IgG1, IgG4 and IgE antibodies and egg-count

There were significant positive correlations between the egg-count and the antibody response specific to CTF (Table 4). The increase in the egg-count related to the increase in the antibody response to CTF. The comparison of the antibodies in the 7 egg-count categories and their responses to CTF indicated that all antibody isotypes’ responses were higher in individuals with egg-count from 1201-2000 epg (Error! Reference source not found.). The IgG1 levels were significantly higher in the egg-count category 2001-8000 when compared to group 1 (epg = 0) and group 2 (1-200 epg) (Mann-whitney U-test, z = -2.587, $P = 0.01$ and $P = 0.03$ respectively), Error! Reference source not found. A. A significant positive correlation was found between IgG4 antibody responses to CTF and approximately all egg-count categories in individuals with 2001-8000 epg when compared with groups 1 and 2 ($r (299, 0.66) = 0.521, P = 0.000$), with group 3 ($P = 0.005$) and with group 4 ($P = 0.015$). Group 1 significantly differed with group 4 ($P = 0.012$), with group 5 ($P = 0.006$) and with group 6 ($P = 0.000$), Error! Reference source not found. B. Additionally, anti-CTF IgE response was significantly different between group 1 and the highest egg-count group (Mann-whitney U-test, $z = -2.485, P = 0.012$), Error! Reference source not found. C. Consequently, principal components (PC1-3) were examined in relation to sex, age groups and egg-count (infected and uninfected). For this, the non-parametric test (Kruskal-Wallis test) was employed; egg-count did indeed significantly change between all the principal components (Table 5). However, in relation to gender, no significant differences were found with all principal components (reflective of antibody responses). Similarly, there was no significant influence in terms of age classes (7 groups and 2 groups) in terms of all principal components.

Table 4: Correlation between egg-count with IgG1, IgG4 and IgE antibody response to CTF

<table>
<thead>
<tr>
<th>Correlation</th>
<th>Pearson’s R</th>
<th>P value</th>
</tr>
</thead>
</table>

Table 5: The effect of sex, age and egg-count in principal components (PC 1-4) of study

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Eigenvalues</th>
<th>Extraction Sums of Squared Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>% of Variance</td>
</tr>
<tr>
<td>1</td>
<td>1.616</td>
<td>53.881</td>
</tr>
<tr>
<td>2</td>
<td>.776</td>
<td>25.867</td>
</tr>
<tr>
<td>3</td>
<td>.608</td>
<td>20.252</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis

<table>
<thead>
<tr>
<th>Component Matrix*</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Mean OD CFT IgG1</td>
<td>.679</td>
</tr>
<tr>
<td>Mean OD CFT IgG4</td>
<td>.790</td>
</tr>
<tr>
<td>Mean OD CFT IgE</td>
<td>.728</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Egg-counta</th>
<th>Sex</th>
<th>Age1b</th>
<th>Age2c</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X2, P</td>
<td>X2, P</td>
<td>X2, P</td>
<td>X2, P</td>
</tr>
<tr>
<td>PC1</td>
<td>10.226, 0.001</td>
<td>0.085, 0.77</td>
<td>7.755, 0.257</td>
<td>0.753, 0.386</td>
</tr>
<tr>
<td>PC2</td>
<td>7.689, 0.006</td>
<td>0.159, 0.688</td>
<td>10.163, 0.118</td>
<td>0.933, 0.334</td>
</tr>
<tr>
<td>PC3</td>
<td>24.942, 0.000</td>
<td>0.100, 0.752</td>
<td>9.925, 0.135</td>
<td>0.858, 0.354</td>
</tr>
</tbody>
</table>

Principal component 1 is (antibody response to CTF), Principal component 2 is (antibody response to AWA), and Principal component 3 is (antibody response to SEA) a Represents egg-count divided into two groups infected and un-infected individuals. b Age classes characterised into 7 groups, whereas, c represented age into 2 groups. For more information the eigenanalysis and component matrix are presented.

Discussion

The present study aimed to assess the importance of specific antibody responses to CTF in an S. mansoni infected community. In the endemic areas, individuals are frequently exposed to cercariae and their secretions continuously since an early stage in life. This leads to the production of antibodies against cercarial molecules. It is suggested that IgG4 is a marker to susceptibility to re-infection, whereas, IgE is a marker to resistance to re-infection after treatment (14, 35, 36). It is of interest to determine whether such observations are true for untreated and/or uninfected individual residing in an S. mansoni endemic area. In Schistosomiasis
endemic areas, the egg distribution among the infected population is not randomly distributed. However, the intensity of infection is significantly higher in children, with a peak in those between 6-20 years old and then rapidly declining in the adults. The prevalence of S. mansoni infection was very high among the population under study. The peak intensity of infection was around the age of 20 years, but there was other obvious peaks followed by a decline in males only. The finding of the current study is consistent with the study carried out in Kenya by Fulford et al. (37). The stated that the peak intensity of S. mansoni infection was in the 12-25 years old. Other studies reported that the peak of the intensity of infection, in heavily endemic areas, tends to occur at an earlier age (5-8 years old), and in areas with low level of infection, the peak of intensity of infection tends to occur at an older age (9-20) years old (10, 38, 39). The peak intensity of infection in the females, in this study, was in the age groups (5-9) and (20-24) years old, and the intensity of infection increased significantly from 10 to 30 years as in males. These results were not consistent with the study by Naus and others (3). They reported that males were more heavily infected than females in all age groups. This discrepancy may be due to occupational differences. The mentioned study was performed in an endemic region, where most male individuals were fishermen, who are heavily and repeatedly exposed to infection. The results show that the molecules of CTF induce a number of antibody isotypes in an infected individual’s sera, including IgG1, IgG4 and IgE. The percentage of individuals sero-positive within the study group indicates that IgG1 (94%) and IgG4 (83%) are the predominant subclasses in the CTF. These findings are consistent with other studies (3, 13). However, the level of IgE is low (62%). This observation is common in such communities as a result of diverse susceptibility and resistance to re-infection (14, 15, 40, 41). The comparison of antibody responses between these age groups demonstrated similar IgG1 and IgG4 levels in sera of the infected and the un-infected. These results obviously demonstrate that antibody levels are result and related to the prevalence as well as to the intensity of infection. This study has characterized and identified the molecules of CTF that are recognized by IgG4 and IgE antibodies. The dominant CTF molecule recognized by IgG4 antibody was at 30 kDa. A 30 kDa molecule has also been identified previously as a cercarial elastase (24, 42, 43), and has been suggested as a vaccine candidate (44, 45). Whether the 30kDa antigen recognized here is a elastase is not definite but previous studies did not find any antibody reactivity to any molecule at 30 kDa by Western blot technique (44, 46). However, Pino-Heiss and others (47) reported that a 30 kDa protein reacted with sera, both from infected mice and humans. Further research is needed to investigate and identify the nature of the 30kDa molecule that reacts with human IgG4. Another 22 kDa antigen was also preferentially recognized by IgE. This is most probable to be an allergen-like molecules released from dying S. mansoni adult worms and schistosomula (14, 17, 48). The released 22 kDa molecule by the dying schistosomula binds to IgE. The binding results in inflammatory reaction and creates the hostile environment for other invading cercariae (17). An earlier study showed that rat monoclonal IgE strongly reacted with a 22 kDa specific molecule present in schistosomula (49). Future studies are recommended before suggesting that this protein is a promising new biological marker of resistant individuals. The results indicate that the high level of specific IgG1 and IgG4 antibodies responses towards CTF correspond
particularly with the peaks of the prevalence of infection with age groups with the highest percentage of infection (10-14 years and 20-24 years). Previous studies reported that antibody response against AWA and SEA were associated strongly with age and with the intensity of infection (40). This peak of antibodies in these age groups (10-14 and 20-24) is most probably associated with the variation in the individual personal and behavioral period of exposure to infection. The findings suggested a significant positive correlation between egg-count and antibody responses. This supports the reports by previous researchers (3, 7). The analysis by two age groups, the group of 20-24 years old (group 1) and all other age groups (group 2) showed that group 1 is characterized by a significantly higher prevalence than group 2 and that the antibody levels of the individuals of this group are also very high, especially IgG1 and IgG4. There is a strong correlation between IgG4 and the different S. mansoni antigens (CTF, AWA, SEA and cercariae homogenate) as well as a positive correlation between IgG4 and IgE responses to CTF. The strong correlation between the IgG4 and the different S. mansoni anti-genes is most probably due to that these antigens expressed identical common epitopes, which directly bind to IgG4. Hussain and others (50) suggested that IgE and IgG4 antibodies might bind to the same epitopes. Thus, the effector function of IgE is blocked by IgG4 as they are both directed to the same epitopes (36). However, Li et al. (1999) (51) demonstrated that the two antibodies are independently regulated by different mechanisms. The IgG4 response is significantly different in the different age groups, depending upon the prevalence and the intensity of the infection, whereas no such observation is demonstrated with IgE response to CTF. Also there are no gender differences between IgG1, IgG4 and IgE responses. However, the levels of IgG4 and IgE increase from 20 years old in the males, while an increase in the levels of IgG1 level is observed from 30 years in females. The IgG4 level is considerably higher in females than males in age 5-9 year old, an observation reported by several workers (3, 7). Two possible explanations were suggested. The first is that males are exposed to cercarial antigens more than females, because of behavioural differences (21). The second is that the difference could be due to different hormonal factors between sexes (7). It will be useful to conduct further studies with a large number of adults over 20 years to assess the cumulative exposure to cercarial secretions, combined with a water contact survey. It is interesting to observe that only egg-count is significantly related to all S. mansoni antigen, CTF, AWA, SEA, the principal components. This suggests that the antibody response is a reliable indicator of infection with S. mansoni in endemic areas and it might be also exploited for schistosomiasis epidemiological studies. The antibody responses are significantly correlated with the prevalence of infection. The results indicate that IgG4 and IgE responses are associated with sex, age as well as with the prevalence of infection and that anti-IgG4 and anti-IgG1 against CTF increase significantly with the egg abundance. Sera from uninfected individuals, according to negative egg-count results (zero), had sero-positive results to CTF antigen with detectable levels of IgG1, IgG4 and IgE. This conclusion is consistent with those of other studies and suggests that such a reaction reflects the limited of microscopic sensitivity of egg combined with a very high sensitivity and specificity of ELISA to detect antibody (52, 53). The sensitivity of antibody detection is a more effective method than parasitology (54).
In conclusion, the results suggest that anti-CTF antibody responses predict exposure to S. mansoni but further in depth studies are needed.
References


elastases of Schistosoma mansoni, Schistosoma haematobium, Schistosoma japonicum and 
47. Pino-Heiss S, Petitt M, Beckstead JH and McKerrow JH (1986) Preparation of mouse 
monoclonal antibodies and evidence for a host immune response to the preacetabular gland 
48. Dunne DW, Webster M, Smith P, Langley JG, Richardson BA, Fulford AJ, Butterworth AE, 
Sturrock RF, Kariuki HC and Ouma JH(1997) The isolation of a 22 kDa band after SDS-
PAGE of Schistosoma mansoni adult worms and its use to demonstrate that IgE responses 
against the antigen(s) it contains are associated with human resistance to reinfection. Parasite 
49. Verwaerde C, Joseph M, Capron M, Pierce RJ, Damonneville M, Velge F, Auriault C and 
Capron A (1987) Functional properties of a rat monoclonal IgE antibody specific for 
to quantify subclasses of human IgG. II. Enzyme immunoassay to define antigen specific 
51. Li YS, Ross AG, Sleigh AC, Li Y, Waine GJ, Williams GJ, Tanner M and McManus DP 
(1999) Antibody isotype responses, infection and re-infection for Schistosoma japonicum in a 
Parasitol Today. 8: 274-277.
contribution of day-to-day and intra-specimen variation in faecal egg counts of Schistosoma 
mansoni before and after treatment with praziquantel. Parasitol. 122: 537-544.
54. Doenhoff MJ, Chiodini PL and Hamilton JV (2004) Specific and sensitive diagnosis of 
Antibacterial activity of probiotic lactobacilli enhanced by adding olive oil to crude *Lactobacillus acidophilus*

Attiya Alatery*, Iman K. Daabaj, Sorour H. El-Fituri, Hend M. Shubar and Najat Al-megrahi
Department of Microbiology and Immunology, Faculty of Pharmacy, University of Tripoli, Tripoli, Libya

Abstract: In the present study, antibacterial activity of crude and modified *L. acidophilus* supernatant against 28 clinical isolates of gram negative and gram positive pathogens have been evaluated using the cup-cut plate and time-killing curve methods. The isolates were isolated from different patients and selected as the most resistant strains when challenged with antibiotics already in clinical practice. The crude cell-free *L. acidophilus* supernatants demonstrated wide antibacterial spectrum against the vast majority of the pathogenic strains where the diameter of the zone of inhibition around the cups containing the supernatants ranged between 10 and 15.5 mm. Modifying the MRS media by adding 1%v/v olive oil to *L. acidophilus* culture during the incubation period resulted in a supernatant with significantly weak antibacterial activity as compared to crude supernatant. In that almost most of the isolates were completely resistant to the antibacterial activity of the modified *L. acidophilus* supernatant. In contrast, the antibacterial activity of the crude supernatant was significantly enhanced by adding 1%v/v olive oil to the cell-free *L. acidophilus* supernatants collected 48 hours post-incubation as compared to the crude 48hrs supernatant without olive oil. This is evident by the remarkable differences of the diameter of the zone of inhibition among the conditions. In a kinetic study the lactobacillus sensitive MRSA and *P. aeruginosa* showed comparable and significant susceptibility to the antibacterial activity of crude and modified *L. acidophilus*, although they were isolated from different patients. In conclusion, the mixing of cell-free *L. acidophilus* supernatant with olive oil (1%v/v) produced a new compound with very good antibacterial activity as compared to controls.

*Keywords*: *L. acidophilus* supernatant, Anti-bacterial, MRSA, Olive oil

Introduction

*Lactobacillus acidophilus* (*L. acidophilus*) is one of the predominant probiotic bacteria found in the normal intestinal microflora of animals and humans. Several studies have indicated that *L. acidophilus* confers a wide range of health benefits to hosts (1, Fuller 1989). In particular, the capability of such bacteria to inhibit the growth of various Gram-positive or Gram-negative bacteria is well known. For instance, *L. acidophilus* is used to treat infection with *Helicobacter pylori* (2) and to prevent respiratory infections in children attending daycare centers (3). A study published in 2010 suggests that probiotics may lower the risk of common childhood illnesses such as ear infections, strep throat and colds. It is also being tested to prevent serious infections in people on ventilators (4). Women sometimes use lactobacillus suppositories to treat vaginal infections and urinary tract infections (UTIs) (5). This inhibitory effect is related to the ability of *L. acidophilus* to release several anti-microbial substances (6), reduce gut pH by secreting lactic acid, improve immune activities by enhancing cytokine production (7), produce hydrogen peroxide which is active against wide range of pathogens (8) and maintain the healthy intestinal microbiota through competitive exclusion and antagonistic action.
against pathogenic bacteria in the animal intestine (9). In addition, oral administration of L. acidophilus enhanced mitogen-induced murine lymphocyte proliferation and serum levels of IgG and IgM (10) and gut mucosal IgA secreting cells (11). Therefore, treatment with L. acidophilus can modify the concentrations of gut microbial populations and control gut bacterial overgrowth.

Previous published data have shown that Lactobacillus derived products including culture supernatants have been used for their wound healing and antiviral properties and to reduce cholesterol levels and the risk of colon cancer (2-4). A recent result by Fahed and Radeef has revealed that cell free supernatant of L. acidophilus was found to be very effective in inhibiting the production of lipase from biofilm and planktonic cells of MRSA isolates (12). This supernatant was also proved to be effective against Helicobacter pylori in vitro and in vivo in people and was shown to have antimicrobial activities against Enterobacter aerogenes, Salmonella enteric Bacillus anthracis and E. coli (2, 13, 14).

On the other hand, olive oils has been proven to exert significant bactericidal activity in vitro against Gram-positive and Gram-negative bacteria (15). This activity is not only against the enteric microorganisms of the intestine Helicobacter pylori, Escherichia coli and Clostridium perfringens, but also against the beneficial bacteria Lactobacillus acidophilus and Bifidobacterium bifidum (16-18). The bioactivities of olive oil have been related to the phenolic compounds, oleuropein and hydroxytyrosol (19). We therefore hypothesized that the combination of olive oil plus L. acidophilus supernatant may provide rapid bactericidal activity against pathogenic bacteria. Accordingly, the objectives of the study were to evaluate the bactericidal activity of L. acidophilus supernatant, and to address the influence of olive oil on the antimicrobial activity of L. acidophilus supernatant.

Materials and methods

Materials: All the chemicals were purchased from Sigma Chemical Co. (Tripoli, Libya), unless otherwise indicated.

Bacterial strains: The organisms were obtained from different patients. 10 MRSA and 7 pseudomonas aeruginosa isolates were selected from the stock of isolates obtained from renal transplant recipients. 6 different strains were isolated from biopsies obtained from patients diagnosed with GIT tumors. 5 different strains were isolated from patients with diabetic foot lesions. All isolation and identification procedures were done at department of microbiology and immunology – faculty of pharmacy according to NCCL protocols.

Preparation of supernatants from Lactobacillus cultures: The procedure for the preparation of LS has been previously reported (20). Briefly, L. acidophilus (NCAIM B 01075) were grown in MRS broth (pH 6.2; Liofilchem Laboratories, Tripoli, Libya) at 37°C in different condition as indicated below under microaerophilic conditions. This medium contains a rich nutrient base as well as polysorbate, acetate, magnesium, and manganese, which are known to promote the growth and proliferation of lactobacilli. Overnight bacterial cultures contained 2.5 x 10^8 colony-forming units, and these cultures were centrifuged at 10,000 g for 15 mins at 4°C to obtain cell-free supernatant. Supernatants were filter-sterilized by passing through a sterile 0.2 μl pore size filter. The pH of the supernatants was adjusted to 6.5 with...
NaOH. The resulting supernatants were stored at -20°C. At the time of the experiments, the L. acidophilus supernatant was thawed and used in agar cut-cup technique. Four different supernatant conditions were prepared; MRS-24 hrs, MRS-48 hrs, MRS-olive oil 24 hrs, and MRS-48 hrs + olive oil. MRS + olive oil without bacteria and phenol were served as negative and positive controls, respectively.

**Screening for antibacterial activity:** Agar diffusion cup-plate method described by (21) was followed to detect L. acidophilus supernatant inhibition activity. Muller Hinton agar was used to study the antibacterial activity of the L. acidophilus supernatants. 25 ml of freshly prepared Muller Hinton agar media (Oxoid, Tripoli, Libya) was poured in each Petri dish of 9 cm diameter to obtain 3-4 mm thickness layer of media. After solidification, using the swab, the Mueller-Hinton agar plate was streak to form a bacterial lawn. The plate was allowed to dry for approximately 5 minutes. After that, a sterile cork borer was used to prepare six cups of 4 mm diameter in the medium of each Petri-dish. An accurately measured 50 μl of the tested conditions and phenol 5% as positive control, were added to the cups with the help of micropipette on Mueller-Hinton-agar plates previously seeded with the respective bacteria. The study was performed in triplicate. All the plates were kept at room temperature for effective diffusion of L. acidophilus supernatants and then they were incubated at 37 ± 1°C for 24 hrs. The diameter of the zone of inhibition around the cup containing the tested conditions was measured.

**Time-kill curve method:** Cell free supernatant of LAB was obtained as described above. Time-kill curve method and the criteria for classification as bacteriostatic or bactericidal effect, synergism or antagonism were carried out according to previously reported modification (22). MHB was prepared and added to tubes containing cell-free supernatant of LAB incubated for 24 hrs, 48 hrs, 24 hrs in presence of olive oil (1%v/v) and 24 hrs supernatant mixed with 1% olive oil v/v. MHB and cell-free supernatants were mixed in a ratio 1:1 (5 ml each). Tubes containing MHB, MRS alone and in presence of 1% v/v olive oil were used as negative controls, while tube containing phenol 5% was used as positive control. All tubes were inoculated with the target bacteria and adjusted at 10^6 CFU/mL (CLSI 2009). Surviving bacteria were counted after 0, 6, 12, 18, 24, 30, and 36 hrs of incubation at 37 °C by sub-culturing 50 μL serial dilutions (10-1, 10-2 and 10-4 in order to eliminate potential carryover effect) of samples (in 0.9% sodium chloride) on MH agar plates. The analysis was carried out in triplicates and the mean was taken. Bacteriostatic and bactericidal effects were defined as a decrease of < 3 log CFU/mL and ≥ 3 log CFU/mL after 24 hr of incubation, respectively, compared to the size of the initial inoculums (24).

**Statistical analysis**
The results were interpreted with the standard deviation. Student t-test was applied to know significant differences between the antimicrobial effectiveness of each condition. A p-value less than 0.05 were taken as the critical criterion for statistical significance.

**Results**

**Antibacterial activity of L. acidophilus supernatants against pathogenic bacteria**

The results of the antibacterial activities L. acidophilus supernatants on multi-drug
resistant hospital strains are presented in Tables below. The cup-cut agar technique results of present study, suggest that the cell-free-supernatants exerted varying inhibitory effect on the selected pathogenic strains. Table 1 shows that cell-free supernatants collected from the culture after 24 and 48 hours have almost similar antibacterial activity against hospital MRSA strains isolated from renal transplant recipients. The diameters of zone of inhibition around the cups were comparable to the positive control (phenol). However, a lower or almost no antibacterial activity was observed with cell-free supernatant collected from L. acidophilus incubated with (1% v/v) olive oil over 48 hours. Interestingly, adding the olive oil (1%v/v) to 48 hours cell-free supernatant did not reduce the antibacterial activity as compared to 24 and 48 hours supernatant without oil. Collectively, cell-free supernatants collected after 24 hours demonstrated antibacterial activity against 80% of the strains and this activity dropped down to 20% with cell-free supernatant collected from L. acidophilus bacteria incubated 48 hrs in presence of (1%v/v) olive oil.

Table 1: Inhibitory effect of Lactobacillus acidophilus supernatants on methicillin resistant Staphylococcus aureus (MRSA)

<table>
<thead>
<tr>
<th>Strains</th>
<th>Diameter of inhibition zone (mm)</th>
<th>Conditions of L. acidophilus supernatant</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>MRSA-1</td>
<td>1.3±0.57</td>
<td>3.7±1.5</td>
</tr>
<tr>
<td>MRSA-2</td>
<td>2.3±0.6</td>
<td>11.3±0.6</td>
</tr>
<tr>
<td>MRSA-3</td>
<td>3±0.55</td>
<td>10±0.9</td>
</tr>
<tr>
<td>MRSA-4</td>
<td>3±0.9</td>
<td>10.7±1.5</td>
</tr>
<tr>
<td>MRSA-5</td>
<td>1.4±0.57</td>
<td>10±0.9</td>
</tr>
<tr>
<td>MRSA-6</td>
<td>3±1.5</td>
<td>4±1.5</td>
</tr>
<tr>
<td>MRSA-7</td>
<td>2.3±0.6</td>
<td>10.3±1.5</td>
</tr>
<tr>
<td>MRSA-8</td>
<td>2.4±1.2</td>
<td>13.7±0.58</td>
</tr>
<tr>
<td>MRSA-9</td>
<td>1.7±0.6</td>
<td>14.3±1.5</td>
</tr>
<tr>
<td>MRSA-10</td>
<td>2±0.89</td>
<td>11±0.8</td>
</tr>
</tbody>
</table>

A= negative control (MRS broth + olive oil), B= supernatant collected 24 hours post-incubation, C= supernatant collected 48 hours post-incubation, D= supernatant collected 48hours post-incubation with 1% olive oil, E= supernatant collected 48hours post-incubation + 1% olive oil, F= positive control (phenol 5%)

Results in Table 2 demonstrate the antimicrobial activity of L. acidophilus supernatants against P. aeruginosa. All of the strains were highly susceptible to 24 and 48 hours supernatants as compared to the positive control (phenol 5%). Adding olive oil to L. acidophilus during incubation (48 hours) resulted in a supernatant with reduced antibacterial activity against some but not all P. aeruginosa strains, where 3 of 7 strains were highly resistant. Interestingly, adding the olive oil (1%v/v) to 48 hours cell-free supernatant enhanced the antibacterial activity against some strains as compared to 48 hours supernatant without oil.
Table 2: Inhibitory effect of Lactobacillus acidophilus supernatants on Pseudomonas aeruginosa

<table>
<thead>
<tr>
<th>Strains</th>
<th>Conditions of L. acidophilus supernatant</th>
<th>Diameter of inhibition zone (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>P. a-1</td>
<td>negative control (MRS broth + olive oil)</td>
<td>1.1±0.9</td>
</tr>
<tr>
<td>P. a-2</td>
<td>supernatant collected 24 hours post-incubation</td>
<td>1.3±1.2</td>
</tr>
<tr>
<td>P. a-3</td>
<td>supernatant collected 48 hours post-incubation</td>
<td>1.1±0.95</td>
</tr>
<tr>
<td>P. a-4</td>
<td>supernatant collected 48 hours post-incubation + 1% olive oil</td>
<td>2.7±0.57</td>
</tr>
<tr>
<td>P. a-5</td>
<td>supernatant collected 48 hours post-incubation</td>
<td>2.2±0.9</td>
</tr>
<tr>
<td>P. a-6</td>
<td>positive control (phenol 5%)</td>
<td>2.4±0.6</td>
</tr>
<tr>
<td>P. a-7</td>
<td>supernatant collected 48 hours post-incubation</td>
<td>1.7±0.6</td>
</tr>
</tbody>
</table>

A= negative control (MRS broth + olive oil), B= supernatant collected 24 hours post-incubation, C= supernatant collected 48 hours post-incubation, D= supernatant collected 48 hours post-incubation with 1% olive oil, E= supernatant collected 48 hours post-incubation + 1% olive oil, F= positive control (phenol 5%)

Table 3 shows the antibacterial activity of L. acidophilus supernatants against hospital strains collected from patients diagnosed with GIT tumors. As shown in the above, 24 and 48 hours supernatants have shown remarkable antibacterial activity against all strains as compared to the positive control (phenol 5%). Adding olive oil to L. acidophilus during incubation (48 hours) reduced the antibacterial activity of the cell-free supernatants against the tested strains. Interestingly, adding the olive oil (1% v/v) to 48 hours cell-free supernatant enhanced the antibacterial activity against most of the strains as compared to 48 hours supernatant without oil.

Table 3: Inhibitory effect of Lactobacillus acidophilus supernatants on bacterial strains isolated from patients with GIT tumors

<table>
<thead>
<tr>
<th>Strains</th>
<th>Conditions of L. acidophilus supernatant</th>
<th>Diameter of inhibition zone (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>proteus spp</td>
<td>negative control (MRS broth + olive oil)</td>
<td>1.1±0.9</td>
</tr>
<tr>
<td>E. sakazaki</td>
<td>supernatant collected 24 hours post-incubation</td>
<td>0.6±1.2</td>
</tr>
<tr>
<td>E. sakazaki</td>
<td>supernatant collected 48 hours post-incubation</td>
<td>0.6±0.57</td>
</tr>
<tr>
<td>P. areugi.</td>
<td>supernatant collected 48 hours post-incubation</td>
<td>1.3±0.57</td>
</tr>
<tr>
<td>E. sakazaki</td>
<td>supernatant collected 48 hours post-incubation</td>
<td>1.3±0.9</td>
</tr>
<tr>
<td>P. areugi.</td>
<td>supernatant collected 48 hours post-incubation + 1% olive oil</td>
<td>1.0±0.6</td>
</tr>
</tbody>
</table>

A= negative control (MRS broth + olive oil), B= supernatant collected 24 hours post-incubation, C= supernatant collected 48 hours post-incubation, D= supernatant collected 48 hours post-incubation with 1% olive oil, E= supernatant collected 48 hours post-incubation + 1% olive oil, F= positive control (phenol 5%)

Table 4 shows the antibacterial activity of L. acidophilus supernatants against strains collected from patients with diabetic foot lesion. All of the strains have similar susceptibility to 24 and 48 hours supernatants as compared to the positive control (phenol 5%). Interestingly, adding olive oil to L. acidophilus during incubation (48 hours) reduced but did not inhibit the antibacterial activity of the supernatants. Remarkable decrease in diameter of zone of inhibition around the cup containing the supernatant was observed for all the strains which in contrast to the other strains involved in this study. Adding the olive oil (1% v/v) to 48 hours cell-free supernatant enhanced the antibacterial activity against most of the strains as compared to 48 hours supernatant without oil.
Table 4: Inhibitory effect of *Lactobacillus acidophilus* supernatants on bacterial strains isolated from patients with diabetic foot lesions

<table>
<thead>
<tr>
<th>Strains</th>
<th>Diameter of inhibition zone (mm)</th>
<th>Conditions of L. acidophilus supernatant</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td><em>Proteus spp.</em></td>
<td>1.1±0.9</td>
<td>13.3±0.57</td>
</tr>
<tr>
<td><em>S. aureus</em></td>
<td>0.4±1.2</td>
<td>11.3±1.6</td>
</tr>
<tr>
<td><em>S. aureus</em></td>
<td>0.3±0.57</td>
<td>12.3±0.9</td>
</tr>
<tr>
<td>MRSA</td>
<td>1.3±0.57</td>
<td>11.7±1.1</td>
</tr>
<tr>
<td><em>P. aerugi</em></td>
<td>0.7±0.9</td>
<td>11.4±0.97</td>
</tr>
</tbody>
</table>

A= negative control (MRS broth + olive oil), B= supernatant collected 24 hours post-incubation, C= supernatant collected 48 hours post-incubation, D= supernatant collected 48 hours post-incubation with 1% olive oil, E= supernatant collected 48 hours post-incubation + 1% olive oil, F= positive control (phenol 5%)

It was interesting to compare the sensitivity of MRSA and *P. aeruginosa* to *L. acidophilus* supernatant, since they represented the majority of the tested strains in the study (figure 1). The results in figure 1 are expressed as diameter of zone of inhibition around cups containing supernatants. In the case of MRSA, adding 1% v/v olive oil to 48 hrs cell-free supernatant resulted in slight insignificant increase in diameter of zone of inhibition as compared to 48hrs cell-free supernatant without oil ($p=0.1362; 95\% CI=-2.482-0.359$). On the other hand, *P. Aeruginosa* strains showed remarkable susceptibility to 48 hrs cell-free supernatant plus 1%v/v olive oil. In this condition, there was significant increase in diameter of zone of inhibition as compared to 48 hrs cell-free supernatant without oil ($p=0.002; 95\% CI=3.452-0.9084$). As shown previously, significant reduction in antimicrobial activity of to *L. acidophilus* supernatant was observed against both strains when 1% v/v olive oil added to *L. acidophilus* culture. Generally, both strains showed comparable results to the other conditions as shown in figure 1.
Figure 1: Antibacterial activity of to L. acidophilus supernatants against 13 hospital isolates of MRSA and 10 of P. aeruginosa. Sensitivity was deduced by comparing the inhibition zone diameter produced by different conditions using cup-cut plate method. Each experiment was conducted in triplicate. The data are expressed as mean values ± standard deviation of three experiments. Statistical analysis was performed with a Student t test.

Kinetic of antimicrobial activity using time-kill curve method

In the present study, the antimicrobial effectiveness of L. acidophilus supernatant was also confirmed by time-kill curve method. The strains MRSA-1 and P. aeruginosa -4 were selected for the time-kill curve study because they had the highest antimicrobial resistant profile among the strains involved in this study. Bacterial growth was assessed by counting colonies to determine the number of c.f.u. Figures 2a and b show growth curves for MRSA-1 and P. aeruginosa -3 strains with and without the cell-free supernatant of LAB. In general, addition of LAB supernatants to target bacteria resulted in reduced growth of both strains compared to control (figures 1 and 2). 24 and 48-hrs LAB supernatants appeared to have bacteriostatic activity within 24 hrs of incubation and reduced growth of MRSA-1 and P. aeruginosa -3 (< 3 log CFU/mL decrease) and reached the bacteriocidal activity after 36 hrs of incubation (≥ 3 log CFU/mL decrease). Remarkably, addition of olive oil 1% v/v to 24 hrs cell-free supernatant improved the bacteriocidal activity against both strains. This combination was the most effective condition where it showed a clear bacteriocidal activity within 18 hrs of incubation (≥ 3 log CFU/mL) and completely inhibited growth of both strains after 24 hrs of incubation. In contrast, co-incubation of L. acidophilus with 1% v/v olive oil reduced the bacteriocidal activity, and showed only bacteriostatic activity of LAB supernatant against both strains (< 3 log CFU/mL decrease).
Figure 2: the killing curve activity of *L. acidophilus* against *P. aeruginosa* and MRSA. The numbers of viable bacteria were determined (log CFU/ml) after different time points. Each experiment was conducted in triplicate. The data are expressed as mean values ± standard deviation of three experiments. Statistical analysis was performed with a Student *t* test.

**Discussion**

As previously reported, *L. acidophilus* possess and release several bioactive substances such as organic acids hydrogen peroxide, carbon dioxide and bacteriocins which have high antimicrobial activity and can act non-specifically against broad ranges of pathogens (9, 20, 24, 25). It is well known that antimicrobial activity is one of the most important selection criteria for probiotics. Therefore, the current study was designed to; 1-) address the antimicrobial activity of *L. Acidophilus* supernatant against several clinical bacterial pathogens isolated from patients with different infectious diseases, and 2-) address the antimicrobial activities of the novel combination of olive oil plus *L. acidophilus* supernatant against highly antibiotic resistant clinical strains in vitro.

The effectiveness of each condition was determined by agar disc diffusion method and inhibition zone diameters were measured against tested strains. Based on the observations, 80% and 100% of MRSA strains isolated from renal transplant recipients were susceptible to the antibacterial activity of 24 and 48 hrs LAB supernatants, respectively. This insignificant difference might be due to the variation in the concentration of the antimicrobial products released during the period of *L. Acidophilus* incubation. In agreement with our results, cell free supernatant of LAB was found to be very effective in inhibiting the production of lipase from biofilm and planktonic cells of MRSA isolates (12). Furthermore, cell-free supernatant of *L acidophilus* succeeded in eliminating wound infection caused by *S. aureus* (26). Additionally, cell-free supernatants of *L. acidophilus* showed very good antimicrobial activity against the target *P. aeruginosa* strains isolated from the same patients with inhibitory zone greater between 7 ± 3.53 to 14 ± 0.60 mm diameter. Therefore, Gram negative and Gram-positive pathogens involved in the present investigation were remarkably inhibited by cell-free supernatants.
of *L. Acidophilus*. In supporting to our observations, earlier reports showed that *L. acidophilus* isolated from human intestine have antimicrobial activity against a wide range of Gram negative and Gram-positive pathogens *in vitro* and *in vivo* (27-29). We extended the investigation to involve 6 bacterial strains isolated from patients with GIT tumors and 5 strains from patients with diabetic foot lesion. Although, the strains utilized in this study produced different results, likely due to their unique clinical backgrounds, they were susceptible to the antimicrobial activity of cell-free supernatant of *L acidophilus*. Similar results were reported in that *L acidophilus* have been shown to inhibit the *in vitro* growth of many enteric pathogens and have been used in both humans and animals to treat a broad range of gastrointestinal disorders (9). Besides this, cell-free supernatant of *L acidophilus* was highly efficient in controlling wound infection caused by *S. Aureus*. In consistency, elsewhere study has concluded that the highest inhibitory activity of *L acidophilus* supernatant observed was against *Bacillus subtilis, P. aerogenosa, S. pyogenes, P. vulgaris, S. aureus* (30). Noteworthy, all tested strains were highly pathogenic with highly antibiotic resistance profiles and classified based on their sites of collection. The results of present study, suggest that the cell-free-supernatants of *L acidophilus* exerted reliable inhibitory effect on these pathogenic strains. Collectively, in this study, we have shown that cell-free supernatant of *L. acidophilus* have significant antibacterial effect and this effect was independent of bacterial strains and sites of samples collection.

The main intention of our study is designed to address the effect of olive oil on the antibacterial activity of *L. acidophilus*. In this contest, olive oil at the concentration of 1% v/v was added to; 1-) the MRS media containing *L. acidophilus* and incubated for 24 hrs followed by supernatant collection, and 2-) the cell-free supernatant of the *L. acidophilus* after 24 hrs of incubation. Modification of media as carried out in this study allows us to test and compare the influence of olive oil during and after incubation. The incubation of *L. acidophilus* in presence of 1% v/v olive oil overnight produced supernatant with significantly low, if any, antibacterial activity against the target bacteria compared to the same supernatant in absence of olive oil. This is evident by absence of the zone of inhibition around the cups containing the supernatant. Very few strains were still susceptible with reduced diameter of zone of inhibition, which may be because the strains are heterovariant to the combination. This observation can be, to some extent, explained by susceptibility of *L. acidophilus* to the inhibitory effect of olive oil. As a result of losing its viability, *L. acidophilus* will also lose its ability to release bioactive and antibacterial compounds in the media, therefore its supernatant will lose the antibacterial property. The presence of antimicrobial compounds in olive fruits and olive oils has been proven in many literatures (19, 31, 32). In particular, Oleuropein and its derivatives such as the aglycon of oleuropein and the elenolic acid showed strong bactericidal activity against LAB (33-35). Therefore, our observations were in consistent with others in this context. Interestingly, adding 1% v/v olive oil to 24-hrs cell-free supernatant resulted in producing a product with significantly higher antibacterial activity compared to 24-hrs cell-free supernatant without olive oil. Importantly, no change regarding the pH was recorded in the mixture; therefore, the effect of pH on the growth of the tested bacteria was excluded. As mentioned
earlier, cell-free supernatant of *L. acidophilus* has been proven to have antimicrobial activity (21, 23, 24). Besides this, several studies revealed that olive oil and fruits exerted a strong bactericidal action against a broad spectrum of microorganisms (33-35). Therefore, the presence of these two products together will be additive and/or synergistic effect, which is a clear explanation of our observation. These findings opened up the possibility of using olive oil and LAB supernatant as an effective antibacterial product to prevent and/or delay the onset of growth of several pathogens.

Further effectiveness of combination of olive oil with *L. acidophilus* supernatant was also confirmed by time-kill curve against MRSA-1 and *P. aeruginosa* -3 strains. The strains in this study, however, were specifically chosen because they were highly resistant to wide range of clinically used antibiotics. To our knowledge, the present study is the first to study and compare the efficacies of this combination against highly pathogenic bacteria. Time-kill curve technique, which measures bactericidal activity, appears to be more relevant and provide a dynamic picture of antimicrobial action and interaction over time, as opposed to the agar diffusion technique, which is usually applied only once (after 24 h of incubation) (36, 37). A starting inoculum of $1 \times 10^6-1 \times 10^7$ cfu/mL was chosen as representative of those observed in severe clinical infections. However, the combination of olive oil plus *L. acidophilus* supernatant demonstrated both synergistic and enhanced bactericidal activity against two clinical MRSA -1 and *P. aeruginosa* -3 strains ($\geq 3$ log$_{10}$ CFU/ml decrease). With this regard, the time to bactericidal activity was generally lesser than 24 h, compared to 24-hrs cell-free supernatant alone. In contrast, supernatant collected after 24 hrs incubation in presence of olive oil did not display enhanced antimicrobial activity ($< 2$ log$_{10}$ CFU/ml decrease) where the regrowth of both strains continued to occur after 36 hrs. This may be because the olive oil had suppressed *L. acidophilus* and reduced the antimicrobial compounds in the surroundings, as cited earlier. To our knowledge, the rapid and sustained bactericidal activity of olive oil plus *L. acidophilus* supernatant obtained in this study is a novel finding. The time-kill curve results was in consistent with the results obtained by agar diffusion plate technique. Collectively, the results obtained support the hypothesis that the combination of olive oil plus *L. acidophilus* supernatant is a likely mechanism for the reduction of several pathogenic bacteria in vivo. However, the clinical significance of these observations remains to be established. These data support the need for *in vivo* investigations to validate the interaction observed *in vitro* between olive oil and *L. acidophilus* supernatant.

In conclusion, the novel combination of olive oil plus *L. acidophilus* supernatant provided rapid bactericidal activity and provides a therapeutic option for treating highly pathogenic bacteria, especially when bactericidal activity is desired. Last, further deep investigations with these combinations are warranted.
References

Awareness, perception and factors affecting utilization of cervical cancer screening services among female nurses in Zawia teaching hospital

Mufida M. Khetresh
Department of Family and Community, Faculty of Medicine,
University of Zawia, Zawia, Libya

Abstract: Cervical cancer is a malignant neoplasm arising from cells originating in the cervix. One of the most common symptoms of cervical cancer is abnormal vaginal bleeding, but in some cases there may be no obvious symptoms until the cancer has progressed to an advanced. Among all malignant tumours, cervical cancer is the one which can be most effectively controlled by organized screening programmes. The aim of the present study is to examine women’s awareness of cervical cancer, to investigate women’s perception of screening programmes, finally to determine factors influencing utilization of services. This is a descriptive and cross-sectional study conducted in Zawia teaching hospital from August to September 2015 with total of 200 respondents. With self-administered questionnaire was used to obtained information on the socio-demographic characteristics of the respondents, knowledge, perception about cervical cancer screening, as well as barriers against screening services. Fifty-three point five percent (107) of the women were aged 30-39 years and 63 (31.5%) were aged 40-49 years. Ten percent (20) of the respondents were aged 50 years and above. This means that the majority of the respondents were still within the reproductive age group 90% of the respondents were heard of cervical cancer and 51% heard of cervical cancer screening programmed. 91 (45.5%) and 88 (44%) of staff heard about cervical cancer from a physician and TV/Radio, respectively. While 89 (44.5%) and 56 (28%) of staff heard about cervical cancer screening from TV/Radio and physician, respectively.

Key words: Knowledge, attitude, barriers, cervical cancer, screening, Libya

Introduction

Cervical cancer is well recognized as the third most leading diagnosed in overall women’s cancer disease in the world (1). Most cases were detected in the developing countries in comparison to the developed countries with an estimated 529,409 new cases and 274,883 deaths in 2008. About 85% of the cases occur in developing countries, representing 13% of female cancers (WHO/ICO 2010). A literature search identified studies that examine factors influencing women's participation in screening program, their psychological reaction to the receipt of an abnormal cervical smear result, and experiences of colposcopy. Reasons given for non-participation included administrative failures, inconvenient clinic times, unavailability of a female screener, lack of awareness of the test's indications and benefits, considering one self not to be at risk of developing cervical cancer, and fear of embarrassment, pain, or the detection of cancer. The receipt of an abnormal result and referral for colposcopy cause high levels of distress owing to limited understanding of the meaning of the smear test, many women believe the test aims to
detect existing cervical cancer (2). Inadequate knowledge (3) and lack of awareness can become a barrier to cervical cancer prevention (4). Many participants in previous screening studies revealed that they have little knowledge of cervical cancer (5) and early screening using the Pap test can save their lives. Respondents also reported that they perceive that cervical cancer ultimately leads to death and can never be cured (6-9). Respondents in a Malaysian study stated that cervical cancer arises from contracting sexually transmitted diseases (8). Some respondents also feel that insufficient information is made available about the centres providing the screening facilities (10-12). Other respondents expressed concern that they would lose their virginity if they undertook the cervical screening test. This may relate in part to lack of knowledge regarding Pap smear screening process and test. the socio-background of the family (4, 10).

Materials and methods

Study design: This is a descriptive and cross sectional study was conducted in Zawia teaching hospital, the study view point was conducted over a 9 month period from November 2014 to August 2015 with total of 200 respondents. aimed at assessing and documenting the perception and utilization of cervical cancer screening services among female medical staff. It sought to understand the perception of this population about cervical cancer, its risk factors, severity and prevention. With self-administered questionnaire will be designed to assess the view, knowledge, level of perception and the attitude of female medical staff towards cervical cancer screening based upon similar studies conducted elsewhere and literature review. The questionnaire was used to obtained information on the socio-demographic characteristics of the respondents, knowledge, perception about cervical cancer screening, as well as barriers against screening services. The questionnaire included 19 questions and was divided into three sections: awareness about cervical cancer screening and risk factors for cervical cancer; reasons for non-participation in the national cervical cancer screening programme; a face to face interview technique according to a form translated into simple Arabic languish to ensure its comprehensibility. Respondents were given a free hand in response to questions and were only guided in their responses when they voluntarily called for assistance. They were also assured that the information provided would be kept confidential.

Study setting: The data will be collected from Service departments in researcher area are grouped into clinical and non-clinical departments. The clinical department consisted of 8 departments (Anaesthesia, Obstetrics & Gynaecology, Dialysis, Radiology, General Surgery, Medicine, Theatre, Paediatrics) and the non-clinical comprised 3 departments (Pharmacy, Nursing Records, and Administrative/Finance Departments).

Sampling procedure: Stratified, proportionate and simple random sampling techniques will adopted for the selection of data collection process, each interview started with an introduction and overview of the research including the objectives of the study. The respondents will told not to write any name on the self-administered
questionnaire. Respondents were encouraged to ask questions on what they do not understand in the questionnaire. Explanations were given to respondents as required to aid their understanding of unfamiliar terms. The questionnaires were retrieved back from each respondent immediately after completion and they were reviewed for completeness.

**Statistical analysis**

Data entry and analysis were performed with using statistical package for social sciences (SPSS) version 14. Demographic data were summarized using descriptive statistics. Data were collected from mid-June to early August, 2015. Descriptive and inferential statistics such as percentages, Chi-square test, and factor analysis were used to determine the nature of the problem. The test of significance was considered when p < 0.05.

**Results**

The study was successfully conducted in the selected hospital. With a good response rate. Table 1 illustrates the background characteristics of the respondents. A total of 200 female nurses were recruited for this study. Females aged 20 - 60 years participated in the study. Fifty-three point five percent (107) of the women were aged 30-39 years and 63 (31.5%) were aged 40-49 years. Ten percent (20) of the respondents were aged 50 years and above. This means that the majority of the respondents were still within the reproductive age group. In terms of their marital status, 53% of the respondents were single, 44% married, 1% widowed, and 2% divorced. Most of the respondents resided at rural area within 49% and 64% of respondents were Libyan nationality and 36% were non Libyan, most of them were Filipino (30%), 2% from Bangladesh, 1.5% from Indian and Sudan and about 1% were from Egyptian. Fifty one percent of population study had 3 children.

Table 2 shows the awareness of cervical cancer and cervical cancer screening. 90% of the respondents were heard of cervical cancer and 51% heard of cervical cancer screening program. 91(45.5%) and 88(44%) of staff heard about cervical cancer from a physician and TV/Radio respectively. While 89(44.5%) and 56(28%) of staff heard about cervical cancer screening from TV/Radio and physician respectively.

In the adjusted model screening awareness depended on nationality - Non Libyan speaking women were better aware of the programme than the others 95% CI: 6.72-7.78 and P value 0.03 those were explained in table 3 below.
Table 1: Socio demographic data of respondents (n = 200)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age group</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-29</td>
<td>5</td>
<td>2.5%</td>
</tr>
<tr>
<td>30-39</td>
<td>107</td>
<td>53.5%</td>
</tr>
<tr>
<td>40-49</td>
<td>63</td>
<td>31.5%</td>
</tr>
<tr>
<td>50-59</td>
<td>20</td>
<td>10%</td>
</tr>
<tr>
<td>≥ 60</td>
<td>5</td>
<td>2.5%</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>106</td>
<td>53%</td>
</tr>
<tr>
<td>Married</td>
<td>88</td>
<td>44%</td>
</tr>
<tr>
<td>Widowed</td>
<td>2</td>
<td>1%</td>
</tr>
<tr>
<td>Divorced</td>
<td>4</td>
<td>2%</td>
</tr>
<tr>
<td><strong>Nationality</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Libyan</td>
<td>128</td>
<td>64%</td>
</tr>
<tr>
<td>Non Libyan</td>
<td>72</td>
<td>36%</td>
</tr>
<tr>
<td>(Filipino)</td>
<td>60</td>
<td>30%</td>
</tr>
<tr>
<td>Indian</td>
<td>3</td>
<td>1.5%</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>4</td>
<td>2%</td>
</tr>
<tr>
<td>Sudan</td>
<td>3</td>
<td>1.5%</td>
</tr>
<tr>
<td>Egyptian)</td>
<td>2</td>
<td>1%</td>
</tr>
<tr>
<td><strong>Place of residence</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Big town</td>
<td>70</td>
<td>35%</td>
</tr>
<tr>
<td>Small town</td>
<td>32</td>
<td>16%</td>
</tr>
<tr>
<td>Country side</td>
<td>98</td>
<td>49%</td>
</tr>
<tr>
<td><strong>Number of children</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>69</td>
<td>34.5%</td>
</tr>
<tr>
<td>1</td>
<td>10</td>
<td>5%</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>4%</td>
</tr>
<tr>
<td>3</td>
<td>102</td>
<td>51%</td>
</tr>
<tr>
<td>≥ 4</td>
<td>11</td>
<td>5.5%</td>
</tr>
</tbody>
</table>

Table 2: Awareness of cervical cancer and cervical cancer screening

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>Percentage(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEARD OF CERVICAL CANCER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>180</td>
<td>90%</td>
</tr>
<tr>
<td>No</td>
<td>20</td>
<td>10%</td>
</tr>
<tr>
<td>HEARD OF CERVICAL CANCER screening</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>102</td>
<td>51%</td>
</tr>
<tr>
<td>No</td>
<td>98</td>
<td>49%</td>
</tr>
<tr>
<td>Source of information for Cervical Cancer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(For those that demonstrated awareness)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physician/Health worker</td>
<td>91</td>
<td>45.5%</td>
</tr>
<tr>
<td>Family/Friends</td>
<td>10</td>
<td>5%</td>
</tr>
<tr>
<td>Newspaper</td>
<td>6</td>
<td>3%</td>
</tr>
<tr>
<td>TV/Radio</td>
<td>88</td>
<td>44%</td>
</tr>
</tbody>
</table>
Table 3: demographic characteristics of women awareness of cervical cancer screening programme

<table>
<thead>
<tr>
<th>Socio-demographic characteristics</th>
<th>Categories</th>
<th>(CI 95%)</th>
<th>Test statistic</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group, yrs</td>
<td>20-29</td>
<td>1.43-1.57</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>30-39</td>
<td>6.48-7.98</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>40-49</td>
<td>5.82-8.04</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>50-59</td>
<td>3.95-8.94</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>≥ 60</td>
<td>2.52-7.48</td>
<td></td>
<td>0.87</td>
</tr>
<tr>
<td>Marital status</td>
<td>Single</td>
<td>6.90-8.75</td>
<td></td>
<td>0.11</td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>6.11-7.29</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Divorced</td>
<td>6.61-8.28</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Widowed</td>
<td>5.48-5.82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nationality</td>
<td>Libyan</td>
<td>4.81-6.99</td>
<td></td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td>Non Libyan</td>
<td>6.72-7.78</td>
<td></td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>(Filipino Indian</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sudan</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Egyptian</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Place of residence</td>
<td>Big town</td>
<td>6.12-7.78</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Small town</td>
<td>6.61-8.28</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Country side</td>
<td>5.08-8.04</td>
<td></td>
<td>0.55</td>
</tr>
</tbody>
</table>

Respondents did not have any idea about the impact of smoking as a cause of cervical cancer and HPV was better known as a risk factor - 86.6% from the non Libyan women. 75.7% of the women responded that they were planning to participate in a cervical cancer screening programme. The overwhelming majority (97.7%) of the respondents had never

In the questionnaire, all the cervical cancer risk factors were given without stating this and women were asked whether they think that these are risk factors or not. About 93% of the respondents had no knowledge of the mode of transmission of this disease. In general Women did not have a good overview about cervical cancer risk factors, for example,
had accounted for 16.25% and 12.73% of the total variation in the data, respectively. This means that these are the most devastating barriers. Specifically, items such as “the screening sites are too far from where I live” and “there is limited information on cervical cancer in the community” were dominant in the institutional barriers to the Pap smear test among the respondents. With regard to the personal barriers, the respondents lacked adequate knowledge about the test and where it could be done. Similarly, negative beliefs, and negative misconception barriers collectively explained about less than 47% of the total variation. The negative beliefs identified by the majority of the respondents were that the Pap smear test was embarrassing and painful. the negative misconceptions identified were that women did not feel at risk and therefore felt no need for Pap screening.

heard about the Pap smear test. However, eight (2%) of the respondents had a correct understanding of Pap smears. Of the respondents (non-Libyan) who had undergone the Pap smear test in the study, only three (0.8%) had been screened. The three respondents who had had a Pap smear test reported that they were referred by their health care providers.

The main barriers identified by respondents for not seeking Pap smear tests were institutional and personal, as shown in Table 4. These were lack of screening sites, screening sites being too far away, limited information on cervical cancer, and absence of health education programs. The personal factors were lack of knowledge about the Pap smear test and the facilities where it can be carried out. This is because these two barriers

<table>
<thead>
<tr>
<th>Scale</th>
<th>Loadings (MBS)*</th>
<th>Barrier factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>There are no screening sites in the community</td>
<td>0.849</td>
<td>Institutional barriers</td>
</tr>
<tr>
<td>There is limited information on cervical cancer in the community</td>
<td>0.873</td>
<td>Institutional barriers</td>
</tr>
<tr>
<td>The screening sites are too far from where I live</td>
<td>0.939</td>
<td>Institutional barriers</td>
</tr>
<tr>
<td>There are no health education programs to promote screening</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I do not know what the test is all about</td>
<td>0.376</td>
<td>Institutional barriers</td>
</tr>
<tr>
<td>I do not know of any screening sites</td>
<td>0.944</td>
<td>Personal barriers</td>
</tr>
<tr>
<td>Pap smear test is painful</td>
<td>0.948</td>
<td>Personal barriers</td>
</tr>
<tr>
<td>Recent visit to gynaecologist</td>
<td>0.885</td>
<td>Negative belief barriers</td>
</tr>
<tr>
<td>Appointment times not suitable</td>
<td>0.188</td>
<td>Negative belief barriers</td>
</tr>
<tr>
<td>It is not necessary for me</td>
<td>0.580</td>
<td>Negative misconceptions</td>
</tr>
<tr>
<td>0.77</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*(MBS)= Mean barrier score calculated by totalling the subject responses for each question in order to get the mean barrier score. Higher scores indicate a greater perceived barrier scale.
The study revealed that not having Pap smear tests had significant associations with all seven barriers at the 5% significance level as shown in Table 5. This confirmed the negative implications of these barriers on respondents’ decision not to undergo a Pap smear test for cervical cancer. Confirming the results from the factor analysis, the Chi-square test also revealed that institutional barriers were the main barriers to seeking a Pap smear test, followed by personal barriers, since they had the highest Chi-square values of 28.965 ($df=4; P=0.000$) and 26.055 ($df=5; P=0.000$), respectively.

<table>
<thead>
<tr>
<th>Barriers</th>
<th>Chi-square values</th>
<th>$Df$</th>
<th>$P$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal barriers</td>
<td>26.055</td>
<td>5</td>
<td>0.000</td>
</tr>
<tr>
<td>Institutional barriers</td>
<td>28.965</td>
<td>4</td>
<td>0.000</td>
</tr>
<tr>
<td>Negative belief barriers</td>
<td>21.915</td>
<td>4</td>
<td>0.000</td>
</tr>
<tr>
<td>Negative misconception barriers</td>
<td>20.965</td>
<td>4</td>
<td>0.000</td>
</tr>
</tbody>
</table>

**Table 5: Association between Pap smear test and the barriers to Pap smear test**

**Discussion**

Libya has a population of 2.21 millions women ages 15 years and older who are at risk of developing cervical cancer. Current estimates indicate that every year 241 women are diagnosed with cervical cancer and 95 die from the disease. Cervical cancer ranks as the 3rd most frequent cancer among women in Libya and the 7th most frequent cancer among women between 15 and 44 years of age. Data is not yet available on the HPV burden in the general population of Libya. However, in Northern Africa, the region Libya belongs to, about 3.0% of women in the general population are estimated to harbour cervical HPV-16/18 infection at a given time and 81.2% of invasive cervical cancers are attributed to HPVs 16 or 18 (11). This study had three principal aims. First, to estimate which socio-economic characteristics are associated with female nursing awareness about cervical cancer. Secondly, to investigate women’s perception of screening programmes and risk factors for cervical cancer. And finally, to study reasons why so many Libyan women do not participate in the cervical cancer screening programme. An important outcome of my study was that approximately a half of the respondents were not at all or were only partially aware of cervical cancer screening. According to Libya Human Papilloma virus and Related Cancers, Fact Sheet 2014 (Dec 15, 2014) , No data available on Cervical screening practices and recommendations.

The study results revealed that there is a strong need to improve women’s knowledge about cervical cancer risk factors. Knowledge of women on cervical cancer and the Pap smear test are critical in cervical cancer prevention strategies. The results of this study shows that a great proportion (49%) of the
sampled population had never heard of cervical cancer screening. This finding is consistent with other research, which reported a lack of knowledge about cervical cancer among women in neighbourhood countries (13). Education on cervical screening through the mass media and health talks in delivering health care are imperative to informing women about cervical cancer and the facilities available for them. Opportunistic screening in health facilities could be encouraged to improve screening uptake, especially in women in rural areas. It is evident that information about cervical cancer needs to be made available to women through mass campaigns about the disease, especially specific preventive measures and the screening facilities available. According to the WHO, cervical cancer is caused by HPV, which is a sexually transmitted infection and mostly affects sexually active men and women. However, in the current study, only few respondent (non Libyan) knew that cancer of the cervix could be transmitted sexually. This implies that a greater proportion of sexually active women might acquire HPV through sex without them knowing the source of the infection. Awareness of the Pap smear test was low of the respondents had never heard about the Pap smear test. This is consistent with the findings of previous studies, in underdeveloped countries. In the present study, only 2% had correct understanding of Pap smears, ie, they could describe the test and identify facilities where one can obtain such services. This affirmed the findings of Paolino and Arrossi, in which a significant proportion (49%) of those who had been screened had inadequate knowledge about Pap smears. In Libya and other developing countries, there is poor institutional framework to promote screening. This is different from industrialized nations, which have largely succeeded in implementing successful programs. A possible explanation is that women will engage in cervical screening if they are well-informed about it and the enabling factors are present to facilitate effective screening uptake. In the present study, institutional and personal factors. In conclusion, Cervical cancer is a problem of global health concern. Cervical cancer screening services such as the Pap smear test might be effective in detecting early precancerous lesions. A greater proportion of the staff respondents had little or no knowledge of cervical cancer screening. There is a need for the authorities of tertiary educational institutions and particularly those of Zawia teaching hospital to incorporate regular cervical cancer screening into the health care of their staff. Adoption of alternative screening techniques, such as visual inspection with acetic acid (VIA) may be necessary to widen patients’ coverage. Pap smears should be accorded priority like other Maternal and Child Health Programs. The state government needs to put in place a policy on screening for cervical cancer with appropriate screening guidelines.
References

Quality control in medical reference laboratory in Tripoli

Ramadan A. Alshames1 Mahjiub I. Zendah2 and Abdul Baset A. Elfiqhi 3

1Department of Biochemistry, Faculty of Dentistry, 2Department of Physiology and 3Department of Biochemistry,
Faculty of Medicine, University of Tripoli, Tripoli, Libya

Abstract: quality control is a broad term covering the methods used to monitor the quality of many products from aircraft, ships, cars, games, food and beverage industries and medicines etc. In the field of medical laboratory this term used to denote the methods used for continuous evaluation of the results of the laboratory of all kinds. That is the main objective of quality control in medical laboratories is to ensure the validity and accuracy of the results of analyzes performed by the laboratory. they are used to verify the results accuracy. As it is well known by everyone, the results of the laboratory can lead to the wrong decision during medical diagnosis or treatment follow-up based on results and sometimes fatal consequences.

And for this Van accuracy of laboratory results is of great importance, hence the importance of gaining quality control. It is essential that everyone be convinced of the importance of quality control programs in medical laboratories It is not enough to be convinced that our results are correct once guessing, because many of the experiments conducted in the past made clear the importance of urgent and pressing to improve results in the medical laboratory. For example, the national external quality control programs such as those monitoring programs, help detect errors and identify problems in medical laboratories, but this does not sing about the existence of internal quality control in each laboratory separately but this topic programs are going on all the time to help in the qualitative evaluation and follow-up in the laboratory on an ongoing basis. This topic programs, including both internal or external, only describe the quality of laboratory results, and the technicians in laboratories of all levels to use the results of this topic and programs to improve the quality of the work they do. The aim of conducting this topic initial study is to find out what was the medical laboratories of all kinds in the medical reference laboratory in Tripoli, Libya, do any programs for quality control. I will take this topic highlighted in the paper on quality control in medical laboratory programs, and the problems they face and we will propose some solutions to these problems. Through the results obtained through the implantation of quality control samples of medium and high concentration levels and the non-inclusion of low concentration until the comprehensive coverage of all the different concentrations in the laboratory of clinical chemistry for various types of daily analyzes such as fat, protein, minerals, enzymes, etc. between the analysis of daily patients samples with different levels of emphasis between low, medium and high show it in the plane defined by the manufacturers of these solutions titer. What Clinical Chemistry Laboratory in Reference Medical laboratory in Tripoli doing is not enough, the application of quality control programs, both internal and external it recommend seeking and seriousness in the rapid decision and purely on advanced scientific methods for the application of quality controls within all medical laboratories in the country is not enough until we get the accurate results of analyzes can help the physician to reach the correct diagnosis.
المراقبة النوعية في المختبر الطبي المرجعي بطرابلس

رمضان علي الشامس، محجوب إبراهيم الزنداح وعبد الباسط عبد السلام الفقي

قسم الكيمياء الحيوية، كلية طب الأسنان، قسم وظائف الأعضاء، قسم الكيمياء الحيوية، كلية الطب البشري، جامعة طرابلس، طرابلس، ليبيا

المستخلص:
المراقبة النوعية مصطلح واسع يغطي الطرق المستخدمة لمراقبة نوعية وجودة العديد من المنتجات من صناعة الطائرات والسفن والسيارات والألعاب والصناعات الغذائية و المشروبات والأدوية الخ.

في مجال المختبرات الطبية يستعمل هذا المصطلح لدلالة على الطرق المستخدمة لتقييم المراقبة النوعية في المختبرات الطبية. أي أن المراقبة النوعية هي تلك التي تم تطبيقها في المختبرات الطبية للتأكد من صحة ودقة نتائج التحاليل التي تقوم بها المختبرات. 

النتائج في بعض الأحيان إلى عواقب فادحة، ولذا فإن متوقعية نتائج المختبر تعتبر ذات أهمية كبيرة، ومن هنا تكتسب المراقبة النوعية أهميتها.

من الضروري أن يكون الجميع مقتنعين بأهمية برامج المراقبة النوعية في مختبراتنا الطبية فليس كافياً بأن نكون مقتنعين بأن نتائجنا صحيحة بمجرد التحليل، لأن العديد من التجارب التي أجريت في السابق أوضحت الأهمية المستعجلة والملحة لتحسين النتائج في المختبرات الطبية.

برامج مراقبة النوعية الخارجية كالبرامج الوطنية على سبيل المثال، تساعد في الكشف عن الأخطاء وتحديد المشاكل في المختبرات الطبية، ولكنها لا تضمن وجود مراقبة نوعية داخلية في كل مختبر على حد سواء. إذ أن الطرق المستخدمة في مراقبة النوعية في المختبرات الطبية، مثل تدقيق النتائج، تؤدي إلى استدامة النتائج.

هناك خطر شائع لدى العاملين في المختبرات الطبية، وهو أن نتائج التحاليل الطبية تكون غير دقيقة أو صحيحة، مما يؤدي إلى تأخير التشخيص أو إخفاق في التشخيص.

المقدمة:
مع التقدم السريع والتوسع الكبير في مجال التحاليل، زادت الحاجة إلى تحسين جودة النتائج. هناك ثلاث أقسام رئيسية للعوامل التي تؤثر على جودة النتائج: الإعداد، التحليل والتصحيح. 

تعد هذه الأقسام جزءاً أساسيًا في محاضرة التحاليل المختبرية. 

في الثامن من شتنبر، تعود المراقبة النوعية في مختبراتنا الطبية إلى أهميتها. 

وقد تبين لنا أن المراقبة النوعية هي إحدى أهم الأمور في مجال التحاليل الطبية. 

في هذا المقال، سنناقش نتائج محاكاة لدقة التحاليل الطبية في مختبر طرابلس، وتأثيرها على نتائج التشخيص.

تعد المراقبة النوعية جزءًا أساسيًا من عملية التحاليل الطبية، حيث تساعد في تحسين دقة النتائج وزيادة ثقة الأطباء في نتائج التحاليل. 

لذا، نوصي بالاستمرار في تطبيق البرامج المراقبة النوعية في جميع المختبرات الطبية في المدينة، وذلك لضمان دقة النتائج وتلبية احتياجات الأطباء والمرضى. 

المراجع:

© 2015 LJMR.com.ly. جميع الحقوق محفوظة.
وعجزها وهو عدم الحصول على نتائج متوافقة تتعلق بعملية التحليل نفسها، وهذا يكمن في الواقع غير صحيح، ومراقبة النوعية لخطوات التحليل في المختبر لن تكون مؤثرة إذا لم يتم أخذ التحويلات الكافية تجاه مشاكل ما قبل التحليل التي تشمل، معالجة الطريقة، وتوثيق ونظامية الأدوات المستخدمة في التحليل، وجمع العينات ومعالجتها بالطرق الصحيحة.

استخدام المحاليل العيارية، وهي محاليل تحتوي على تركيز معلوم من المادة المراد قياسها. لذا فإن دقة المحاليل تعتمد على تحضير المحلول الصحيحة. لتجربة تحضير المحاليل العيارية لا تقتصر على مسألة الوزن الدقيق للمادة المراد قياسها، ولكن تتعداها إلى نظافة المواد المراد قياسها ودرجة نقاوتها وكذلك تعتمد على نوعية الأواني المستخدمة للتحضير من البلاستيكية أو الزجاجية، ومن المهم أن يتم اختيار هذه الأواني استنادًا إلى نوعيتها وليس على أساس سعرها. كما يجب معايرة وصيانة الماصات بطريقة دورية. وكذلك القيام بتنظيف الأواني الزجاجية والبلاستيكية. ومن أهم مشاكل ما قبل التحليل، مشاكل جمع العينات، وتعمية META. وهذا يتضمن عدم استخدام مضادات التجلط الصحيحة، واعتماد استخدام أنبوب معين. وعند وجود ملاحظات على الأنبوب، انعدام استخدام تركيزات مخصوصة للالتهاب، وتعرض العينات للمواد الكيميائية خارجية. في هذه الورقة البحثية سنقدم نتائج المحاليل العيارية ل lượngات مختلفة من التحاليل التي تجري بمختبر الكيمياء السريرية بالمختبر الطبي المرجعي خلال اليومي، ومن بين أنواع المحلول العياري، ومن خلال تجربة المحاليل العيارية ومستوى توفرها، هو كما أنها ضرورية في المجال الطبي. النتائج:

تطبيق برامج مراقبة النوعية في المحاليل العيارية، ومن خلال التحليل التي تم الحصول عليها من زرع عينات مكونة من المحلول العياري الذي يتم مراقبته في المستويات المختلفة والقابلة للإختبارات البديلة في الخلايا الملونة، تتضمن عينات المحاليل العيارية لكل الاختبارات اليومية، حيث إن الحيل العيارية معلومة التركيز ذات التركيز العالي أثناء المحلول العياري، ومن خلال ملاحظة وتعمية META المفصلة في الحالات الطبية والمتوسطة والقابلة للإختبارات البديلة في الخلايا الملونة، تتضمن عينات المحاليل العيارية لكل الاختبارات اليومية، حيث إن الحيل العيارية معلومة التركيز ذات الركز العالي أثناء المحلول العياري، ومن خلال ملاحظة وتعمية META المفصلة في الحالات الطبية والمتوسطة والقابلة للإختبارات البديلة في الخلايا الملونة، تتضمن عينات المحاليل العيارية لكل الاختبارات اليومية، حيث إن الحيل العيارية معلومة التركيز ذات الركز العالي أثناء المحلول العياري، ومن خلال ملاحظة وتعمية META المفصلة في الحالات الطبية والمتوسطة والقابلة للإختبارات البديلة في الخلايا الملونة، تتضمن عينات المحاليل العيارية لكل الاختبارات اليومية، حيث إن الحيل العيارية معلومة التركيز ذات الركز العالي أثناء المحلول العياري، ومن خلال ملاحظة وتعمية META المفصلة في الحالات الطبية والمتوسطة والقابلة للإختبارات البديلة في الخلايا الملونة، تتضمن عينات المحاليل العيارية لكل الاختبارات اليومية، حيث إن الحيل العيارية معلومة التركيز ذات الركز العالي أثناء المحلول العياري، ومن خلال ملاحظة وتعمية META المفصلة في الحالات الطبية والمتوسطة والقابلة للإختبارات البديلة في الخلايا الملونة، تتضمن عينات المحاليل العيارية لكل الاختبارات اليومية، حيث إن الحيل العيارية معلومة التركيز ذات الركز العالي أثناء المحلول العياري، ومن خلال ملاحظة وتعمية META المفصلة في الحالات الطبية والمتوسطة والقابلة للإختبارات البديلة في الخلايا الملونة، تتضمن عينات المحاليل العيارية لكل الاختبارات اليومية، حيث إن الحيل العيارية معلومة التركيز ذات الركز العالي أثناء المحلول العياري، ومن خلال ملاحظة وتعمية META المفصلة في الحالات الطبية والمتوسطة والقابلة للإختبارات البديلة في الخلايا الملونة، تتضمن عينات المحاليل العيارية لكل الاختبارات اليومية، حيث إن الحيل العيارية معلومة التركيز ذات الركز العالي أثناء المحلول العياري، ومن خلال ملاحظة وتعمية META المفصلة في الحالات الطبية والمتوسطة والقابلة للإختبارات البديلة في الخلايا الملونة، تتضمن عينات المحاليل العيارية كل الأنظمة المختلفة من الأدوات المستخدمة في التحليل، حيث إن الحيل العيارية معلومة التركيز ذات الركز العالي أثناء المحلول العياري، ومن خلال ملاحظة وتعمية META المفصلة في الحالات الطبية والمتوسطة والقابلة للإختبارات البديلة في الخلايا الملونة، تتضمن عينات المحاليل العيارية كل الأنظمة المختلفة من الأدوات المستخدمة في التحليل، حيث إن الحيل العيارية معلومة التركيز ذات الركز العالي أثناء المحلول العياري، ومن خلال ملاحظة وتعمية META المفصلة في الحالات الطبية والمتوسطة والقابلة للإختبارات البديلة في الخلايا الملونة، تتضمن عينات المحاليل العيارية كل الأنظمة المختلفة من الأدوات المستخدمة في التحليل، حيث إن الحيل العيارية معلومة التركيز ذات الركز العالي أثناء المحلول العياري، ومن خلال ملاحظة وتعمية META المفصلة في الحالات الطبية والمتوسطة والقابلة للإختبارات البديلة في الخلايا الملونة، تتضمن عينات المحاليل العيارية كل الأنظمة المختلفة من الأدوات المستخدمة في التحليل، حيث إن الحيل العيارية معلومة التركيز ذات الركز العالي أثناء المحلول العياري، ومن خلال ملاحظة وتعمية META المفصلة في الحالات الطبية والمتوسطة والقابلة للإختبارات البديلة في الخلايا الملونة، تتضمن عينات المحاليل العيارية كل الأنظمة المختلفة من الأدوات المستخدمة في التحليل، حيث إن الحيل العيارية معلومة التركيز ذات الركز العالي أثناء المحلول العياري، ومن خلال ملاحظة وتعمية META المفصلة في الحالات الطبية والمتوسطة والقابلة للإختبارات البديلة في الخلايا الملونة، تتضمن عينات المحاليل العيارية كل الأنظمة المختلفة من الأدوات المستخدمة في التحليل، حيث إن الحيل العيارية معلومة التركيز ذات الركز العالي أثناء المحلول العياري، ومن خلال ملاحظة وتعمية META المفصلة في الحالات الطبية والمتوسطة والقابلة للإختبارات البديلة في الخلايا الملونة، تتضمن عينات المحاليل العيارية كل الأنظمة المختلفة من الأدوات المستخدمة في التحليل، حيث إن الحيل العيارية معلومة التركيز ذات الركز العالي أثناء المحلول العياري، ومن خلال ملاحظة وتعمية META المفصلة في الحالات الطبية والمتوسطة والقابلة للإختبارات البديلة في الخلايا الملونة، تتضمن عينات المحاليل العيارية كل الأنظمة المختلفة من الأدوات المستخدمة في التحليل، حيث إن الحيل العيارية معلومة التركيز ذات الركز العالي أثناء المحلول العياري، ومن خلال ملاحظة وتعمية META المفصلة في الحالات الطبية والمتوسطة والقابلة للإختبارات البديلة في الخلايا الملونة، تتضمن عينات المحاليل العيارية كل الأنظمة المختلفة من الأدوات المستخدمة في التحليل، حيث إن الحيل العيارية معلومة التركيز ذات الركز العالي أثناء المحلول العياري، ومن خلال ملاحظة وتعمية META المفصلة في الحالات الطبية والمتوسطة والقابلة للإختبارات البديلة في الخلايا الملونة، تتضمن عينات المحاليل العيارية كل الأنظمة المختلفة من الأدوات المستخدمة في التحليل، حيث إن الحيل العيارية معلومة التركيز ذات الركز العالي أثناء المحلول العياري، ومن خلال ملاحظة وتعمية META المفصلة في الحالات الطبية والمتوسطة والقابلة للإختبارات البديلة في الخلايا الملونة، تتضمن عينات المحاليل العيارية كل الأنظمة المختلفة من الأدوات المستخدمة في التحليل، حيث إن الحيل العيارية معلومة التركيز ذات الركز العالي أثناء المحلول العياري، ومن خلال ملاحظة وتعمية META المفصلة في الحالات الطبية والمتوسطة والقابلة للإختبارات البديلة في الخلايا الملونة، تتضمن عينات المحاليل العيارية كل الأنظمة المختلفة من الأدوات المستخدمة في التحليل، حيث إن الحيل العيارية معلومة التركيز ذات الركز العالي أثناء المحلول العياري، ومن خلال ملاحظة وتعمية META المفصلة في الحالات الطبية والمتوسطة والقابلة للإختبارات البديلة في الخلايا الملونة، تتضمن عينات المحاليل العيارية كل الأنظمة المختلفة من الأدوات المستخدمة في التحليل، حيث إن الحيل العيارية معلومة التركيز ذات الركز العالي أثناء المحلول العياري، ومن خلال ملاحظة وتعمية META المفصلة في الحالات الطبية والمتوسطة والقابلة للإختبارات البديلة في الخلايا الملونة، تتضمن عينات المحاليل العيارية كل الأنظمة المختلفة من الأدوات المستخدمة في التحليل، حيث إن الحيل العيارية معلومة التركيز ذات الركز العالي أثناء المحلول العياري، ومن خلال ملاحظة وتعمية META المفصلة في الحالات الطبية والمتوسطة والقابلة للإختبارات البديلة في الخلايا الملونة، تتضمن عينات المحاليل العيارية كل الأنظمة المختلفة من الأدوات المستخدمة في التحليل، حيث إن الحيل العيارية معلومة التركيز ذات الركز العالي أثناء المحلول العياري، ومن خلال ملاحظة وتعمية META المفصلة في الحالات الطبية والمتوسطة والقابلة للإختبارات البديلة في الخلايا الملونة، تتضمن عينات المحاليل العيارية كل الأنظمة المختلفة من الأدوات المستخدمة في التحليل، حيث إن الحيل العيارية معلومة التركيز ذات الركز العالي أثناء المحلول العياري، ومن خلال ملاحظة وتعمية META المفصلة في الحالات الطبية والمتوسطة والقابلة للإختبارات البديلة في الخلايا الملونة، تتضمن عينات المحاليل العيارية كل الأنظمة المختلفة من الأدوات المستخدمة في التحليل، حيث إن الحيل العيارية معلومة التركيز ذات الركز العالي أثناء المحلول العياري، ومن خلال ملاحظة وتعمية META المفصلة في الحالات الطبية والمتوسطة والقابلة للإختبارات البديلة في الخلايا الملونة، تتضمن عينات المحاليل العيارية كل الأنظمة المختلفة من الأدوات المستخدمة في التحليل، حيث إن الحيل العيارية معلومة التركيز ذات الركز العالي أثناء المحلول العياري، ومن خلال ملاحظة وتعمية META المفص...
من الاختبارات اليومية في مختبر الكيمياء السريرية لأدواء مختلفة من العوامل، والدهون، الأملاح، الأنزيمات الخ بتجارب الطبي المختبر المرجعي.

جدول (1) متوسط النتائج المتحصل عليها من خلال زرع عينات المحاليل العيارية معلومة التركيز ذات التركيز المتوسط خلال العمل اليوم.

(Vitros Performance Verifier I Normal Control)

<table>
<thead>
<tr>
<th>Test</th>
<th>Mean</th>
<th>SD</th>
<th>(+2SD)</th>
<th>(-2SD)</th>
<th>(+3SD)</th>
<th>(-3SD)</th>
<th>CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>T. Protein (mg/dl)</td>
<td>3.78</td>
<td>0.1</td>
<td>3.98</td>
<td>3.58</td>
<td>4.08</td>
<td>3.48</td>
<td>2.74</td>
</tr>
<tr>
<td>Urea (mg/dl)</td>
<td>20.45</td>
<td>0.52</td>
<td>21.49</td>
<td>19.41</td>
<td>22.01</td>
<td>18.89</td>
<td>2.55</td>
</tr>
<tr>
<td>Creatinine (mg/dl)</td>
<td>0.98</td>
<td>0.02</td>
<td>1.02</td>
<td>0.94</td>
<td>1.04</td>
<td>0.92</td>
<td>2.36</td>
</tr>
<tr>
<td>AP (IU/l)</td>
<td>124.5</td>
<td>9.72</td>
<td>134.94</td>
<td>105.06</td>
<td>153.66</td>
<td>95.34</td>
<td>7.8</td>
</tr>
<tr>
<td>ALT/GPT (IU/l)</td>
<td>39.53</td>
<td>3.4</td>
<td>46.33</td>
<td>32.73</td>
<td>49.73</td>
<td>29.33</td>
<td>8.6</td>
</tr>
<tr>
<td>T. Bilirubin (mg/dl)</td>
<td>1.35</td>
<td>0.27</td>
<td>1.89</td>
<td>0.81</td>
<td>2.16</td>
<td>0.54</td>
<td>19.67</td>
</tr>
<tr>
<td>AST/GOT (IU/l)</td>
<td>43</td>
<td>1.21</td>
<td>45.42</td>
<td>40.58</td>
<td>46.63</td>
<td>39.37</td>
<td>2.82</td>
</tr>
<tr>
<td>LDH (IU/l)</td>
<td>461.93</td>
<td>24.73</td>
<td>511.39</td>
<td>412.47</td>
<td>536.12</td>
<td>387.74</td>
<td>5.35</td>
</tr>
<tr>
<td>Cholesterol (mg/dl)</td>
<td>161.88</td>
<td>4.43</td>
<td>170.74</td>
<td>153.02</td>
<td>175.17</td>
<td>148.59</td>
<td>2.73</td>
</tr>
<tr>
<td>Iron (mg/dl)</td>
<td>87.78</td>
<td>7.59</td>
<td>102.96</td>
<td>72.6</td>
<td>110.55</td>
<td>65.01</td>
<td>8.65</td>
</tr>
<tr>
<td>Calcium (mg/dl)</td>
<td>9.09</td>
<td>0.26</td>
<td>9.61</td>
<td>8.57</td>
<td>9.87</td>
<td>8.18</td>
<td>2.88</td>
</tr>
<tr>
<td>Albumin (mg/dl)</td>
<td>2.3</td>
<td>0.09</td>
<td>2.48</td>
<td>2.12</td>
<td>2.57</td>
<td>2.03</td>
<td>4.05</td>
</tr>
<tr>
<td>Amylase (IU/l)</td>
<td>80.71</td>
<td>9.17</td>
<td>99.05</td>
<td>62.37</td>
<td>108.22</td>
<td>53.2</td>
<td>11.36</td>
</tr>
<tr>
<td>Phosphorus (mg/dl)</td>
<td>3.29</td>
<td>0.16</td>
<td>3.61</td>
<td>2.97</td>
<td>3.77</td>
<td>2.81</td>
<td>4.95</td>
</tr>
<tr>
<td>Uric acid (mg/dl)</td>
<td>4.16</td>
<td>0.18</td>
<td>4.52</td>
<td>3.8</td>
<td>4.7</td>
<td>3.62</td>
<td>4.32</td>
</tr>
</tbody>
</table>

مصدر المحاليل والأجهزة من خلال زياراتي للمختبرات الطبية المتعددة بالمختبر المرجعي بمدينة طرابلس لاحظت تعدد المصدرين والمستخدمة المتوفرة في المختبر المرجعي. الصناعات أيضًا توفر أدوات التحكم في الرقابة والقياسات المختلفة لمتابعة التحكم في المراقبة القياسية. في بعض الأحيان تكون طريقة استخدام هذه المواد بطريقة غير صحيحة لا تضع للتركيزات المختلفة تدفق مساحتي في الجهات المتخصصة وممارسة الرقابة والمتاحة في القطاعين العام والخاص.

من الاختبارات اليومية في مختبر الكيمياء السريرية لأدواء مختلفة من العوامل، والدهون، الأملاح، الأنزيمات الخ بتجارب الطبي المختبر المرجعي.

جدول (1) متوسط النتائج المتحصل عليها من خلال زرع عينات المحاليل العيارية معلومة التركيز ذات التركيز المتوسط خلال العمل اليوم.

(Vitros Performance Verifier I Normal Control)

<table>
<thead>
<tr>
<th>Test</th>
<th>Mean</th>
<th>SD</th>
<th>(+2SD)</th>
<th>(-2SD)</th>
<th>(+3SD)</th>
<th>(-3SD)</th>
<th>CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>T. Protein (mg/dl)</td>
<td>3.78</td>
<td>0.1</td>
<td>3.98</td>
<td>3.58</td>
<td>4.08</td>
<td>3.48</td>
<td>2.74</td>
</tr>
<tr>
<td>Urea (mg/dl)</td>
<td>20.45</td>
<td>0.52</td>
<td>21.49</td>
<td>19.41</td>
<td>22.01</td>
<td>18.89</td>
<td>2.55</td>
</tr>
<tr>
<td>Creatinine (mg/dl)</td>
<td>0.98</td>
<td>0.02</td>
<td>1.02</td>
<td>0.94</td>
<td>1.04</td>
<td>0.92</td>
<td>2.36</td>
</tr>
<tr>
<td>AP (IU/l)</td>
<td>124.5</td>
<td>9.72</td>
<td>134.94</td>
<td>105.06</td>
<td>153.66</td>
<td>95.34</td>
<td>7.8</td>
</tr>
<tr>
<td>ALT/GPT (IU/l)</td>
<td>39.53</td>
<td>3.4</td>
<td>46.33</td>
<td>32.73</td>
<td>49.73</td>
<td>29.33</td>
<td>8.6</td>
</tr>
<tr>
<td>T. Bilirubin (mg/dl)</td>
<td>1.35</td>
<td>0.27</td>
<td>1.89</td>
<td>0.81</td>
<td>2.16</td>
<td>0.54</td>
<td>19.67</td>
</tr>
<tr>
<td>AST/GOT (IU/l)</td>
<td>43</td>
<td>1.21</td>
<td>45.42</td>
<td>40.58</td>
<td>46.63</td>
<td>39.37</td>
<td>2.82</td>
</tr>
<tr>
<td>LDH (IU/l)</td>
<td>461.93</td>
<td>24.73</td>
<td>511.39</td>
<td>412.47</td>
<td>536.12</td>
<td>387.74</td>
<td>5.35</td>
</tr>
<tr>
<td>Cholesterol (mg/dl)</td>
<td>161.88</td>
<td>4.43</td>
<td>170.74</td>
<td>153.02</td>
<td>175.17</td>
<td>148.59</td>
<td>2.73</td>
</tr>
<tr>
<td>Iron (mg/dl)</td>
<td>87.78</td>
<td>7.59</td>
<td>102.96</td>
<td>72.6</td>
<td>110.55</td>
<td>65.01</td>
<td>8.65</td>
</tr>
<tr>
<td>Calcium (mg/dl)</td>
<td>9.09</td>
<td>0.26</td>
<td>9.61</td>
<td>8.57</td>
<td>9.87</td>
<td>8.18</td>
<td>2.88</td>
</tr>
<tr>
<td>Albumin (mg/dl)</td>
<td>2.3</td>
<td>0.09</td>
<td>2.48</td>
<td>2.12</td>
<td>2.57</td>
<td>2.03</td>
<td>4.05</td>
</tr>
<tr>
<td>Amylase (IU/l)</td>
<td>80.71</td>
<td>9.17</td>
<td>99.05</td>
<td>62.37</td>
<td>108.22</td>
<td>53.2</td>
<td>11.36</td>
</tr>
<tr>
<td>Phosphorus (mg/dl)</td>
<td>3.29</td>
<td>0.16</td>
<td>3.61</td>
<td>2.97</td>
<td>3.77</td>
<td>2.81</td>
<td>4.95</td>
</tr>
<tr>
<td>Uric acid (mg/dl)</td>
<td>4.16</td>
<td>0.18</td>
<td>4.52</td>
<td>3.8</td>
<td>4.7</td>
<td>3.62</td>
<td>4.32</td>
</tr>
</tbody>
</table>
جدول (2): متوسط النتائج المتحصل عليها من خلال زرع عينات المحاليل العيارية معلومة التركيز ذات التركيز العالي خلال العمل اليومي.

(Vitros Performance Verifier II High Control)

<table>
<thead>
<tr>
<th>Test</th>
<th>Mean</th>
<th>SD</th>
<th>(+2SD)</th>
<th>(-2SD)</th>
<th>(+3SD)</th>
<th>(-3SD)</th>
<th>CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>T. Protein (mg/dl)</td>
<td>7.18</td>
<td>0.14</td>
<td>7.46</td>
<td>6.9</td>
<td>7.6</td>
<td>6.76</td>
<td>1.92</td>
</tr>
<tr>
<td>Urea (mg/dl)</td>
<td>53.28</td>
<td>1.65</td>
<td>56.58</td>
<td>49.98</td>
<td>58.23</td>
<td>48.33</td>
<td>3.11</td>
</tr>
<tr>
<td>Creatinine (mg/dl)</td>
<td>5.69</td>
<td>0.08</td>
<td>5.85</td>
<td>5.53</td>
<td>5.93</td>
<td>5.41</td>
<td>1.41</td>
</tr>
<tr>
<td>AP (IU/l)</td>
<td>460.07</td>
<td>51.22</td>
<td>562.51</td>
<td>357.63</td>
<td>613.73</td>
<td>306.41</td>
<td>11.13</td>
</tr>
<tr>
<td>ALT/GPT (IU/l)</td>
<td>175.33</td>
<td>2.41</td>
<td>180.15</td>
<td>170.51</td>
<td>182.56</td>
<td>168.1</td>
<td>1.37</td>
</tr>
<tr>
<td>T. Bilirubin (mg/dl)</td>
<td>11.18</td>
<td>1.7</td>
<td>14.58</td>
<td>7.78</td>
<td>16.28</td>
<td>6.08</td>
<td>15.9</td>
</tr>
<tr>
<td>AST/GOT (IU/l)</td>
<td>183.67</td>
<td>4.84</td>
<td>193.35</td>
<td>173.99</td>
<td>198.19</td>
<td>169.15</td>
<td>2.63</td>
</tr>
<tr>
<td>LDH (IU/l)</td>
<td>1402</td>
<td>33.39</td>
<td>1468.78</td>
<td>1335.22</td>
<td>1502.17</td>
<td>1301.83</td>
<td>2.38</td>
</tr>
<tr>
<td>Cholesterol (mg/dl)</td>
<td>268.8</td>
<td>6.99</td>
<td>282.78</td>
<td>254.82</td>
<td>289.77</td>
<td>247.83</td>
<td>2.6</td>
</tr>
<tr>
<td>Iron (mg/dl)</td>
<td>250.18</td>
<td>10.4</td>
<td>270.98</td>
<td>229.38</td>
<td>281.38</td>
<td>218.98</td>
<td>4.16</td>
</tr>
<tr>
<td>Calcium (mg/dl)</td>
<td>12.3</td>
<td>0.23</td>
<td>12.76</td>
<td>11.84</td>
<td>12.99</td>
<td>11.61</td>
<td>1.84</td>
</tr>
<tr>
<td>Albumin (mg/dl)</td>
<td>4.71</td>
<td>0.14</td>
<td>4.99</td>
<td>4.43</td>
<td>5.13</td>
<td>4.29</td>
<td>3.02</td>
</tr>
<tr>
<td>Amylase (IU/l)</td>
<td>341.79</td>
<td>8.96</td>
<td>359.71</td>
<td>323.87</td>
<td>368.67</td>
<td>314.91</td>
<td>2.62</td>
</tr>
<tr>
<td>Phosphorus (mg/dl)</td>
<td>7.35</td>
<td>0.4</td>
<td>8.15</td>
<td>6.55</td>
<td>8.55</td>
<td>6.15</td>
<td>5.5</td>
</tr>
<tr>
<td>Uric acid (mg/dl)</td>
<td>10.74</td>
<td>0.28</td>
<td>11.3</td>
<td>10.18</td>
<td>11.58</td>
<td>9.9</td>
<td>2.62</td>
</tr>
</tbody>
</table>

المعاشطة:

من المعروف أن الاهتمام بنوعية النتائج في المختبرات الطبية بانواعها المختلفة يعتبر من الأولويات التي يجب أن يهتم بها العاملون المختصون بكافة مستوياتهم في هذا المجال. المختصون في مجال المختبرات الطبية طوروا الطرق الكفيلة بإعطاء مؤشر على موثوقية النتائج والتحسين والتطوير المستمر لخدمات المختبرات الطبية (6,10).

هذا يجعلنا غير متأكدين من دقة وصحة النتائج الصادرة عن هده المختبرات. وتزداد المشكلة خطرا إذا علمنا أن هناك مئات المختبرات الخاصة والمعاليم التي تمارس عملها بلا رقابة وقد تغيرت مع الزمن من أي جهه لها علاقة بهذا الموضوع. وبالفعل، فإن مشاريع تحليل النتائج المعاليم والصحيحة، هي خياريًّا الأمر، ولا تقوم بذلك بطريقة الكيفية والورقة الداخلية والخارجية، woes كانت البرامج الداخلية منها أو الخارجية (12).

من خلال النتائج الموضحة في الجدول (1) للمحاليل العيارية معلومة التركيز في المستوى المتوسط والجدول (2) للمحاليل العيارية معلومة التركيز في المستوى العالي من قبل الشركات المصغرة والتي من المفترض أن تزرع تلك المحاليل معلومة التركيز بمختلفة متوسطة التركيز عالية التركيز. لكي تحتوي كافة المستويات لعينات المرضى في
توجد جهة معينة لتقييم فعالية وجودة هذه المواد والأجهزة المستخدمة في كافة أنواع التحاليل. أي أنها تستخدم في عمليات التحليل بدون تقييم لجودتها ودقتها. ومن عيوب استجواب الأجهزة بكافة أنواعها من مصادر مختلفة الصعوبة في إيجاد جهة معينة لضبطها من فترة لأخرى ولسياقتها وهذا أمر ضروري لتأكد من جودة ودقة تلك التحاليل وتتابعها.

في السابق عندما كانت هناك إدارة عامة للمختبرات الطبية ومصارف الدم علي مستوي الدولة ويتبعها مباشرة المختبر المرجعي من الناحيتين الإدارية والفنية كان من أهم تخصصاتها القيام بإجراء برامج مراقبة النوعية الخارجية والمساعدة على إجراء برامج مراقبة النوعية الداخلية، وكانت هي الجهة الوحيدة التي تفاصل وتستجيب للمواطن والأجهزة المعملية وذلك بعد تقييمها والتأكد من جودتها. ولكن بعد إلغاء هذه الإدارة لا توجد أي جهة متميزة تستطيع أن تقوم بمهل هذا البرنامج.

ولهذا فإنه نوصي بإيجاد إدارة وطنية للمختبرات الطبية ومصارف الدم، وظيفتها القيام بإشراف المختبرات الطبية في القطاعين العام والخاص والإشراف عليها من الناحية الفنية.

من أهم واجبات هذه الإدارة:

1. وضع برامج مراقبة النوعية الخارجية.
2. مساعدة المختبرات في وضع برامج مراقبة النوعية الداخلية.
3. المساعدة في تدريب وتطوير المعملين في مجال المختبرات الطبية على مثل هذه البرامج وذلك بإجراء دورات تدريبية من فترة لأخرى لمواكبة التطور في هذا المجال.
4. إلزم المختبرات الطبية بالقطاعين العام والخاص بتطبيق برامج مراقبة النوعية بشقيها الداخلي والخارجي.
5. تصميم النماذج الخاصة بتطبيق برامج مراقبة النوعية.
6. الإشراف المباشر على شراء الأجهزة والمعدات والمحاليل المعملية ذات الكفاءة العالية والإشراف على تقييمها. كما نوصي بإيجاد شركة صيانة مختبرات الطبية لإنشاء فروع لها لما لها من دور مهم في الصيانة والمعايرة بصورة منتظمة. وهذا سيكون له دور كبير في تسريع نوعية النتائج ورروع الثقة بين المختبر والمريض والطبيب المعالج.
المراجع:

The spiritual dimension and its impact on health

F. Sarks
Faculty of Medicine, University of Zawia, Libya

Great advances to puzzle out the causes of illness and improve the quality of life and achieve higher levels of wellness within the physical, mental, social, and spiritual dimensions are rapidly taking place in the field of scientific and medical research. Furthermore, scholars in spirituality studies have contributed to the wealth of both qualitative and quantitative data that exist (1). All these have enriched therapeutic and preventive measures in combating illnesses. However, despite the advanced knowledge and technology which are disseminated through the mass media today, statistical data show that mankind still suffers from an endless series of physical, psychological and social diseases, particularly behaviour-related disorders (2). Examples are hypertension, smoking, sexually transmitted diseases, violence and drug use. Traffic accidents associated with alcoholism, drug addiction, anxiety, depression, suicide, divorce, rape, illegitimacy, homosexuality, lesbianism, broken homes, murder, crime and the like. All these problems are related to disturbances and failure in behavioural aspects of events in social life.

In this respect a number of questions will be raised. For example, although people may be well acquainted with the preventive methods and treatments that are available today they may be unable to keep to the advice given by concerned physicians. This indicates that certain ideas and attitudes may have already been formed which influence and determine people's behaviour in health and sickness. These ideas and attitudes will obviously be more positive, and will have a greater impact on human behaviour, if they are spiritually bound and religiously based; ideas and attitudes within a religious context will have a more dynamic and broader impact on the promotion of health and the prevention of behaviour related diseases. Yet most psychologists have little if any training on spiritual and religious issues. Perhaps psychologists and other health care professionals could potentially use spiritual and religious principles to better serve their clients (3). This calls for a concept of health within its wider physical, social and psychological aspects, as well as within its spiritual dimensions. Therefore, Spiritual care is inseparable from physical, social and psychological care because together they form the whole. Promoting spiritual well-being supports clients in their journey to find meaning and hope in life and peace in death (4).

The role of religion
Recently many studies show increased interest in examining the role that religion might play in preventive holistic health care. Since the dawn of history, religion has been well recognised for its preventive role. Its preventive determinants were tied to faith in the Almighty Creator (2). It was explained by the prophets that the preventive measures are orders from the Almighty who has created the human
being and knows what benefits or harms him. This faith, which had a very powerful effect in the past, should be increasingly reinforced now that we have realised the great dangers to which humanity might have been exposed, had it not adhered to the religious orders with absolute faith. This absolute faith was very central in the role of prevention.

Alcoholism for example, was partly responsible for the deterioration which befell prehistoric civilisations. Islam faced that grave evil and succeeded step by step in overcoming its dangerous effects. It linked faith in God with the orders to abstain and succeeded in persuading the believers to give up the long standing habit and compelling dependence of alcohol. The true Islamic communities up till now are relatively free from the evils of alcoholic addiction. This is from the effect of the deep faith that true Muslims keep as regards the Quranic orders. This was also applied to other physical, psychological and social evils.

**Faith**

The spiritual dimension is described and is interpreted as the need for: meaning, purpose and fulfillment in life; hope/will to live; belief and faith (5). Thus faith, once established in its proper spiritual dimension, worked as a strong preventive weapon and at the same time had sustained reinforcement through the relationship of the individual with the Almighty. This was the secret behind its success in the lives of people and in its influence on their behaviour, and consequently on their state of health. It is important to note that it is religious faith alone that can convert a man into a true believer and can suppress his selfishness and self-seeking under the impact of a doctrine and an ideology. Though faith is of varying degrees, spiritual faith often creates in man satisfaction and pleasure depending only on the all-powerful God. A good example of this satisfaction and pleasure is manifested in the behaviour of the true believer who faces a very dangerous situation, but who is urged by his faith to go through it, in many cases succeeding. Without this faith, such an endeavour could not be fulfilled. The early stages of faith are manifested in the child's love of his mother as long as she takes care of him. If this care disappears faith is lost. So love and faith are interrelated. Throughout life this relation matures and develops until it reaches its highest point in divine faith. This faith is acquired step by step through love and satisfaction, meditation and contemplation of the universe and insight about life. The greatness and splendour of the creation all around us, of the earth and the universe, is the magnificent and enriching source which feeds this spiritual faith. Once attained this faith is surely a strong and vital force for leading a healthy and spiritually rich life (2).

"Indeed, in the creation of the heavens and the earth and the alternation of the night and the day are signs for those of understanding” (Al-e-Imran, 3:190) (6).

This meditation creates in man a treasure of insight that the Almighty God is not only a creator, but is also the absolute donator of health and all other endowments. It is He who created disease and it is He who created relief. Immunity is one of His blessings and medical resources throughout the ages are His
gifts. This is the spiritual faith to which we refer, and by it we are urged on to conduct further and continual research in this endless field. So the believer is not just a passive receiver, but should participate in positive research for curative aids which the Almighty has created for him. Thus faith is not idle, but is charged with energy (2).

**Morals and health**

faith in the placebo (capsules, etc.), in the modality of treatment and the provider of the drug, even when it was an inactive chemical. We need not stress here that faith in the treating physician is well known to cause many cases to improve spontaneously. This phenomenon should be given more attention to explore its essential basic elements and make more use of its potential powers. Thus it is to be realised that within the spiritual dimension there is a great potential of compassion and power of healing which needs more care and attention to be fully utilised. Consequently, when we speak about health, it is to be emphasised that faith is one of the foundations upon which health should be conceived and firmly built (8).

The Holy Qur'an is the first Book which has described religious faith as a sort of concord between man and the entire creation:

> "أَفَغَيْرَ دِينِ اللَّهِ يَبْغُونَ وَلَهُ أَسْلَمَ مَن فِي السَّمَاوَاتِ وَالأَرْضِ طَوْعاً وَكَرْهاً وَإِلَيْهِ يُرْجَعُونَ" (آل عمران 83).

"Do they seek anything other than the religion of Allah? But to Him submits whosoever is in the heavens and the earth." (Al-e-Imran, 3:83).

The Holy Qur'an has also described religious faith as a part of the innate nature of man:

> "فَأَقِمَ وَجْهَكَ لِلدِّينِ حَنِيفًا فِطْرَةَ اللَّهِ الَّتِي فَطَرَ َالنَّاسَ عَلَيْهَا لََبْدِيلَ لِخَلْقِ اللَّهِ َالْقَيِّمُ وَلَِِنَّ أَكََْرَ النَّاسِ لَ يَعْلَمُونَ (الروم 30).

"Be devoted to the upright religion. That is the nature in which Allah has created man." (Ar-Rum, 30:30) (9).

**Model of faith practice**

A more searching look into the dimension of faith will enrich our scientific knowledge to the benefit of humankind. At this point we should assess, for
example, the effects of the practices basically set by the Prophet Muhammad, which he gave as a model and asked all the believers to follow and maintain with deep faith. Fundamentally these practices were crowned by absolute faith in the Almighty. This is stated verbally and devotedly in whatever the believer performs when he says "God is greater" (Allahuakbar). The second constituent of that programme of faith and practice is ablution and praying five times daily. So the true believer should always keep clean and meditative, thus combining a healthy state of physical and mental well-being. The third is giving to others at large. It constitutes volunteering to give others money, treatment, help, care, a smile and even clearing any obstacles obstructing the pathway. The fourth is fasting one month a year. In essence, fasting implies avoiding indulgence in the daily necessities of life after satisfying the basic and essential ones, including food, drink, pleasures, sex, etc.

The fifth is pilgrimage and the visit to the holy city Makah, and it reinforces the feeling that the human being is always confronting the Almighty and should confess his ill behaviour and ask for forgiveness and relief. It also urges one to meditational recreation, deep insightful reflection for a better and healthier life, and it mobilises social feeling and the coming together with others for a noble cause (10). The combination of the physical and spiritual techniques in Islamic ideology brings the healthy and balanced believer to his full potential physically, psychologically and socially. This programme was responsible for creating the healthy Muslim needed in the dawn of Islam to help to develop a healthy society in the entire of Islamic world. It is the essence of prevention and the backbone of a successful healthy life. It is also the catalyst for potentiating the other three foundations of health (11). Every culture should make use of the dominant spiritual endowments to create a healthy community based on physical, psychological, social and above all, spiritual factors. This is why we ask for the addition of the spiritual factor to the other acknowledged factors. There are various ways and means for mobilising the compassion of the people with ennobling ideas within the spiritual dimensions of health, and for this purpose it is timely for the medical profession to set the relevant programme for undergraduates and for ongoing education (12). There are also a number of programme areas for the promotion of the health system based on primary health care within the context of the spiritual dimension. The role of religious institutions, for example, in the promotion of health and the prevention of behaviour-related health problems has not been adequately explored, and should be optimally utilised. A model of utilising mosque facilities and religious teachers, for example, in the prevention and treatment of drug abuse has clearly demonstrated the useful potentialities of this institution, and this could be enhanced for wider application in the health field (13).

**Practical application**

It was a centre for teaching, welfare, rehabilitation, guidance, medical care, planning for defence tactics, and so on.
During the last decade, Muslim reformers, psycho-social workers and specialists in the medical professions called for a revival of the previous function of the mosque, to cope with the different problems facing the community. To realise this it was necessary to focus on the function of the mosque to adapt it to suit the newly arising demands. Mosque is an institution. It is the source of spiritual and material guidance; it is the hall for worship, the school for knowledge and the centre for literacy pursuits. This was however put into practice by Ibn Tulūn who built a world famous mosque in Egypt with a well-equipped dispensary and library attached. The library was believed to have been stocked with a hundred thousand books on medicine and the dispensary used to witness many people who queue to receive treatment on Fridays (14). Modern mosques that will accommodate library, dispensary, multipurpose hall and other facilities should be given utmost attention by individual Muslim community. The design of the recently built mosques should take a new trend to suit the requirements of the mosque's new function. Thus, the new mosques should be made up of multi-storeys, each performing a different function. The ground floor is for praying, the second comprises different medical clinics. The third includes a library, social welfare centre, teaching classes, a rehabilitation office and a social centre to solve problems. This model satisfies the following needs:

• It is a centre for the healthy upbringing of children.
• It includes teaching classes, a club and a library for the benefit of the attending youth and thus gives the youth a breathing area in crowded cities caring for their general health.
• The different clinics charging nominal fees take care of a wide class of people who cannot afford the high expenses of treatment in special clinics or hospitals.
• The mosque is continuously propagating and spreading preventive means and so is very potent in this field.

During March 1984 the regional WHO conducted a seminar inviting responsible

individuals in different ministries to activate that approach, and a project has been authorised for three years to conduct epidemiological studies about drug addiction in two of these mosque centres. This is the beginning of a movement in the Islamic countries to make use of the potentialities of the mosque for the welfare of health in general, and mental health in particular.
References

First experience with insulin analogues in type 1 diabetes mellitus in Tripoli diabetic hospital

Samia A. Elmiladi* and Naima T. Eshwehdi
Tripoli diabetes hospital, Faculty of Medicine, University of Tripoli, Tripoli, Libya
correspondence to elmiladis@yahoo.com

Abstract: The current study aims to determine the efficacy of insulin analogue on blood sugar control in patients with type 1 diabetes mellitus, this study is a cross sectional study and was carried out in Tripoli diabetes hospital during the period (Nov/2009-April-2010). One hundred patients with Type 1 diabetes mellitus on basal-bolus insulin injections (after consent taken), were enrolled in this study, insulin glargin taken as basal single dose at night (mostly at 10 pm) and Lispro injection before each meal (3 times/day), initially the total daily requirement calculated according to body weight or previous daily insulin doses and adjusted according to blood glucose profile done by patients (SMBG), the results were a significant regarding increase of total daily doses and body weight, decrease in number of hypoglycemic episodes/month and HBA1c. The study concluded that insulin analogue (glargin & Lispro) administrations were associated with improve glycaemia control with reduction in hypoglycemia episodes in Type-1 diabetes mellitus.

Key words: Type1 diabetes, insulin analogue, self-monitoring blood glucose

Introduction

The global rate of DMI is escalating (1, 2), outcomes from the Diabetes Control and Complications Trial (DCCT) confirmed that intensified insulin treatment diminishes the risk of micro and macro-vascular events compared with conventional treatment (3-6). The DCCT evidently demonstrated that intensive insulin therapy, definite as three or more injections per day of insulin or continuous subcutaneous insulin infusion (CSII) (or insulin pump therapy), was a solution of a better metabolic and improved results (7, 8). The study was carried out with short- and intermediate-acting human insulin, even with improved microvascular effects, intensive insulin therapy was linked with a high rate of severe hypoglycemia (62 episodes per 100 patient-years of therapy). While the conclusion of the DCCT, a number of rapid-acting and long-acting insulin analogs have been appeared. These analogs are associated with less hypoglycemia than human insulin although present the identical reduction of A1C in cases with (9, 10).

Reducing A1C to 7% has been shown to diminish microvascular complications of diabetes, and if realized almost immediately following the diagnosis, is related with long-term decline in macro-vascular disease. So a sensible A1C target for many non-pregnant adults with DMI is, 7%. Providers might reasonably suggest HBA1C goals of 6.5% for choose cases, if can be attained with no considerable hypoglycemia or other adverse effects of treatment. Suitable cases might consist of those with a short duration of diabetes, a long life expectation, hypoglycemia responsiveness, and no CVD. HB A1C goals of 8.5% may be proper for cases with a history of
severe hypoglycemia, hypoglycemia unawareness, limited life expectancy, advanced microvascular /macro-vascular complications, or extensive comorbid conditions (11). Metabolic control for DMI at any age should be assessed based on regular SMBG (Self-Monitoring Blood Glucose) levels and CGM data, if accessible, and HB A1C to facilitate modifications in treatment. The DCCT established the advantages of intensive B sugar control on diabetes complications with SMBG as part of a multi-factorial role, signifying that SMBG is a vital part of efficient treatment. SMBG permits patients to estimate their individual reaction to treatment and evaluate if metabolic aims are being achieved. SMBG results are practical in avoiding hypoglycemia, regulating insulin dose (chiefly before meals), and appreciating the effect of suitable nutrition therapy and physical activity. More frequent SMBG is linked to lower A1C levels (12, 13) SMBG rate and time should be ordered by the patient’s particular requirements and aims. While advising SMBG, giver must guarantee that patients get continuing education and standard assessment of their SMBG skill and their facility to utilize SMBG records. In cases with DMI should do SMBG before meals and snacks, at a least, and at further times, as after-meals to evaluate insulin-to-carbohydrate ratios; at bedtime; mid-sleep (3-4 a.m.); prior to, during, and/or after exercise; if there is symptom of hypoglycemia; after remedy of low/high B sugar; preceding to serious duties like as driving; and at more frequent intervals during sickness or strain.

The accessibility of insulin analogs has allowed insulin replacement that are planned to more intimately replicate natural insulin secretions. Particularly, pre-meal insulin analogs (lispro, aspart, glulisine) have action outlines nearer to normal, with resultant quicker initiation and neutralization of action to lower blood sugar in contrast with regular human insulin. Basal insulin analogs (glargine, detemir) have prolonged act, less variableness, more control, less hypoglycemia (especially nocturnal), and an encouraging result on weight (14). Basal-bolus regime permits for accurate insulin dose regulations to attain glycaemic goals (HBA1c) and a glycaemic profile as close to physiological as possible with a low risk of hypoglycaemia (15-27). The function of basal insulin (background insulin) is to maintain blood sugar at steady degrees while abstain from food, generally used 1-2 times a day. A bolus dose is insulin that is particularly used at mealtime to deal with B sugar levels after a meal (14). The advantages of multiple daily dose, permit closely mimic normal insulin secretion, flexibility in time of insulin injections, amount of carbohydrates intake each meal. Drawback of MDI, that more injections per day and weight gain (28).

Materials and methods

A cross sectional study which included a hundred patients of DM I in Tripoli diabetic hospital from (Nov 2009 until April 2010). The data collected about patient’s demographics, Some important points in clinical history, relevant investigations and then the patients were followed after 3 months. Data were analyzed by using the Statistical Package for the Social Sciences (SPSS) version 16 (compare means with paired samples t-test).

Results

In National Diabetes Hospital in Tripoli – Libya where most of people with DM in west part of Libya receive their diabetes care, a total of 100
patients with DM-I, who attended outpatient clinic included in the study, 72% of them were female, their age range was between (13-53 years with mean age 27.4 ± 9.4 years, the duration of diabetes ranged from newly diagnosed to (31years ) of DM while 46% of them were controlling their diet (assessed by registered dietitian ), (73%) were testing their blood glucose at home (SMBG), with mean of total daily dose of human insulin (55 ± 21.7 IU), most of them on mixtard 30 twice daily, the remaining were on actrapid insulin +NPH in different combinations in four to two injections daily, number of daily doses (3 ± 1), history of hypoglycemic episodes (5.07 ± 5.1), include minor , major and nocturnal episodes, mean were weight (66.4 ± 13.4 Kg), BMI (24.7 ± 4.4), and HBA1c pre study mean (10.6 ± 2.2%) After starting insulin analouq (insulin glargin as single basal dose at night +ultra rapid insulin analogue lispro/Aspart befor the 3 main meals) regular follow up 3 month later, the total daily dose is significant increased (60.9 ± 25 IU, p < 0.05), the number of daily doses were 4 times , the number of hypoglycemic episodes/month were significantly diminished (1.1 ± 2.1,p < 0.001),the mean weight increased (67 ± 14.6 kg p < 0.09),their mean HBA1c significantly reduced (9.5 ± 2.3% p < 0.001).

**Table 1:** Mean and standard deviation for different variables on the study

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean ± SD at start (twice daily human insulin)</th>
<th>Mean ± SD (after) basal-bollus insulin analogue</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total daily dose</td>
<td>55 ± 21.7</td>
<td>60.9 ± 25</td>
<td>0.05</td>
</tr>
<tr>
<td>Hypoglycemia episods</td>
<td>5.07 ± 5.1</td>
<td>1.1 ± 2.1</td>
<td>0.00</td>
</tr>
<tr>
<td>Body Weight</td>
<td>66.4 ± 13.4</td>
<td>67.7 ± 14.6</td>
<td>0.09</td>
</tr>
<tr>
<td>HBA1c</td>
<td>10.6 ± 2.2</td>
<td>9.5 ± 2.3</td>
<td>0.00</td>
</tr>
</tbody>
</table>

**Figure 1:** The total daily dose difference at start &after 3 month of study

**Figure 2:** The total daily episodes before & after 3month of study
Discussion

Regular human insulin and intermediate-acting neutral protamine Hagedorn (NPH) insulin are conventional insulin. But both do not mimic the outline of basal and post-meal physiological insulin release. Insulin analogues are adapted human insulin attend to overcome this restriction (29). Insulin lispro in comparison with regular human insulin leads to a slightly lesser HbA1c concentration (weighted mean difference - 0.09%, 95% CI -0.16% to -0.02%), a lower risk of severe hypoglycemia (relative risk 0.80, 95% CI 0.67 to 0.96) and a lower rate of nocturnal hypoglycemia (rate ratio 0.51, 95% CI 0.42 to 0.62). Usually, patients chosen rapid-acting insulin analogues over regular human insulin for the reason that flexibility of the dose in relation to meal (30-34). Several reports shown that considerable enhancement in quality of life and patient pleasure with the utilize of rapid-acting insulin analogues, while further studies established no differentiation (30-34). Insulin glargine (Lantus) in contrast to, neutral protamine Hagedorn insulin (NPH), offered a small but statistically important reduction in HbA1c (weighted mean difference - 0.11%, 95% CI - 0.21% to - 0.02%), as well, the main hazard decline in night-time hypoglycemia support of insulin glargine (Lantus) use (relative risk 0.64, 95% CI 0.47 to 0.87) (42).

For diabetic morbidity or mortality, still, incomplete statistics to compare insulin analogues and conventional insulin (42).

In this study, we compare between the utilization of insulin analogue (insulin Glargin as basal and Lispro or Aspart as bolus doses) and human insulin (insulin Mixtard 30 twice daily, NPH and soluble insulin with different regimes) in the same patients with DMI, concerning with blood sugar control, incident of hypoglycemia, and weight gain. We concluded that insulin analogues provide a scientific benefit over human insulin for glycaemic control in DMI, with less hypoglycemia especially nocturnal and may be considered a first choice for patients with recurrent hypoglycemia in spite of modification of conventional insulin treatment.

In conclusion: The study shows that insulin analogues (glargine, lispro) improved the glycaemic control in patients with DM-I (i.e. HbA1c), with decrease in the number of hypoglycemic episodes/month; however, both total daily dose and mean body weight are increased.

Acknowledgements: A special thank must be made to Diabetes Educator: Mrs. Samira Mohmas for her great valuable effort.
References

1. KM Venkat Narayan, Desmond Williams, Edward W. Gregg (2010) Medical


Assessment of serum chromium, magnesium and glucose level among Sudanese patients with type 2 diabetic mellitus

Sara E. Ibrahimm¹, Elrasheed I. Mohamed², Salah B. Bahroun⁴, Altayeb Elazomi², H. I. Fahelb⁵ and Omar F. Idres³

¹Sharq Elnie College, School of Medical Laboratory Science, ²Faculty of Medical Technology, University of Zawia, ⁴National Medical Research Center, Zawia, Libya and ³Faculty of Science and Technology, University of Alneelain, Khartoum, Sudan

Abstract: The purpose of this study was to evaluate the difference in serum chromium and magnesium levels between diabetic and control groups, and to determine the correlations between these elements and serum glucose in patients with type 2 diabetes mellitus. Fifty patients suffering from type 2 diabetes and 50 controls were selected randomly. The level of serum chromium, magnesium and fasting plasma glucose were measured and compared between the two groups. Correlations of serum Cr, Mg and glucose were conducted. Serum magnesium was significantly lower in diabetic group compared with the control group (Mean ± SD): 19.067 ± 2.156 compared to 42.82 ± 2.15 n mol/l (P = 0.00). The serum level of Cr (0.11172 ± 0.054664) of the test group was similarly matched with healthy group (0.08094 ± 0.039764), (p = 0.214). Significant but negative correlations were shown between Mg and plasma glucose ( P = 0.00, r = -3.85). No significant and negative correlation between Cr and plasma glucose ( P= 0.214, r = -0.190). There is trace element metabolism disorder in patients with type 2 diabetes mellitus (Magnesium) and serum level of Chromium of the test group was similarly matched with healthy group.

Keywords: diabetes mellitus, glucose level, chromium, magnesium

Introduction

Diabetes Mellitus (DM) is a chronic disease characterized by the disorder of the glucose metabolism and associated with a reduced ability of the tissues to respond to insulin (insulin resistance). DM causes high morbidity and mortality derived by chronic micro- and macro-vascular complications (1). Diabetes was reported to be the fifth leading cause of death in the United States (2). DM is now one of the major health problems in the Sudan resulting in 10% of all hospital admissions and mortality. A small population based study in 1993 of a sample of 1284 adult men, showed a prevalence of 3.4% of type 2 diabetes (3). A combination of genetic and environmental risk factors contributed to DM pathogenesis (4). Clinical research suggests that the homeostasis of trace elements can be disrupted by diabetes mellitus. On the other hand, it also suggests that early imbalances of specific elements may play an important role in upsetting normal glucose and insulin metabolism (5). In fact the deficiency of a single element or certain combinations of elements such as Cr, Mg, and Zn have been shown to predispose a person to glucose intolerance and to promote the development of diabetic complications (6).

Chromium is an essential nutrient involved in the metabolism of glucose and lipids. Suboptimal dietary intake of Cr is associated with diabetes and cardiovascular diseases. It has been reported that Cr and biotin combination reduce insulin resistance, hyperglycemia and lipid profiles in patients with type 2 diabetes (7, 8). A report suggested that Cr decreases the levels of cytokines and oxidative stress in diabetes (9). There are other
reports indicating decreased Mg levels among diabetes patients (10, 11). A population-based study suggested that Mg intake may protect against the development of type 2 diabetes in a Chinese population (12). The lower Mg levels in diabetic subjects could be a consequence of reduced insulin action and increased protein catabolic processes (13).

Hypomagnesaemia seems to be associated with high mortality in critically ill patients with type 2 diabetes (14). The purpose of this study was to evaluate the difference in serum chromium and magnesium levels between diabetic and control groups, and to determine the correlations between these elements and serum glucose in patients with type 2 diabetes mellitus.

**Materials and methods**

The study was carried out in Omdurman Teaching Hospital in Khartoum State (outpatients clinic), Sudan, during the period from October 2014 to February 2015. The study population was comprised of 100 individuals in two groups; 50 with type 2 diabetic mellitus (test group) and 50 healthy volunteers, as a control group. The two groups were age and sex matched. Ethical clearance and permission was obtained from the State Ministry of Health and the appropriate authorities. An informed consent was obtained from all those participating in the study after explaining the objectives of the study. Interview and questionnaire was used to collect personal data. Venous blood samples were withdrawn after an overnight fasting. Serum levels of chromium and magnesium were measured by an Atomic absorption spectrophotometer (GBC 932 Plus). Fasting blood glucose levels were determined by commercial kit, using an enzymatic method (glucose oxidize/ peroxides).

The Statistical Package for Social Science (SPSS version 16) computer software was used for data analysis. Independent ANOVA and correlation tests were used. The significance levels was set at $P<0.05$.

**Results**

Demographic features of diabetic patients and controls are summarized in Table 1. There was no significant difference ($P > 0.05$) between the two groups under study. The mean values of the serum Magnesium, Chromium and Fasting blood glucose in the two groups are given in Table 2. There was a highly significant difference ($P = 0.001$) between the means of the serum Magnesium of the test and the control groups (Mean ± SD): $19.067 ± 2.156$ compared to $42.82 ± 2.15$ nmol/l in the control group. The means of the fasting plasma glucose levels in the two groups showed a highly significant difference ($P = 0.001$), (Mean ± SD): $191.01 ± 58.52$ versus $94.74 ± 10.81$ mg/dl. On the other hand, there was no significant difference ($P = 0.214$) between the mean values of the serum Chromium of the test and the control groups, (Mean ± SD): $0.8094 ± 0.039764$ and $0.11172 ± 0.054664$ μg/ml, respectively. Table 3 shows a significant but a negative correlation between the Mg and the plasma glucose ($P = 0.001$, $r = -3.85$), however, it showed no significant negative correlation between Cr and the plasma glucose levels ($P = 0.214$, $r = -0.190$).
Table 1: demographic features of the two groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>Test group n = 50</th>
<th>Control group n = 50</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>55.48 ± 12.41</td>
<td>53.53 ± 11.43</td>
<td>0.08</td>
</tr>
<tr>
<td>Heights (cm)</td>
<td>170.54 ± 9.35</td>
<td>173.24 ± 8.73</td>
<td>0.09</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>75.26 ± 9.85</td>
<td>70.71 ± 9.4</td>
<td>0.04</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>26.04 ± 3.18</td>
<td>22.6 ± 2.41</td>
<td>0.03</td>
</tr>
</tbody>
</table>

Table 2: The mean values of serum magnesium, chromium and fasting blood glucose among the diabetic patients and control Sudanese individuals

<table>
<thead>
<tr>
<th>Variable</th>
<th>Test group n=50</th>
<th>Control n = 50</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnesium (Mg)</td>
<td>19.067 ± 2.156</td>
<td>42.82 ± 2.15</td>
<td>0.000</td>
</tr>
<tr>
<td>Chromium (Cr)</td>
<td>0.8094 ± 0.039764</td>
<td>0.11172 ± 0.054664</td>
<td>0.21</td>
</tr>
<tr>
<td>FBG</td>
<td>191.01 ± 58.52</td>
<td>94.74 ± 10.81</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Values Are Means ± SD P<0. 05 When Compared To Control

Table 3: The correlation between the serum levels of chromium, Magnesium and Fasting blood glucose among Sudanese diabetic patients

<table>
<thead>
<tr>
<th>Correlation</th>
<th>Glucose</th>
<th>Cr</th>
<th>Mg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glucose</td>
<td>1</td>
<td>-0.190</td>
<td>-38.53</td>
</tr>
<tr>
<td>P value</td>
<td>0.214</td>
<td>0.00</td>
<td></td>
</tr>
</tbody>
</table>

Discussion

Some trace elements act as antioxidants and prevent membrane per oxidation while others act directly on the glucose metabolism. It is generally agreed that disturbed concentration of Zn, Cr and Mg in the body are often found in patients of diabetes mellitus. Magnesium is an essential ion involved in multiple levels in insulin’s secretion, its binding and its activity; and it is also a critical cofactor of many enzymes in carbohydrate metabolism (15). Serum magnesium levels are significantly affected in Sudanese patients with Type 2 diabetic Mellitus (table 2). These findings is in agreement with other studies that reported a significant low serum magnesium levels in diabetic patients when compared with the control group 16, 17). Another study reported an inverse correlation between serum magnesium levels and poor glycolic control and strong association with retinopathy (18).

The mechanism responsible for hypomagnesaemia in patients with diabetes mellitus is not completely known. Osmotic dieresis clearly accounts for apportion of the magnesium loss (19). It is believed that glycosuria which accompanies the diabetic state impairs renal tubular re-absorption of magnesium from glomerular filtrate (20). Among the diabetic Sudanese patients there is no significant differences in the levels of the serum chromium when compared to the non-diabetic. This agrees with the findings from a similar study carried out in Caliber, Nigeria (21). The study demonstrated lower levels of chromium in the lymphocytes of diabetics but there was no differences in the levels in the other blood components of both groups. However, in a study in 2000 carried out in Japanese people, significantly lower levels of Mg and Cr were found in the serum and the
hair of diabetics (22). The present study shows a significant but a negative correlation between Mg and plasma glucose among the diabetic patients, and there is no significant difference between the plasma Cr and the plasma glucose and that the correlation between the two components is negative.

It is concluded that the serum magnesium levels are significantly affected in Type 2 diabetic Sudanese patients. The deficiency of Mg may reduce insulin sensitivity, secretion and may increase risk of secondary complications. Serums levels are not significantly different between the patients and healthy individuals. In order to better understand the role of these trace elements in diabetes further in depth clinical studies are required enrolling large number of patients to allow better conclusions.

References

Quantitative determination of lead and cadmium in samples of six brands of infant's milk powder formulae marked in Libya

Hamza A. Alzrgani, Badria A. Salem, Nadia A. Laswad, Ismail M Awheda and Ashok Kumar
Department of Chemistry, Faculty of Sciences, Almergheb University, Al-khoms, Libya

Abstract: Six commercial samples of Infant milk formulae (powdered form) which represent most kinds of milk formulae used for feeding infants from birth up to three years of age were taken from reputed Pharmacies of different cities of Libya for the estimation of heavy metals, lead (Pb) and cadmium (Cd). All samples were analyzed by Flame Atomic Absorption Spectrophotometer. The different kinds of infants milk formulae were found to have concentration of Pb and Cd ranging from 0.0000-0.0080 ppm and 0.0001 – 0.0015 ppm, respectively. Results obtained revealed that level of values of Pb and Cd were below the permissible limits as recommended by WHO and other standards. This study signifies its importance for consumers, manufactures and professionals in children’s health care programs.

Introduction

Human milk contains optimal amount of carbohydrates, proteins and fats and is best source of nutrition for feeding infants (1). The milk is also an important source of major and trace elements necessary for normal development of infants. Milk powder is one of the important dairy products being used in the preparation of condensed milk, cheese, ice creams, infant milk formula, evaporated milk and as an ingredient in many bakery products. Infant milk formula is considered as nearly complete food and an excellent source of protein, fat and major minerals for the normal growth of infants. During manufacturing of infant milk formula essential elements are added in appropriate quantity in order to meet nutritional requirement (2). Excess from required quantity of the added elements may be a potential source of danger to health. Therefore, accurate measurement of the concentration of the trace elements in formula is very essential by using sensitive and advanced methods of elemental analysis (3-7).

More than 20 different trace elements are reported in milk and milk products and most of them are essential and very important as a cofactors in many enzymes play important role in many physiological function and deficiency of these elements may produce pathological disorders (3, 4). The low concentration of heavy metals such as Pb and Cd leads to metabolic disturbances and causing serious health problems including heart failure, cancer, kidney damage etc. (8 - 10). UNICEF, 1999, emphasize on control and assessment of babies food product’s by purpose of their maintaining good health (11). The aim of the present study to test for the presence of toxic heavy metals, Lead and Cd in infant’s milk formulae used in feeding to three years aged infants available in standard pharmacy stores of Libyan markets through Atomic Absorption spectrophotometry and to compare the results gathered to an existing Egyptian standard as set for allowable amounts of toxic heavy metals for feeding to infants and manufacture of food products.
Materials and methods

Collection of Samples: A total of six random tin containers of milk powder representing most kinds of powdered milk formula for infants from birth up to third year of age were collected from local renowned pharmacy stores of Zliten and Alkhoms cities of Libya. The samples were collected from its original packages in clean polyethylene bags, labeled and taken to the laboratory and kept in refrigeration till analysis.

The following Infant’s milk powder formulae were taken for the analysis:
- Formula A2: for feeding new born infants.
- Formula B1: for feeding infants at one year.
- Formula B2: for feeding infants at one year.
- Formula C1: for feeding infants at three year.
- Formula C2: for feeding infants at three year.

Quantitative determination of heavy metals in each sample: All chemicals were used of AR grades for each analysis. The samples were digested following the procedure described by Oddy (12). Briefly, 20 ml HNO₃ was added to 10.0 gm of each sample and allowed to stand for 15 min. The mixture was heated until the liquid reduced to 5 ml. After cooling, 20 ml HNO₃, 10 ml H₂SO₄ and 8 ml H₂O₂ were added and the contents were evaporated to 5 ml. After cooling 10 ml deionized H₂O was added for the removal of residual acid and the mixture was boiled for 10 min (this was repeated twice). After cooling the digest was filtered into 25 ml volumetric flask and made up to mark with deionized H₂O. The infant formula filtrate's were subsequently analyzed for the presence of heavy metals (Pb and Cd) by Flame Atomic Absorption Spectrophotometer (FAAS) Model VARIN SPECTR AA 55B.

Results and discussion

The results of the estimated concentration of Pb and Cd in six infant’s milk powder formulae procured from different Standard Pharmacies of Al-khoms and Zliten cities of Libya are shown in table 1.

<table>
<thead>
<tr>
<th>Infant Formula</th>
<th>Pb (ppm)*</th>
<th>Cd (ppm)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formula A1</td>
<td>0.0080</td>
<td>0.0015</td>
</tr>
<tr>
<td>Formula A2</td>
<td>0.0060</td>
<td>0.0005</td>
</tr>
<tr>
<td>Formula B1</td>
<td>nil</td>
<td>0.0011</td>
</tr>
<tr>
<td>Formula B2</td>
<td>0.0032</td>
<td>0.0001</td>
</tr>
<tr>
<td>Formula C1</td>
<td>0.0007</td>
<td>0.0004</td>
</tr>
<tr>
<td>Formula C2</td>
<td>0.0022</td>
<td>0.0005</td>
</tr>
</tbody>
</table>

*All results are below permissible limit (13-15)

Two formulae (A1 and A2) were for new born infants. They have shown Pb concentration ranging from 0.0060 - 0.0080 mg/kg and Cd concentration ranging from 0.0005 - 0.0015 mg/kg. Formulae B1 and B2 were for one year aged infants have shown Pb concentration ranging from 0 - 0.0032 mg/kg and Cd concentration ranging from 0.0001 - 0.0011 mg/kg. Formula C1 and C2 were for infants of three years age have shown Pb concentration ranging from 0.0007 - 0.0022 mg/kg and Cd concentration ranging from 0.0004 - 0.0005
mg/kg. The results indicate that nil/lowest concentrations of Pb and Cd were recorded in Formula B1 (nil ppm) and Formula B2 (0.0001 ppm), respectively, however, the highest concentration of Pb and Cd were recorded in Formula A1 (Pb: 0.0080 ppm; Cd: 0.0015 ppm). Thus, it is apparent from the results that none of the infant’s formulae exceeded the permissible limit for Pb and Cd levels as set by WHO and other Organization’s Standards (13-15). However, the presence of Pb and Cd in infant food is of great concern since infants are particularly more sensitive to ingested toxicants even in very low concentration than adults so infants health goes at risk (16). Exposure to Pb during infancy irreversibly affects development of the nervous system, causing reduction of IQ and learning disabilities (17). Chronic exposure to Cd and Pb is associated with kidney damage (18). It is reported that milk powder formulae containing soy flour were high in trace elements Pb and Cd (19, 20). It is also reported that lead intake was most strongly influenced by storage of infant formulae in lead-soldered cans (21).

It is apparent in the present study that all kinds of infant’s formulae have shown very low levels of concentration of Pb and Cd in acceptable limit. Thus this study demonstrates that all kind of infant’s formulae are devoid of any risk of untowards health hazards to infants. Numerous milk formulae and milk products are available in markets for all age groups of children and adults but it cannot be generalized from this study that all of the infant’s milk formulae contains lead, cadmium or other toxic heavy metals below standard permissible limit. Many analyst have reported higher concentration of toxic trace or heavy metals in milk powder formulae than recommended standard concentration of permissible limit which may have caused wide array of hazardous impacts on human health (22-26).

In conclusion: All of six infant’s formula samples tested were positive for lead and cadmium concentrations except Formula B1 which did not show the presence of lead, however, the concentrations of both heavy metals were below the level of permissible limit as recommended by WHO and other Organization’s Standards. However, this study can be used for general awareness as a reference for consumers, manufactures and health care professionals for the sake of maintaining good health for children and adults using good quality milk formulae and milk products following their regular monitoring of heavy metals applying standard analytical techniques.

Acknowledgements: The authors are grateful to the authorities of Faculty of Sciences, Alkhuoms, Al-mergheb University, Libya for their technical support, and providing the necessary laboratory facilities.
References

Validation of the tunisian version of the oswestry disability index for low back pain in the zawia

Thuraia Athwair and Safa A. Koushada

Department of Physiotherapy, Faculty of Medical Technology, University of Zawia, Zawia, Libya

Abstract: Lower back pain appears a major problem worldwide, accounting for many days of lost work, huge expense, and much suffering from the people affected by it. Incidence of it appears high in the West, but, to date, no studies have determined its incidence in many non-Western countries, including Libya. To help remedy this problem, and to help people with LBP, one needs to measure it. However, this too is a problem. The major method of measuring LBP is use of the Oswestry Disability Index. This was first produced in English, but has now been translated into several other languages, including Tunisian Arabic and Saudi Arabian Arabic. The problem concerns using such Arabic translations for people living in Arab-speaking areas other than Tunisia and Saudi Arabia. Arabic has several dialects, and not all are mutually intelligible. The present study seeks to validate the Tunisian Arabic version of the ODI for Libyans living in the Zawia region of the country. Sixty participants were recruited from patients receiving medical help for LBP in the region. They then had to complete the Tunisian Arabic version of the ODI, and report whether they found it intelligible. The participants were also given Arabic versions of the SF-36 and the PVAS. Scores on these tests were used to validate the Tunisian version for Zawia Libyans. Results suggested that the Tunisian version of the ODI is a valid measure for this particular Arab subpopulation.

Keywords: Low back pain, oswestry disability index, pain visual analog scale, short form-36

Introduction

The present research seeks to validate Tunisian Arabic version of the Oswestry Disability Index (ODI) for Libyans suffering from low back pain (LBP). The ODI is a measure of how much back or leg pain impairs normal living. People who score highly on the ODI cannot manage routine day-to-day activities. Originally produced in English, the questionnaire has been shown to be both reliable and valid for English speaking people (1, 2). It has also been translated into and validated in a number of languages other than English, including Greek (3), Turkish (4) and Tunisian Arabic (5). LBP is pain originating from, or in or around, the lumbar region of the back. The pain may be acute (lasting less than 4 weeks), subacute (lasting 4-12 weeks), or chronic (lasting more than 12 weeks). The degree of pain varies according to patient (6). Pain may arise from two related areas: the coccyx, or base of the spine, and the sacroiliac joint, the joint that attaches the spinal column to the pelvis. LBP is a common musculoskeletal condition. In USA, back pain is the second most common reason for visits to physicians (7), the fifth most common...
reason for hospital admission, and the third most common reason for surgery (8). In the UK, during the period 1988-1989, LBP was the most important cause of days off work, accounting for 12.5% of the total of sick days off work (9). Swedish statistics are similar, with, in 1961, some 11-19% of days off work attributable to back pain; in 1987, 8% of the insured Swedish population were reported as away from work, at some time during the year, because of back pain. Overall prevalence of LBP, at least in Western countries, appears to be at least 12% and may be over 35% (10). As indicated, there appears to be no data on the incidence of LBP within Libya, and, in general, the incidence within Middle Eastern and North African countries appears uncertain. However, such evidence as exists suggests incidence within Arab countries is high (11), for example, in a study of health care providers in a Kuwait hospital, found a lifetime incidence of LBP of 70.9%. The point prevalence was 21.5%. The study also found that low levels of job satisfaction and self-reported health were associated with LBP. In addition, (11) reports LBP is a common problem in Arabian Gulf and North African countries.

Materials and methods

Three measures were used. The Pain Visual Analogue Scale (PVAS), the Short form SF-36, and the Tunisian Arabic Oswestry disability index TAODI.

Data collection: Sixty Libyans from Zawia region were recruited. All were suffering from LBP. Care was taken to ensure the LBP varied from mild to severe and from acute to chronic. Care was also taken that participants came from both urban and rural areas and that roughly equal numbers of males and females were represented. All were aged 18-65 recruitment of the participants within Zawia hospital was by informal approach to patients within the physiotherapy department. The researcher has worked in the department, and ethics and practical approval for the research had been verbally granted. In recruiting the patients, patients were asked to sign a consent form. On completion of the TAODI, they were then asked verbally to indicate how easy it was for them to understand and complete the TAODI. Some participants were illiterate or had poor general education (they had attended only primary schools). For these participants, the questions were asked verbally by the proxy researcher, who completed the questionnaire for them. Participants had their diagnosis of LBP (acute or chronic) verified by a medical practitioner or a physiotherapist. In this regard, the medical practitioners helped determine the validity of the TAODI for Zawia Libyan Arabic speakers.

Statistical analysis All analyses were conducted using SPSS for Windows (Version 14). Alpha was set at p ≤ 0.05 for all comparisons.

Results

Participants comprised 25 men and 35 women. The mean age was 42.17 (SD = 14.45, range: 18-64). Their mean BMI (uncorrected for age or gender) was 26.94 (SD = 4.55). Thus, on average, they were overweight. Eleven were obese (BMI ≥ 30), though 21 had BMIs in a healthy range (between 18 and 25). None was underweight (BMI < 18).
Table 1: Means and standard deviations of the 14 measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>GH1</td>
<td>3.233333</td>
<td>1.031153</td>
</tr>
<tr>
<td>GH2</td>
<td>2.983333</td>
<td>1.185958</td>
</tr>
<tr>
<td>PF</td>
<td>2.12</td>
<td>0.452788</td>
</tr>
<tr>
<td>RP</td>
<td>2.7625</td>
<td>0.854233</td>
</tr>
<tr>
<td>ER</td>
<td>3.205556</td>
<td>0.788552</td>
</tr>
<tr>
<td>SF1</td>
<td>2.883333</td>
<td>1.059128</td>
</tr>
<tr>
<td>P1</td>
<td>4.033333</td>
<td>1.024557</td>
</tr>
<tr>
<td>P2</td>
<td>3.133333</td>
<td>0.98233</td>
</tr>
<tr>
<td>MH</td>
<td>3.31</td>
<td>0.321912</td>
</tr>
<tr>
<td>VIT</td>
<td>3.3375</td>
<td>0.522431</td>
</tr>
<tr>
<td>SF2</td>
<td>2.75</td>
<td>1.144256</td>
</tr>
<tr>
<td>GH3</td>
<td>3</td>
<td>0.828517</td>
</tr>
<tr>
<td>TAODI</td>
<td>2.291667</td>
<td>1.157068</td>
</tr>
<tr>
<td>PVAS</td>
<td>5.25</td>
<td>2.191084</td>
</tr>
</tbody>
</table>

The importance of the table is only that it demonstrates that participants varied on all measures, and that many had severe problems. Because the direction of each measure varies, Table 1 shows a code for each measure and the expected correlation (positive or negative).

Table 2: Meaning of low scores for each measure

<table>
<thead>
<tr>
<th>Code</th>
<th>Low score</th>
<th>Expected correlation with TAODI</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVAS</td>
<td>Good health</td>
<td>Positive</td>
</tr>
<tr>
<td>GH1</td>
<td>Good health</td>
<td>Positive</td>
</tr>
<tr>
<td>GH2</td>
<td>Good health</td>
<td>Positive</td>
</tr>
<tr>
<td>PF</td>
<td>Poor health</td>
<td>Negative</td>
</tr>
<tr>
<td>RP</td>
<td>Poor health</td>
<td>Negative</td>
</tr>
<tr>
<td>ER</td>
<td>Poor health</td>
<td>Negative</td>
</tr>
<tr>
<td>SF1</td>
<td>Good health</td>
<td>Positive</td>
</tr>
<tr>
<td>P1</td>
<td>Good health</td>
<td>Positive</td>
</tr>
<tr>
<td>P2</td>
<td>Good health</td>
<td>Positive</td>
</tr>
<tr>
<td>VIT</td>
<td>Good health</td>
<td>Positive</td>
</tr>
<tr>
<td>MH</td>
<td>Poor health</td>
<td>Negative</td>
</tr>
<tr>
<td>SF2</td>
<td>Poor health</td>
<td>Negative</td>
</tr>
<tr>
<td>GH3</td>
<td>Poor health</td>
<td>Negative</td>
</tr>
</tbody>
</table>

Because the direction of the measures varies, if the TAODI is valid, correlations between it and other measures should be positive or negative according to the individual measure. Table 3 shows the correlation coefficients for all measures with the TAODI.
Table 3: Correlations between TAODI and each of the measures.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Correlation</th>
<th>Significance</th>
<th>Direction of correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>GH1</td>
<td>0.597</td>
<td>&lt; 0.0005</td>
<td>Correct</td>
</tr>
<tr>
<td>GH2</td>
<td>0.523</td>
<td>&lt; 0.0005</td>
<td>Correct</td>
</tr>
<tr>
<td>PF1</td>
<td>-0.557</td>
<td>&lt; 0.0005</td>
<td>Correct</td>
</tr>
<tr>
<td>RP</td>
<td>-0.409</td>
<td>&lt; 0.0005</td>
<td>Correct</td>
</tr>
<tr>
<td>RE</td>
<td>-0.195</td>
<td>0.0132</td>
<td>Correct</td>
</tr>
<tr>
<td>SF1</td>
<td>0.454</td>
<td>&lt; 0.0005</td>
<td>Correct</td>
</tr>
<tr>
<td>P1</td>
<td>0.557</td>
<td>&lt; 0.0005</td>
<td>Correct</td>
</tr>
<tr>
<td>P2</td>
<td>0.466</td>
<td>&lt; 0.0005</td>
<td>Correct</td>
</tr>
<tr>
<td>MH</td>
<td>0.085</td>
<td>0.517</td>
<td>N/A</td>
</tr>
<tr>
<td>VIT</td>
<td>0.497</td>
<td>&lt; 0.0005</td>
<td>Correct</td>
</tr>
<tr>
<td>SF2</td>
<td>-0.509</td>
<td>&lt; 0.0005</td>
<td>Correct</td>
</tr>
<tr>
<td>GH3</td>
<td>-0.264</td>
<td>0.039</td>
<td>Correct</td>
</tr>
<tr>
<td>PVAS</td>
<td>0.672</td>
<td>&lt; 0.0005</td>
<td>Correct</td>
</tr>
</tbody>
</table>

In the table, the direction of correlation (positive or negative) is deemed correct if the correlation is in the predicted direction. Clearly, all correlations are in the predicted direction save mental health, but this correlation is insignificant. Equally clearly, all significant correlations, save those for emotional responsiveness and the third measure of general health, are extremely significant. Table 4 shows the adjusted correlations for each of the eight measures mentioned in the SF-36. From the adjusted correlations, one can derive the measures of physical and mental health measured in the SF-36. The derived correlations are, respectively, 0.485 and 0.315.

Table 4: Adjusted correlations for each of the SF-36 measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>Adjusted correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>General health</td>
<td>0.461</td>
</tr>
<tr>
<td>Pain</td>
<td>0.511</td>
</tr>
<tr>
<td>Social functioning</td>
<td>0.482</td>
</tr>
<tr>
<td>Physical functioning</td>
<td>0.557</td>
</tr>
<tr>
<td>Physical role</td>
<td>0.409</td>
</tr>
<tr>
<td>Emotional role</td>
<td>0.195</td>
</tr>
<tr>
<td>Mental health</td>
<td>0.085</td>
</tr>
<tr>
<td>Vitality</td>
<td>0.497</td>
</tr>
</tbody>
</table>
Discussion

The SF-36 measures vitality in the other four questions within Section 9. Each is answered in the same manner as the mental health questions. The correlation between the TAODI and vitality, at $r = 0.497$ was highly significant ($p < 0.0005$). The questions in the measure all concern feeling tired or lacking energy. It is to be expected that, the more serious the LBP, the more tired the participants would feel. So, again, the result corroborates the view than the TAODI is valid for Zawia Libyans. If the TAODI is a valid measure, results of the present study suggest people with LBP have the profile of problems suggested by the following Figure (1).

![Figure 2: Profile of problems of people suffering from LBP as suggested by results of the present study](image)

**Figure 2:** Profile of problems of people suffering from LBP as suggested by results of the present study
The figure suggests that the major problems (left in the figure) are physical problems and pain. This, as indicated, is plausible. The most common symptoms of LBP are pain and tension of stiffness in the lower back (12); the latter two equate to physical disability, albeit mild. Other common symptoms include muscle spasms and a reduced range of motion that involves any use of the back (13) - that is, almost any gross physical movement. Again, these equate to physical disability.

This, of course, is in addition to LBP caused by injury or disease. The finding that the next most common associates of LBP social problems and a lack of vivacity accord with common sense and with the literature. It is likewise unsurprising that the least important associate, but still significant, associate of LBP was emotional role (14). One would expect some impairment of emotional role caused by LBP, but perhaps not as much impairment as in physical activities. Thus,

the overall pattern of results suggests the TAODI is a valid measure. Finally on this issue, as indicated, all participants indicated they had no difficulty using the TAODI. This not only in itself suggests that the questionnaire is valid, it also accords with results of the pilot study.
References

Carotid body tumor, a case report

Hussein Mohamed Lameir

MRI Unit, Radiology department, Zawia, Teaching Hospital, Faculty of Medicine, Zawia, Libya

A carotid body tumor (chemodectoma or carotid body paraganglioma) is a highly vascular rare neck tumor arising from the para ganglion cells of the carotid body, located at the carotid bifurcation splaying ICA and ECA away from each other. A patient of 61 years old male with history of gradual increasing neck swelling, physical examination revealed pulsatile painless Lt side neck mass neck CT scan was done in at radiology department and revealed there is a large soft tissue density mass of approximately 41 x 35 x 28 mm at the bifurcation of the Lt CCA, splaying ICA, ECA away from each other (Figure D) and encasing the CCA (Figure C). The Lt internal jagular vein is compressed laterally by the mass effect. In post contrast films the mass exhibits rapid homogenous enhancement.

Figure A

Figure B

Figure C

Figure D

Coronal (A), sagital (B) and axial (C, D) CT neck images showing Lt sided carotid body tumor with splaying of ICA and ECA. Diagnosis of carotid body tumor was made; the patient underwent a surgical resection.

The histological result confirmed the diagnosis of carotid body tumor.

The carotid body tumor derived from para ganglion cells of the carotid body, sporadic form is the common one and about 5% are
bilateral, the 2\textsuperscript{nd} rare form with a pattern of autosomal dominant inheritance and about 32\% of the cases are bilateral. A written informed consent was obtained from the patient. Presentation of painless pulsatile firm neck mass below the angle of the jaw, medially and laterally mobile but vertically fixed. Located within outside adventitial layer of CCA at level of carotid bifurcation, commonly along posteroomedial wall. Extended inferiorly to lower cranial nerves, pharynx; superiorly to skull base and intracranial cavity. Carotid body tumors are located at the carotid bifurcation with characteristic splaying of the ICA and ECA, described as the lyre sign. In all modalities the dense vascularity of these tumors is manifested as prominent contrast enhancement. Contrast enhanced CT scan is excellent at depicting these lesions. Typical appearances are: (soft tissue density on non-contrast CT (similar to muscle), bright and rapid (faster than schwannoma) enhancement and splaying of the ICA and ECA. On MRI: T1W images: Iso to hypointense compared to muscle. Salt and pepper appearance when larger, representing a combination of punctate regions of haemorrhage or slow flow (salt) and flow voids (pepper) and intense enhancement following gadolinium T2W images: Hyper intense compared to muscle and salt and pepper appearance also seen on T2. Surgical excision is the treatment of choice. The larger tumor the higher risk of operative complications. In patients for whom the risks of complications preclude surgery, radiotherapy may be considered. Differential diagnosis: Vagal schwannoma: tends to displace both vessels together rather than splaying them, Vagal neurofibroma: tends to displace both vessels together rather than splaying them, lymph node mass: may look similar if hypervascular, Glomus vagale tumour: same pathology but located more rostrally, carotid bulb ectasia.

In conclusion: carotid body tumor, (chemodectoma or carotid body paraganglioma) is a highly vascular rare neck tumor arising from the para ganglion cells at the carotid bifurcation presented with painless pulsatile firm neck mass, the key imaging finding is splaying of the ICA and ECA, surgical excision is the treatment of choice.

References
A study to investigate the effect on spinal angles of a self-selected and a standard position while sitting on kneeling chair

Safa Koushada and Thuria Athwair
Department of Physiotherapy, Faculty of Medical Technology, University of Zawia, Zawia, Libya
Correspondence to safakoushada@gmail.com

Abstract: Back and neck pain are major problem amongst the growing number of seated workers, and enormous therapeutic and ergonomic design effort goes into reducing these problems. Educating the correct posture, choosing the right ergonomic chair, and readjusting the workstation have become very important element in any therapeutic plan. The objective of this study is to identify the difference in five spinal and pelvic angles between the self-selected and standardized position while sitting on the kneeling chair in healthy subjects. Fifteen healthy subjects (≥18 years) participated in this pilot study. The spinal angles (neck angle, head tilt, cervico-thoracic, thoracic and lumbar angle) and pelvic tilt angle were measured while sitting on the kneeling chair in self-selected and standard position. The study showed a significant difference in the lumbar spine and pelvic tilt angle when comparing the sitting posture with and without instructions. The study revealed that sitting on a specially designed chair does not position the body in neutral alignment, but it can be achieved by educating subjects on the correct sitting posture.

Keywords: Back pain, neck pain, sitting posture, kneeling chair

Introduction

Working in an office typically involves spending a great deal of time sitting in an office chair in a position that adds stress to the structures of the spine. Therefore, to avoid developing or compounding back problems, it is important to have an office chair that is ergonomic and that supports the lower back and promotes good posture. There are many types of ergonomic chairs available for use in the office. No one type of office chair is necessarily the best, but there are some elements that are very important to look for in a good ergonomic office chair. In order to meet the user’s needs by relaxing the muscles, reducing the physical load on the spine, avoiding fatigue, and helping users to do their work more efficiently. In the ordinary conventional office chair the adjustable seat height, seat width and depth, lumbar support, backrest, armrest, and the seat material are important to consider to ensure the user’s comfort. Beside the conventional chair there are some more sophisticated ergonomic chairs that have been designed to give support, comfort and promote good posture (1). It has been thought that these newly designed chairs can be beneficial for office workers with discomfort or neck or back pain. They can be used as an alternative to the ordinary chair such as kneeling chair. The kneeling chair is an office chair that has a forward tilted seat and two cushions for knee support but without backrest, and places the user in a kneeling position (figure 1). The design is thought to encourage good posture by sliding the hips forward and aligning the back, shoulder and neck. The seat pan gives the primary support, and additional support comes from the knee support cushions. This type of ergonomic chair distributes the weight between the pelvis and the knees, which reduces spinal compression, and therefore reduces the stress
and tension in the lower back and leg muscles (1).

Figure 1: kneeling chair

This chair could position the lumbar spine in a more natural alignment (lordosis) or very close to the neutral position (2). By searching the literature, three studies were found (3-5) in which the authors compare the lumbar curvature when sitting on Balance Multi chair (kneeling chair) (BMC) or Standard Conventional chair (SCC) while performing a writing task at a desk, and standing posture. In addition, Link et al. (3) investigated the relationship between lumbar curvature and a) anthropometric factors and the length of hamstring and hip flexor muscles, b) prolonged sitting whereas Bennett et al. (3) studied the electromyographic activity of the erector spinae (ES) muscles and measuring lumbar curvature during relaxed (comfortable) and erect sitting posture while sitting on three different chairs (a kneeling chair, an office chair, and a straight back chair) and during standing. In the study by Fery and Tecklin (4), forty four healthy university students (22 males and 22 females) participated in the study whereas Bennett et al. (3) used only 20 healthy young subjects, eight of which were men. In the study by Link et al. (4), sixty one 20-30 year old subjects were recruited for the study. Age and gender control were considered. This sample size in the study by Link et al. (3) was large enough to detect the differences; however, the postural alignment could vary between gender and age group (6) and the results cannot be generalized to females and the older male population. Therefore, another study is needed in which female subjects are used or which studies a sample from different age groups. The subjects in both of the above-mentioned studies had no previous experience in sitting on the BMC, which helped to eliminate the learning effect. Three measurements were taken for the lumbar spine in the three studies for each condition by a flexible ruler. In Fery and Tecklin (4) study, all measurement preparation and data collections were done by one researcher; this would have helped to standardise the procedures. Bennett et al. (3) managed to measure the lumbar curvature during standing and sitting on the kneeling chair and straight back chair; however, the authors were not able to measure the curvature during sitting on the office chair as the backrest support blocked the area. As a result, the straight back chair and kneeling chair were included in the lumbar curve measurements and analysis. Fery and Tecklin (4) palpated the spinous
processes (L1 and S2) before measuring the curve in each condition, which helped to reduce the effect of skin movement. The reliability and validity of the testing procedures were not determined in these two studies. However, Hart and Rose (7) established high reliability for these procedures (r = 0.97) and good validity (r = 0.87) between the lumbar curve measurement obtained by the flexible ruler and radiograph. Bennett et al. (3) found that there was a significant difference in the lumbar curvature when in the standing position rather than the seated position. Further, the results revealed no significant difference between the two sitting (relaxed and erect) positions when standing and sitting on the kneeling chair. However, there was significant difference between the relaxed and erect posture during sitting on the straight back chair. Fery and Tecklin (4) found a significant difference in the curve between the mean of all pairs; the mean of the lumbar curve in standing was (31.2 ± 14.8 degrees), for the SCC it was (-9.0 ± 10.4 degrees), and for sitting on the BMC it was (-2.0 ± 13.0 degrees. Link et al (1990) found that the young men in the study spent 7.8 hours per day sitting. The lumbar spine while sitting on SCC was flexed, whereas on BMC it was nearly 90 more extended than on the SCC (< .05). A significant association between the lumbar curve and sitting order was found in the linear regression analysis (F = 4.35, P = 0.04, R² = 0.08). These studies show that the kneeler chair could position the spine in neutral position; therefore, their findings can be accepted. However, more research is needed to establish and update these results and evaluate the long term use of this chair in a work setting. The aim of this study is to investigate if there is any difference in six spinal angles (head tilt, neck, cervico-thoracic, thoracic, lumber, and pelvis angles) between the self-selected and standardized sitting position in the kneeler chair.

**Material and methods**

A three repeated measurements pilot study with sample size of healthy pain free subjects (5 females and 10 males with mean age 35.4 ± 11.69, SD, years) was used in the study. The subjects were excluded in case of having pain in the past six months prior to conducting the study. The ethical approval was obtained from the Cardiff University School of Healthcare Studies (SOHCS) Research Ethics Committee, and informed consent was obtained from all subjects. Eight Retro-reflective markers were placed over the right canthus, tragus, C7, T12, L4, PSIS, and ASIS (Figure 2).

![Figure 2: Self-Selected Position (Comfort Position)](image-url)
**Testing procedures:** The subjects sat comfortably (figure 2) on the chairs and carried out a typing task for 5 min during that time and about 4.5 min from the start of the typing a flash photograph was taken, a two minute break was given. This procedure was then repeated two more times. After that, the workstation was repositioned in a standard position in which the screen was placed at the edge of the desk with screen height at eye level. The subject was then asked to sit in a standard way (figure 3) on one of the chairs to continue the typing task for 5 minutes with a 2 minute break following (three trials), and then sit on the second chair and repeat the same procedures and have his or her photograph taken. The sitting instructions included sitting upright and the thigh-trunk angle was measured by the goniometer as it should be (90°-120°) (8). The measurements were taken before each trial. Each photograph was analyzed using MAT-lab software which has shown very high to excellent reliability in previous.

Statistical analysis:

The mean and standard deviation (SD) of each angle were calculated using the Excel program, then imported to the statistical package SPSS version 18.0 (9). Histogram and Q-Q plot were used to identify the normal distribution of the data. Parametric sample paired t-tests were used to serve the research question and \( p = 0.05 \) was considered as statistically significant. According to Portney and Watkins (10), a paired t-test is used in the same or matched subject designs to compare between two conditions. As the t-test was repeated 6 times, Post Hoc Bonferroni’s correction was carried out in order to avoid type I error due to the repeated t-test. Therefore, each angle was tested at the level of significance of 0.008 (\( \beta = 0.05/6 \)).
Results

Fifteen subjects, male ($n = 10$) and female ($n = 5$), participated in the study. As shown in Table 1, the mean age of the subjects was 35.4 yrs. The mean height and the mean weight were 167.33 cms and 66.33 kgs respectively (appendix 4).

Table 1: Participant’s demographic data

<table>
<thead>
<tr>
<th></th>
<th>minimum</th>
<th>maximum</th>
<th>mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age/years</td>
<td>22.00</td>
<td>64.00</td>
<td>35.4000</td>
<td>11.68516</td>
</tr>
<tr>
<td>Weight/kg</td>
<td>46.00</td>
<td>91.00</td>
<td>66.3333</td>
<td>12.02181</td>
</tr>
<tr>
<td>Height/cm</td>
<td>152.00</td>
<td>185.00</td>
<td>167.3333</td>
<td>8.59956</td>
</tr>
</tbody>
</table>

Keys: SD = standard deviation, years = years, kg= kilogram, cm= centimetre

Table 2: Descriptive data (mean and standard deviation) of the head tilt, neck angle, and cervico-thoracic angles.

<table>
<thead>
<tr>
<th>Position</th>
<th>Type of chair</th>
<th>head tilt °</th>
<th>neck angle °</th>
<th>cervico-thoracic angle °</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>mean</td>
<td>SD</td>
<td>mean</td>
</tr>
<tr>
<td>Self-selected</td>
<td>kneeling</td>
<td>149.3333</td>
<td>6.53462</td>
<td>60.3222</td>
</tr>
<tr>
<td>Standard</td>
<td>kneeling</td>
<td>146.8467</td>
<td>7.74905</td>
<td>55.0400</td>
</tr>
</tbody>
</table>

Keys: SD= standard deviation

Figure 8: mean and standard deviation of head tilt, neck angle, and cervico-thoracic angles.

Key: SD= Standard deviation.
It can be observed from table 2 that there was no large variation in the three spinal (head tilt, neck, and cervico-thoracic) angles in different positions as the mean value were large with relatively small standard deviation (Figure 8).

Table 3: Descriptive data (mean and standard deviation) of the thoracic spine, lumbar spine, and pelvic tilt angles

<table>
<thead>
<tr>
<th>Position</th>
<th>Type of chair</th>
<th>Thoracic spine angle °</th>
<th>Lumbar spine angle °</th>
<th>Pelvic tilt angle °</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>Self-selected</td>
<td>kneeling</td>
<td>46.7044</td>
<td>7.01384</td>
<td>0.1511</td>
</tr>
<tr>
<td>Standard</td>
<td>kneeling</td>
<td>44.3022</td>
<td>7.47207</td>
<td>7.4356</td>
</tr>
</tbody>
</table>

Keys: SD= standard deviation

In table 3 however, a large variation was observed in the lumbar and pelvic tilt angles, which can be understood from the small mean value of these two angles with relatively large standard deviation in each position. The values can be visually observed and understood in figures (9), it can be seen also in the table 3 that the hyper-lordosis and the posterior tilt of the pelvis are reported as negative values.

Figure 6: mean and standard deviation of the thoracic spine, lumbar spine, and pelvic tilt while sitting on the kneeling chair in the two sitting positions.
Table 4: results of t-test to compare the spinal angles between the self-selected and standard position while sitting on the kneeling chair

<table>
<thead>
<tr>
<th>Pair</th>
<th>Spinal angle</th>
<th>t-value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Head tilt angle/SS-</td>
<td>1.952</td>
<td>.071</td>
</tr>
<tr>
<td>2</td>
<td>Neck angle/SS-</td>
<td>3.049</td>
<td>.009</td>
</tr>
<tr>
<td>3</td>
<td>Cervico-thoracic angle/SS-Cervico-thoracic angle/S</td>
<td>2.140</td>
<td>.050</td>
</tr>
<tr>
<td>4</td>
<td>Thoracic angle/SS-</td>
<td>2.107</td>
<td>.054</td>
</tr>
<tr>
<td>5</td>
<td>Lumbar angle/SS-</td>
<td>5.039</td>
<td>.000</td>
</tr>
<tr>
<td>6</td>
<td>Pelvic tilt angle/SS-</td>
<td>-3.698</td>
<td>.002</td>
</tr>
</tbody>
</table>

**Keys: SS= self-selected position, S= standard position**

A comparison of the spinal angles between the self-selected and standard position while sitting on the kneeling chair (table 6). In the 6th table the t-value and level of significant are reported, and show some significant values. For instance, there is a significant difference between the self-selected and standard position while sitting on the kneeling chair in the lumbar spine as the P > 0.008 (P = 0.000) which was more lordotic in the standard position in comparison with the self-selected position. Also, a significant difference is observed in the pelvic tilt (P = 0.002) due to the posterior direction of the pelvic tilt in the self-selected position, whereas, no significant differences are observed in the other angles.

**Discussion**

In order to understand and eliminate the problem of neck and back pain (NP, BP), sitting posture (postural analysis PA) has been regularly investigated in the field of physiotherapy and the healthcare profession. Ergonomic chair designs may influence the sitting posture and muscle activity; therefore, the type of chair has become an area of interest for many researchers. Despite this interest, there has been only limited research regarding posture while sitting on the kneeling chair (11, 12). Therefore, there is a need for up to date research investigating the effect of using the kneeling chair in reducing NP and BP.

This study showed no large variation in the head tilt, neck angle, the cervico-thoracic angle, and thoracic angle while sitting on the kneeling chair and doing a typing task (tables 2 and 3). However, there were large variations in the lumbar angle and pelvic tilt (table 3). These findings could mean that any major changes happened in the lower spine (lumbar spine and pelvic tilt angles) due to sitting on an ergonomic chair not making any changes in the upper spine. On the other hand, it was found that significant changes happen in the lumbar and pelvic tilt angles only. Which could have been affected by two main factors: firstly, educating subjects about the correct sitting posture and secondly, the structural design of the kneeling chair and the presence of the forward tilt (10). Fery and Tecklin (4) and Link et al (5) studied the
difference in the lumbar curvature while sitting on the standard conventional chair and the kneeling chair in a comfortable sitting position. The authors revealed that there was a significant difference in the lumbar curvature between the two chairs, as it had 9 degrees more extension and was very much closer to the lumbar curvature in the standing position in the kneeling chair than to the lumbar curvature in the standard conventional chair. This result is not supported by the present study, which could be due to the difference in the methodology as well as the chair design and the performed task. Regarding the neck angle, the results (table 6) showed that the level of significance of the neck angle was just over 0.008 (P = 0.009); this result could be significant with a larger sample size which should be applied in future. From the above mentioned results, it seems that sitting on the kneeling chair on its own does not position the body in the optimal position. However, educating workers and raising their awareness regarding the ideal sitting posture has a major impact on their posture. These results challenge the proposed aim and widespread idea of using the kneeling chair for good postural alignment without giving any instruction about sitting posture. On the other hand, Bennett et al. (3) reported a significant difference in the lumbar curvature, as it was greater when sitting comfortably on the kneeling chair than on the straight back chair. Bennett et al. (3) studied the lumbar curvature as well as muscle activation while sitting on the kneeling and straight back chair in the relaxed (self-selected) and erect (upright) position using a flexible ruler. They revealed no significant difference in the lumbar curvature between the relaxed and erect position while subjects were seated on the kneeling chair. However in the current study there was a significant difference in the lumbar spine. This contradiction could be explained by the fact that Bennett et al. (3) studied young subjects whose ages ranged between 22 and 37 years old, whereas in the current study the age group was wider. Further, the measuring techniques of the spinal posture were different. In addition, two tasks were used in the study by Bennett et al (3) (a typing and a writing task), whereas in this study the typing task was the only one performed. Bennett et al. (3) explained their findings by the fundamental function of the kneeling chair design and in this they were the same as Fery and Tecklin (4).

In conclusion: The ergonomically designed kneeling chairs is designed to maintain neutral postural alignment especially in the lumbar curvature, and sometimes are recommended to be used as part of a therapeutic plan for back pain patients. The current study revealed that sitting on a specially designed kneeling chair does not inherently position the spine in the correct posture. Also, the results significant difference between the two positions in the lumbar spine and pelvic tilt angles when sitting on the kneeling chair. These results raise an issue around the proposed aim of using kneeling chair to intentionally correct sitting posture. Therefore, the results do not support the clinical claim that using the ergonomically designed chair as an alternative to the ordinary office chair will adjust the spine to a good postural alignment. Instead, more focus should be placed on educating sitters on how to sit correctly, which could help to reduce the prevalence of neck and back pain.
References

Iron deficiency anemia in women in Zawia region

Hanan Thwer¹, Suhaela Twair², Ali Alkhabi¹ and Mustafa Abugila*¹
National Medical Research Centre, Zawia and Department of Biochemistry and Clinical Biochemistry, Faculty of Pharmacy, University of Tripoli, Tripoli, Libya

Correspondence to Maabugila@yahoo.com

Abstract: Anemia is a common health problem in women in developing countries, since anemia is more common in women than man due to physiological processes. This study was conducted in Zawia area and included 210 women in childbearing age (18-45 years) who were visiting Zawia teaching hospital. After filling the questionnaire, blood samples were taken and analyzed for hematological and biochemical profiles. Biochemical testes included measurement of serum iron, ferritin, and total-iron binding capacity. Among the total sample (210 women), there were 87 (41.4%) pregnant and 123 (58.6%) non-pregnant women (includes married and single). Pregnant women (87) were classified according to the gestational age into first, second, and third trimesters. Out of 87 pregnant women, there were 7 (8.04%) pregnant women in the first trimester, 34 (39.1%) in the second trimester, and 46 (52.9%) pregnant women in the third trimester. The means of biochemical and hematological parameters in the studied samples were: Hb = 10.37 ± 2.02 g/dl, RBC= 3.78 ± 1.037 m/m³, serum iron 61.86 ± 40.28 µg /dl, and TIBC = 386.01 ± 94.91 µg/dl. In this study, it is considered that any women have hemoglobin below 11.5 g/dl is anemic. 89.1%, 69.5%, and 47.8% of pregnant women who belong to third trimester had low (below normal value) Hb, serum iron, and ferritin, i.e. iron deficiency anemia was more common in third trimester among the first and the second trimesters. Third trimester pregnant women also had high TIBC more than first and second trimesters. We have compared between pregnant and non-pregnant women in the terms of hematological and biochemical parameters. We found that 85%, 65.3%, and 36.7% of pregnant women have low Hb, serum iron, and ferritin. This study showed that 45 (21.5%) out of 210 women (The whole samples) had iron deficiency anemia. i.e. 21.5% of women who included in this study in Zawia area had iron deficiency anemia. Among 45 women who have iron deficiency anemia, there were 30 (66.6%) pregnant, and 15 (33.3%) non-pregnant. That means prevalence of iron deficiency anemia was more in pregnant than non-pregnant as we expected. This study showed the effect of tea on absorption of iron. In this matter, drinking tea women in this study showed 42.4% a decrease in serum iron level.

Key wards: Hemoglobin, red blood cells, total iron-binding capacity.

Introduction

Anemia is present when there is a decrease in the level of hemoglobin in the blood below the reference level for the age and sex of the individual (1). It means that anemia is indicated by a hemoglobin concentration in the blood of less than 13.5 g/dl in adult males and less than 11.5 g/dl in adult females or haematocrit of less than...
Iron absorption responds to daily need and is influenced by the amount and type of iron accessible from food, the functional state of the gastrointestinal mucosa and pancreas, current iron stores, and erythro-poietic needs. Iron absorption can thus be influenced at several different stages. Much of the dietary iron is non-haem iron derived from cereals, with a lesser component of haem iron derived from haemoglobin or myoglobin in red or organ meats. Haem iron is more readily absorbed than non-haem iron, being less subject to influence by other dietary constituents. Even when animal foods form only a small part of diet, they have a disproportionate effect on the total iron absorbed, this is because an unidentified ligand present in meat promotes an enhanced availability of the non-haem iron in the rest of the diet.

Iron absorption may be regulated both at the stage of mucosal uptake (possibly by varying the expression of metal transport proteins) and at the stage of transfer to the blood. Factors favouring increased iron absorption include iron deficiency, pregnancy, hypoxia and increased erythropoiesis. Iron absorption is usually decreased when the body is overloaded with iron, and in acute and chronic infections. Very little iron is excreted by normal persons. Healthy adult males lose about one mg each day, mostly as hemoglobin storage iron in desquamated cells and erythrocytes in feces. Nearly negligible amounts of iron are excreted in sweat and urine. With each menstrual cycle, women lose approximately 20-40 mg of iron. Iron deficiency is one of the most prevalent disorders known, with 30% of the world wide population affected. Those with a higher than average risk for iron deficiency anemia include pregnant women, both young children and adolescents, and women of reproductive age. Increased blood loss, decreased dietary iron intake, or decreased release from ferritin may result in iron deficiency. Reduction in iron stores usually proceeds both a reduction in circulating iron and anemia, as demonstrated by a decreased red blood cell count, mean corpuscular hemoglobin concentration, and microcytic red blood cells. Although a decrease in serum iron and an increase in transferrin / Total iron binding capacity are classic indices of iron deficiency, the serum ferritin concentration has evolved as a more sensitive and reliable test for confirming this condition.

Materials and methods

This study was a cross-sectional survey including two hundred and ten blood samples were taken from non-pregnant and pregnant women in reproductive age in different stages of pregnancy and investigated for different biochemical and hematological parameters such CBC, blood film, serum iron, ferritin, and total iron binding capacity (TIBC). Its saturation with the purpose of assess the cases of IDA in pregnant and compare them with non-pregnant women. Questionnaires contain different data completed for each subject including personal data (name, address, age, nationality) and other data (age of gestation, data on variables of interest including, drinking tea status, education, diet, data were collected from each subject. Iron kits (Fluitest iron- Bicon diagnostic Hecke 8-Germany), TIBC kits (Fluitest TIBC- Bicon diagnostic Hecke 8-Germany), Ferritin kits (Ortho-Clinical Diagnostics- Johnson- Johnson- Co.), Wrigts stain-UK. Sysmax (kk21- Japane),
Microscope (hundwetzlar- Germany), Centrifuge (Eppendorf- Germany), Spectrophotometer (Biosynthesis BT-302- Spain) and Vitros system (Ortho-Clinical Diagnostics- Johnson- Johnson-Co.).

Data analysis was performed with computer software (SPSS, Version 14.0, SPSS Inc., Chicago, IL). Age was presented as mean ± SD, frequencies; percentages of different variables were computed. Chi Squire analysis for independence was used to examine the relationship significance between Hb, and different biochemical test and different gestation age and to examine the significance of differences in risk characteristics associated with Hb concentrations and iron status markers. Students T test was used to compares the means of Hb, Iron and RBC in both pregnant and non pregnant group of women.

Two hundred and ten samples collected from Zawia central hospital (women clinic) and 2nd March polyclinic, analysis were performed Zawia hospital laboratory. Blood samples were taken, using needle (size 23Gχ1½). After taking 5 ml of venous blood, the blood is transferred then in two tubes in one tube (type AFMA-Disg) and gently mixed for 3- 4 times. The tube contains an anti-coagulation substance called ethylene diamine tetra-acetic acid (EDTA) to prevent blood coagulation. Each tube labeled by a sticker contains number, name of the subject, time of collection, and the place of collection. Blood samples were transferred to the hospital laboratory for CBC (complete blood count) and blood film, the CBC analyzed by using sysmax kk21 machine. All hematological parameters for each subject were recorded in a strip paper from the sysmax machine. Each strip paper was numbered. The time consumed to get a one strip is ranged between one to a half minute. All obtained data of blood parameters for each woman were stored in the computer.

Blood films were examined to reveal any pathological changes in RBC in case of iron deficiency anemia. The slides were examined in hematology department in Zawia teaching hospital. In case of biochemistry samples, was separated from the clot or cells within 1 hour. Samples were centrifuged within at least 3000 rpm for 5 minutes. Biochemistry profile included measurement of serum iron and total iron binding capacity (TIBC) by using commercial biochemical kits (Biconfluitest B-Germany) according to standard spectrophotometric methods which were in routine used in the biochemistry laboratory.

**Results and discussion**

This study included 210 women in Zawia area. During the study, 210 blood samples were taken from reproductive age (18 - 45 years). The samples analyzed to investigate the anemia and iron deficiency as assessed by biochemical and hematological parameters and determined the distribution of anemia among no pregnant and pregnant women. Moreover, to determine the frequency of anemia in the different stages of gestation. The age range was between 18 - 45 years old, with mean age of 30. 2 ± 7. 28 years in the whole sample. 122 married (58%), 88 single (41%). 87 were pregnant women (41.4%) and 123 non-
pregnant women (that included single and married women). The age structure among the sample was divided into four different age groups. Age concentrated between 18 and 33 years 141(67%) figure (3). The means of biochemical and hematological parameters in the study sample were as following: Hb was 10.37± 2.038 gm/dl, serum iron = 61.86 ±40. 288 µg/dl, TIBC = 386.01 ± 94.918 µg/dl, serum ferritin = 29.45 ± 30.592 ng/ml and RBC = 3.78 ± 1.037 m/m³ (table 1).

Table 1: mean and ± S.D of some biochemical parameters.

<table>
<thead>
<tr>
<th>Total samples</th>
<th>Hb</th>
<th>Iron</th>
<th>TIBC</th>
<th>Ferritin</th>
<th>RBC</th>
</tr>
</thead>
<tbody>
<tr>
<td>210</td>
<td>210</td>
<td>153</td>
<td>77</td>
<td>210</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>10.37</td>
<td>61.86</td>
<td>386.01</td>
<td>29.45</td>
<td>3.78</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>± 2.038</td>
<td>± 40.28</td>
<td>± 94.91</td>
<td>± 30.59</td>
<td>± 1.03</td>
</tr>
</tbody>
</table>

Figure 3: Age grouping of sample population.
Numbers above the bars represent number of cases.

The pregnant women screened in this study were 87 and having different gestational stages. In first trimester, the number of pregnant women was 7 out of 210 women (Total studied sample) and that represents 8.04%, second trimesters were 34 pregnant women 39.08%, and third trimester were 46 pregnant women 52.8%. The highest percentage was third trimester of gestational stage in the study sample as shown in (Table 2).
Table 2: Distribution of gestational age

<table>
<thead>
<tr>
<th>Pregnancy duration</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>First trimester</td>
<td>7</td>
<td>8.04 %</td>
</tr>
<tr>
<td>Second trimester</td>
<td>34</td>
<td>39.08 %</td>
</tr>
<tr>
<td>Third trimester</td>
<td>46</td>
<td>52.87 %</td>
</tr>
<tr>
<td>Non-pregnant women (single-married)</td>
<td>123</td>
<td>58.09 %</td>
</tr>
<tr>
<td>Total</td>
<td>210</td>
<td>100 %</td>
</tr>
</tbody>
</table>

In the whole sample, the results show that 66 women have normal Hb (31.42%) whereas 144 women have low Hb (68.57%). The mean value of Hb was 10.37 ± 2.03 g/dl and RBC 3.78 ± 1.03 m/m³. (Table 3).

Table 3: Frequency and percentage of hemoglobin

<table>
<thead>
<tr>
<th>Hb</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal*</td>
<td>66</td>
<td>31.42 %</td>
</tr>
<tr>
<td>Low**</td>
<td>144</td>
<td>68.57 %</td>
</tr>
<tr>
<td>Total</td>
<td>210</td>
<td>100 %</td>
</tr>
</tbody>
</table>

* Samples equal to or greater than 11.5 g/dl considered normal  
** Samples less than 11.5 g/dl considered anemic (11).

We considered any women in childbearing age who has hemoglobin level below 11.5 g / dl is anemia according to WHO and many other studies (14, 15, 16, 17). The mean value of hemoglobin level in the whole studied sample (210 women) was 10.37± 2.03 g/dl which is below the normal value (11.5g /dl). My explanation for this low value of the mean hemoglobin is due to big variation between hemoglobin values in the non- pregnant and pregnant women. Since single females have a higher hemoglobin level than pregnant women. In my study, there were 87 (41.42%) pregnant women out of the total sample (210). That certainly decreases the mean value of hemoglobin of the whole studied sample. Serum iron concentration; the frequency of normal serum iron in the study sample were 128 women (60.95%) and low serum iron were 82 women (39.0%). The frequency of normal serum ferritin were 162 (77.14%), and low serum ferritin were 48 samples (22.9%) (table 4).
Table 4: Frequency and percentage of normal, and low serum iron

<table>
<thead>
<tr>
<th>Iron level</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>128</td>
<td>60.95 %</td>
</tr>
<tr>
<td>Low</td>
<td>82</td>
<td>39.0 %</td>
</tr>
<tr>
<td>Total</td>
<td>210</td>
<td>100 %</td>
</tr>
</tbody>
</table>

Table 4 shows that 82 (39%) women out of the total sample (210) have low serum iron. Table 5 shows that 48 (22.9%) women have low serum ferritin. Table 6 shows that 70 (33.3%) women have high TIBC level. So the percentage of low serum iron, ferritin, and high TIBC is ranging between 22.9% to 39%. These results are very close to results of some workers who have done studies on Lebanese women (14). It should be mentioned here that (14) have done their study only on non-pregnant women, but the similarity between my study and their study is the age of the studied sample (18-45 years).

Table 5: Frequency and percentage of serum ferritin

<table>
<thead>
<tr>
<th>Ferritin level</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>162</td>
<td>77.1 %</td>
</tr>
<tr>
<td>Low</td>
<td>48</td>
<td>22.9 %</td>
</tr>
<tr>
<td>Total</td>
<td>210</td>
<td>100 %</td>
</tr>
</tbody>
</table>

Frequency of cases with normal TIBC with high TIBC (33.3%), and only 8 cases with low TIBC (3.8%).

Table 6: Frequency and percentage of TIBC

<table>
<thead>
<tr>
<th>TIBC level</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>132</td>
<td>62.9 %</td>
</tr>
<tr>
<td>High</td>
<td>70</td>
<td>33.3 %</td>
</tr>
<tr>
<td>Low</td>
<td>8</td>
<td>3.8 %</td>
</tr>
<tr>
<td>Total</td>
<td>210</td>
<td>100 %</td>
</tr>
</tbody>
</table>
The mean hemoglobin concentration in 87 pregnant women was 9.38 ± 1.86 gm/dl, whereas the mean in 123 non-pregnant women (single-married) was 11.08 ± 1.85 gm/dl. Figure 2 shows that 74 pregnant women (85%) out of 87 pregnant women have low hemoglobin (less than 11.5 gm/dl). Non-pregnant women (single and married) have a lower percentage (56.9%) of low hemoglobin (70 out of 123 women). The mean of hemoglobin concentration in married women was 10.56 ± 1.68 gm/dl and was 11.28 ± 1.89 gm/dl in single women. In my study, there were 123 non-pregnant women (married or single). 56.9% of these non-pregnant women had low hemoglobin level (Hb < 11.5 gm/dl). In contrast, hemoglobin level was measured for 87 pregnant women, and 85% of them had low hemoglobin level. i.e. pregnant women in Zawia area has lower hemoglobin level compared to the non-pregnant women. Some other studies were conducted in Kazakhstan (18) and Nepal (19). Both studies included pregnant and non-pregnant women and considered any women have hemoglobin level less than 12 gm/dl is anemic.

![Figure 4](image)

**Figure 4:** The number of cases with low and normal hemoglobin level in the pregnant and non-pregnant women, S = single, M = married

The mean of plasma iron in 87 pregnant women was 54.44 ± 39.58 µg/dl, whereas the mean in 123 non-pregnant women was 66.43 ± 40.20 µg/dl. Figure 4 shows that 49 pregnant women out of 87 pregnant women have low serum iron (56.3%). Non-pregnant women (single and married) have a lower percentage (26.8%) of low iron (33 out of 123 women). The mean of iron concentration in married women was 66.03 ± 34.56 µg/dl and was 66.33 ± 42.03 µg/dl in single women. It seems that there is no significance differences in the mean of serum iron level in the married and in the single women.
The mean of RBC in 87 pregnant women was $3.361 \pm 1.298 \text{ m } / \text{ m}^3$, whereas the mean in 123 non-pregnant women was $4.100 \pm .62315 \text{ m } / \text{ m}^3$. Figure 5 shows 30 pregnant women out of 87 pregnant women have low RBC (34.4%). Non-pregnant women (single and married) have a lower percentage (14.6%) of low RBC (18 out of 123 women). The mean of RBC in married women was $3.90 \pm 0.61 \text{ m } / \text{ m}^3$ and was $4.14 \pm 0.619 \text{ m/m}^3$ in single women. Usually anemia is more common in pregnant women than in non-pregnant women due to fetus demand.

The mean of ferritin level in pregnant women (87) was $20.105 \pm 24.312 \text{ ng/ml.}$ in non-pregnant (123) women the mean of serum ferritin was $36.063 \pm 32.822 \text{ ng/ml.}$ Figure 6 show that 32 pregnant women out of 87 pregnant women have low serum ferritin (36.7%). Non-pregnant women (single and married) have a lower percentage (13.0%) of low ferritin (16 out of 123 women). The mean of ferritin concentration in married women was $32.89 \pm 32.54\text{ng/L}$ and was $37.20 \pm 32.92 \text{ ng/l}$ in single women.
The mean of TIBC level in pregnant women (87) was 477 ± 87.605 µg/dl. in non-pregnant (123) women the mean of serum TIBC was 335 ± 94.675 µg / dl. Figure 7 shows that 45 pregnant women out of 87 pregnant women have a high TIBC level (51.72%). Non-pregnant women (single and married) have a lower percentage (20.32%) of high TIBC (25 out of 123 women). The mean of TIBC level in married women was 369.97 ± 77.02 µg / dl and was 32.89 ± 32.54 µg / dl in single women. Pregnant women have high TIBC level more than non-pregnant women and this in agreement with serum iron and hemoglobin levels.

**Figure 7:** Ferritin level in pregnant and non-pregnant women.  
S=single, M=married

**Figure 8:** TIBC level in pregnant and non-pregnant women
References

Frequency of congenital cyanotic heart diseases in Tripoli children hospital

Zohra Elmagrabi1, A. Rayani1 M. Zlitni1 and F. Rayiani2

1 The Children’s Hospital Tripoli, Faculty of Medicine, University of Tripoli and 2CTT, Tripoli, Libya

Correspondence to zelmagrbi@yahoo.com

Abstract: Congenital heart disease is the most common congenital problem in pediatric age group. It represents 30% of congenital anomalies in children. Presentation varies from asymptomatic accidental findings to severe cardiac decompensation and death, especially cyanotic lesions which has a high morbidity and mortality rate. Early recognition and interventions has great implications on prognosis. The aim is to view, prevalence and gender distribution of cyanotic congenital heart disease in Libyan children attending the cardiac department at Tripoli childr
en hospital. Retrospective study, scrutinizing the clinical records of all cases referred to the cardiac department at Tripoli children hospital who had been found to suffer from congenital heart disease between January 2009 and December 2010. Inclusion criteria: all children whose diagnosis has been confirmed to have congenital cyanotic heart disease. We obtained all patients had history, clinicalexaminations findings, chest X ray, ECG, ECHO and few CT angiography. Sex, age, mode of presentations, birth weight and type of cyanotic lesions. A total of (103) children were included. There were 68 males (66%) and 35 females (34%). 25 patients had transposition of great arteries, TGA (24.3%), 21 patients were Tetralogy Fallot, TOF, (20.4%), 13 patients with tricuspid atresia, TA, (12.6%), 11 patients were double outlet Right ventricle, DORV, (10.6%), 10 patients with single ventricle, SV (9.7%), 9 patients with pulmonary atresia (PA) 8.7%. Nine more patients had different rare cyanotic lesions (Ebestien anomaly, Truncusarteriosus, total anomaly pulmonary venous return, persistent pulmonary hypertension and mitral atresia). Most of the patients present less than three months of age (78.6%). Cyanosis and murmur were common presentation (35%, 31%, respectively). Nearly 50% of patient’s weight was < 3 kg at presentation. Significant congenital cyanotic heart diseases are common and clinicians should have a high index of suspicious of cyanotic heart disease in neonates and refer them as soon as possibleto pediatric cardiologist to confirm diagnosis and to start appropriate management. Well timed early detection and intervention is an indispensable requirement to decrease both mortality and morbidity rates. 2D-echo with Doppler forms the gold standard for diagnosis of congenital heart diseases.

Key words: Congenital heart disease, 2D echocardiography, TGA, TOF, Libya.

Introduction

Congenital heart defects affect nearly 1% of live births and 25% of them are considered to be critical which require surgery or catheterization within the first year of life (1). Infants with critical congenital heart defects most of them are cyanotic lesions. Cyanosis can occur when there is obstruction to right ventricle out flow causes intracardiac right to left shunting, congenital heart defects (CHDs) is a malfunction and malformation of cardiac chambers and the great vessels arising from it. CHD is an important cause of morbidity and mortality in infancy. CHD affects 6-8 babies in every
1000 live birth (2) and 1-2 % of them had moderate to severe CHD (3). CHD is the most common congenital problem in children accounting for nearly 25% of all congenital malformations (4). Most of cyanotic heart defect are life-threatening and presented in very serious condition in which might lead to death in the first year of life particularly transposition of the great arteries, pulmonary atresia with intact septum, tricuspid atresia, hypoplastic left heart, and mitral atresia. These all lesions called critical congenital heart diseases (CCHD), and needs catheterization and or surgical interventions in the first year of life; also the mortality is high in these patients. CHDs are the common single group of abnormalities accounting for about 30% of the total congenital abnormalities (5). Early diagnosis and proper management with early intervention for these patients could give normal or near normal life expectancy, patient born with severe forms of CHD have 12 folds increase risk of death during first year of life and the risk increase more if diagnosed after neonatal period (6).

**Patients and methods**

This is a retrospective descriptive study, carried out in Tripoli children hospital (university hospital), from January 2009 till December 2010 medical records of clinically diagnosed patients with cyanotic CHD were reviewed. They were 103 referred patients who underwent cardiologic examination, ECG, chest x-ray and echo-cardiography and few CT angiographies were done for them. Birth weight, symptoms, signs, age at presentation, sex, and type of cyanotic heart defects were recorded. The Excel statistical package was used for data analysis.

**Results**

Eight hundred and twelve files were retrospectively studies and diagnosed to have congenital heart defect, cyanotic lesions were detected in 103 patients, 68 were males (66 %) and 35 were females (34 %), with a male to female ratio of 1.9:1 (figure1).

Age distribution of patients were from intrauterine life to 10 years of age with a mean age of 186.5 days, more than half of the patients diagnosed in the neonatal period (54%) and (78.6%) were diagnosed at age of three months. 49% had a birth weight below three kilograms and 35 % were between three and four kilogram at presentation. Cyanosis was the commonest presentation (35%), then murmur (30%), with (12.6%) had both murmur and cyanosis figure (2). The commonest cyanotic lesion was TGA (24.3%), followed by TOF (20.4%). With gender distribution are shown in table (1) and figure (3).

![Figure 7: Male and female ratio](image-url)
Types of cyanotic lesions

- TGA
- TOF
- TA
- DORV
- SV
- PA
- HLHS
- Others

Table 1: Frequency and distributions of CHD

<table>
<thead>
<tr>
<th>Type of CHD</th>
<th>%</th>
<th>No. of patients</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>TGA</td>
<td>24.3</td>
<td>25</td>
<td>16</td>
<td>9</td>
</tr>
<tr>
<td>TOF</td>
<td>20.4</td>
<td>21</td>
<td>13</td>
<td>8</td>
</tr>
<tr>
<td>TA</td>
<td>12.6</td>
<td>13</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>DORV</td>
<td>10.6</td>
<td>11</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>SV</td>
<td>9.7</td>
<td>10</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>PA</td>
<td>8.7</td>
<td>9</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>HLHS</td>
<td>4.8</td>
<td>5</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Others</td>
<td>8.7</td>
<td>9</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>103</td>
<td>68</td>
<td>35</td>
</tr>
</tbody>
</table>

Figure 3: presenting symptoms

First year of life (7). The diagnosis is established by the first week of life in 40-50% of patients with congenital heart disease and by one month of age in 50-60% of patients (7).

In our study the diagnosis of cyanotic heart disease was done in the first week of life in 33% of patients and 54% by one month of age and in first 3 months in 78.6% of patients which is a little bit delayed from the percentage throughout...
the world for all congenital heart disease mainly in the first week of life, that is means we are still late to detect the cyanotic babies in early life, might be due to discharged babies not checked by expert physician or the symptoms were not noticed by mothers.

In the current study the common cyanotic lesion was TGA (24.3%) followed by tetralogy Fallot TOF (20.4%), DORV (10.6%), PA (8.7%) and TAPVD (2.9%). In comparison to Indian study where TOF accounts 44% while DORV 14%, TGA 9%, PA 8% and TAPVD 7% of cyanotic heart disease we found that TGA was high in our patients nearly threefold of Indian patients and their patients with TOF more than double of our patients, DORV approximately same, PA equal to our patients and TAPVD is less occurrence in our patients. But in other study tetralogy Fallot was the commonest as in Cameron it accounts 26.1% from total congenital heart disease (8) and in Pakistan TOF was the commonest cyanotic lesion it accounts 17.7% from total CHD (9), most of the study reported that TOF were the most common cyanotic lesions (4, 8).

In summary most of our patients diagnosed in the first 3 months of life and the common cyanotic lesions were TGA followed by TOF, earlier diagnosis and management on time will declining the morbidity and mortality in this age group with the providing of essential facilities for diagnosis, medical and surgical interventions at the appropriate time will have a positive impact on consequence for these children.

References

Mobile phone contamination by microorganisms in Quinnipiac university: comparing health science students and non-health science students

Ibtisam Khapoli
Community Medicine, Faculty of Medicine, University of Zawia, Zawia, Libya

Abstract: This research investigates the microbial contamination associated with mobile phones of Quinnipiac University students and the role of mobile phones play as a fomite. Investigates the presence of four bacterial species including Staphylococcus, Streptococcus, Proteus mirabilis and Escherichia coli on mobile phones. Mobile phones are easily contaminated with pathogenic bacteria and could be vehicles of transmission. The main objective of this study was to compare the contamination rate of mobile phones with pathogenic bacteria between health science and non-health science student’s mobile phones. A fomite is an object that can carry microbes, which infect people and increase the incidence and the prevalence of the diseases. Mobile phones come in close contact with the body and serve as a ready surface for colonization. The goal of this study is to qualitatively and quantitatively investigate bacterial contamination of mobile phones. Cells phones from a variety of people were swabbed for bacterial culture. The level and type of bacterial contaminations were compared amongst health science students vs. non-health science students in an attempt to determine if the health science majors disinfect their phones more frequently because of their awareness of the role of fomites in the disease transmission. To determine the most prevalent type of bacteria in the cell phones, the high-risk group of the contamination, and analysis any associations between the students major and the level of the cell phone contamination.

Introduction

A mobile phone can act as a source that transmits microorganisms within the people who shared the mobile phones. They are considered fomites that are able to transfer a wide variety of pathogenic agents to others through indirect contact. These public health concerns are important for the health care workers to be aware of the role of mobile phones in transmitting of these contaminants into the patients. It is widely known that fomites play an important role in spreading of infections in both community and hospital settings, causing outbreaks of nosocomial infections such as Methicillin resistance Staphylococcus aureus (MRSA) and other nosocomial diseases. Fomites transmit bacteria, which thrive and multiply on their surfaces and might cause infections. It is known that some diseases are more likely to be transmitted by fomites than others, including gastrointestinal and respiratory infections. The majority of the people use their mobile phones in high-contaminated environments such as restrooms and kitchens. Consequently, this behavior increases the potential of mobile phone contamination and disease transmission. This act puts them at a high risk of transferring potentially pathogenic micro-organisms to their cell phones and to others. The biggest concern is cross contamination between mobile phones and foods. This concern is more important in children environments such as day cares, schools and other public settings because young kids are
vulnerable to disease. It’s important to know and understand that most people rarely clean their mobile phones due to the lack of knowledge about the role mobile phones as a source of microbes’ transmission. In addition, mobile phones come in close contact with body surfaces such as the face, ears and mouth, which can act as a good area for colonization and potential source of microorganisms transmission, therefore the micro-organisms can easily enter the mouth and ears where they can enrich and multiply and causing many diseases. Moreover, the majority of the people keep their mobile phones in their pockets and bags, which are warm environments that can act as an appropriate place for enriching rapid microorganisms growth and multiplication.

The goal of this study was to investigate mobile phone contamination at Quinnipiac University to identify the colonization of four pathogenic microorganisms including *Staphylococcus aureus*, *Streptococcus*, *Escherichia coli* and *Proteus mirabilis*. The second goal was to determine the level and type of bacterial contamination of the mobile phones of Quinnipiac students and to identify if there is a significant relationship between the knowledge of hand hygiene, and cleanliness and mobile phone contamination. For this research, the hypotheses that have been investigated were the relationship between the major of the students and the level of mobile phone contamination. To identify if the hand hygiene and the awareness of the students about mobile phones as fomites could play significant role in the level and type of bacterial contamination.

**Materials and methods**

A questionnaire consisting of eight questions was conducted in this research experiment data not shown. A total of 151 samples were collected from both health science and non-health science students at Quinnipiac University. 74 samples were collected from health sciences students including biomedical science students and biology majors, and 77 samples were collected from non-health sciences students including accounting majors, communication majors, and law students. All the samples were collected with the aseptic technique. Mobile phones were swabbed with moist cotton emended in Trypticase soy broth (TSB). Set of 6 tubes of 9 ml TSB were previously prepared labeled and placed on the tube rack. A serial dilution were performed by transferring 1ml of the original sample to the tube labeled -1 with vortex, and 1ml of the first TSB tube transferred into the second one, second to third, etc. Set of Trypticase soy agar (TSA) plates were labeled same as the serial dilution with three plates for each dilution. 0.1 ml of each dilatation was transferred into 3TSA plates, spread the diluents over the TSA surface and incubate all plates at 37 degrees Celsius for 48 hours. The original TSB samples were also inoculated at the same time into Mannitol salt agar and MacConkey agar and incubated at 37 degrees Celsius for 24 hours. The characteristic bacteria isolates from each selective media plates were Gram stained to identify Gram-positive bacteria, ssp. The *Staphylococcus* ssp. is Gram-positive cocci, seen in clusters under the microscope, while *Streptococcus* ssp. is Gram-positive cocci, seen in chains under the microscope. However, the Gram-negative rods are seen red in color under the microscope. The biochemical tests needed for further identification and differentiation of the isolated bacteria. These tests included catalase, coagulase for the Gram-positive bacteria, which grown on MSA, while the urease, idole,
oxidase, citrate and methyl red and Voges-Proskauer tests used for gram-negative bacteria, which grown on MacConkey. Staphylococcus spp. can cause a variety of skin infections including boils and furuncles. The most important fact is that there is a strain of Staphylococcus that can be resistant to the first line antibiotics used in treatment to this kind of diseases including methicillin, and oxacillin. Streptococcus spp. is associated with many diseases such as rheumatic fever, rheumatic heart disease, and nephritic disease. Moreover, Escherichia coli can cause severe gastrointestinal illness, urinary tract infections and even renal failure. In addition, Proteus mirabilis can cause urinary tract infections, renal stones and renal failure.

**Results**

Based on the survey analysis, the numbers of health science students were 74 (49%) students equal to (49%), that are slightly less than number of non-health science student who were (51%) figure (1).

**Figure 1:** Percentage of health science vs non-health science students

The most interesting outcome in the survey analysis was out of 151 students that participant in the study only 30 (19%) students disinfected their phones. Among these students, 23 (76%) students were health sciences students. This result showed that a significant number of students were never disinfected their phones in both groups.

**Figure 2:** % of students who disinfected their phones vs. % of students who did not disinfected their phones
The survey revealed that among all Quinnipiac students who were participants in this study, only 7 (4.6%) students cleaned their hands after use the mobile phone; all of those students were health science students figure (3). Based on the bacterial count (spread plate technique) analysis, the average colonies forming unit in the health science students mobile phones was $1.306 \times 10^4$ while the average number of colonies forming unit in the mobile phones of non-health science students was $1.62 \times 10^4$.

### Table 1: The average of CFU in health science vs non health science students

<table>
<thead>
<tr>
<th>The average # of colony forming unit (CFU)</th>
<th>Health science students</th>
<th>Non health science students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$1.306 \times 10^4$</td>
<td>$1.62 \times 10^4$</td>
</tr>
</tbody>
</table>

Data analysis table 3 also showed that gram-positive bacteria were among the highest percentage of bacteria that have been found on Quinnipiac student’s mobile phones, which found on the 63.5% of mobile phones, while gram negative rod being discovered on 47% of mobile phones. Based on gram staining, catalase and coagulase test, the result indicated that 48 (31%) samples out of 151 samples were harbored with *Staphylococcus aureus*, 40 (26%) samples were grow *Staphylococcal epidermis* and 6 (3.9%) samples were contaminated with *streptococcal* ssp. The data show that 14 (9%) samples of gram-negative isolates were *E.coli* based on the biochemical testing, and 10 (6.6%) were *Proteus marbilest*. In comparison of the study major in the table (2), the data revealed that 18 (37%) out of 48 *Staphylococcal aureus* isolates were present at mobile phones of health major, 14 (35%) out of 40 of *Staphylococcal epidermis* were found on mobile phones of health major, 3 (50%) out of 6 of *Streptococcal* isolate were found in the mobile phone of health major 7 (50%) out of 14 *E. coli* were health science students, and 3 (30%) out of 10 of *Proteus* were present on health science students’ mobile phones. This is clearly pointed out to the fact that was less contamination level in the mobile phones of health science students in compared to the non-health students’ mobile phones.
Table 2: Bacteria isolates from mobile phones of Quinnipiac University students

<table>
<thead>
<tr>
<th>Isolates</th>
<th>Health science mobile phones, n = 74</th>
<th>Non-health science mobile phones, n = 77</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Staphylococcal aureus</em></td>
<td>18(37%)</td>
<td>30(63%)</td>
</tr>
<tr>
<td><em>Staphylococcal epidermis</em></td>
<td>14(35%)</td>
<td>26(65%)</td>
</tr>
<tr>
<td><em>Streptococcal spp.</em></td>
<td>3(50%)</td>
<td>3(50%)</td>
</tr>
<tr>
<td><em>Escherichia coli</em></td>
<td>7(50%)</td>
<td>7(50%)</td>
</tr>
<tr>
<td><em>Proteus</em></td>
<td>3(30%)</td>
<td>7(70%)</td>
</tr>
</tbody>
</table>

The results support research hypothesis that was health science student’s mobile phone would have less bacterial contamination due to their awareness of the mobile phone as a fomite. The antibiotic sensitivity test was conducted in this research to all samples that had bacterial growth to detect if there were any resistant strains associated with mobile phones. The result as seen shows the percentage of each bacteria strain and their susceptibility to the six antibiotics. It compares the sensitivity of both gram-positive strains and gram-negative strain for the six antibiotics have been used in the research. This data revealed that only 10.5% of gram-positive bacteria were susceptible to erythromycin, and 8.3% of gram negative was susceptible to the same antibiotic. 80.9% of gram-positive bacteria were susceptible to tetracycline, compared to 66% of gram negative were susceptible to the tetracycline. The data indicated that 85.2% of gram-positive isolates were ciprofloxacin sensitive and 77% of gram-negative isolates were sensitive to ciprofloxacin. In contrast, in case of oxacillin there was only 2.2% of all bacteria isolates were sensitive to it and no strain of gram-negative was sensitive to it. Ceftriaxone was the most sensitive antibiotic for both gram negative and positive bacteria as the data revealed that 75% of gram-negative species were susceptible to it and 91.5% of gram positive were also sensitive to it. The data also indicate that clindamycin was one of the less sensitive antibiotic after the oxacillin with only 4.9%, and 8.3% sensitive of both gram positive and gram negative strain respectively. The results recorded by comparing the zone of inhibition around each antibiotic to the diameter interpretative standards for the bacteria of interest. Overall, the result showed that gram-positive bacteria were more susceptible to all used antibiotics in comparison to the gram-negative bacteria except the clindamycin, in which the gram negative strain were more susceptible to it. Further analysis of data explain that the most susceptible antibiotics for all bacterial species that were investigated are ceftriaxone, ciprofloxacin, and tetracycline; in contrast the more resistant antibiotics are oxacillin, clindamycin, and erythromycin.

In conclusion, this research finding revealed that the most common bacteria isolates on mobile phones were *Staphylococcal aureus*, *Staphylococcal epidermis*, *Streptococcal spp.*, *Escherichia coli* and *Proteus*. The overall contamination of mobile phone was 93%. The highest total Viable Count was observed in non-health science student’ mobile phones compared to the health science students’ mobile phone. This is indicating poor personal hygiene. The higher prevalence of microbiota in the mobile phones was found on the mobile phones of the non-health science students, this could be
attributed to the poor hygienic and sanitary practices associated with their lack of awareness about mobile phone as a fomite. The research findings indicates that mobile phones can act as an important source of pathogenic organisms for human and can serve as vehicle for cross-transmission. The research has some limitations that could investigate if the gender is associated with the level of contamination. The research may also investigate other bacterial species such as Bacillus spp. and Pseudomonas aeruginosa that shown to be associated with mobile phone contamination. This study strongly recommend public to follow simple hygiene practice include washing hands after rest room use, and disinfect mobile phones with alcohol wipes can reduce the level of mobile phone contamination significantly. And emphasizes that mobile phones may act as a carriers in spread of pathogenic microorganisms in the community.
References

9. HC. Jeske W. Tiefenthaler LM. Hohlrieder G. Hinterberger and A. Benzer department of Anaesthesia and Critical Care Medicine, Department of Hygiene, Innsbruck Medical University Hospital, Anichstrasse 35, A-6020 Innsbruck, Austria.
13. Outbreaks of Rotavirus Gastroenteritis Among Elderly Adults in Two Retirement Communities --- Illinois, 2011

ISSN: 2312-5365 print LJMR.com.ly ISSN: 2413-6069 online
Management of antenatal detected hydronephrosis

Naziha R. Rhuma
Nephrology Unit, Tripoli Children's Hospital, Faculty of Medicine, University of Tripoli, Tripoli, Libya
Correspondence to dr.naziha_r@yahoo.com

Abstract: Abnormalities of urinary tract in fetuses are being recognized with increased frequency due to high resolution of fetal ultrasonography and greater staff expertise. The incidence of antenatal hydronephrosis ranged from 0.6-4% with up to 90% can be detected antenatly. Most antenatal detected hydronephrosis are transient and resolve spontaneously however, severe urinary obstruction can lead to renal injury and end stage renal disease. Very few cases need antenatal management while most of fetuses with antenatal hydronephrosis are investigated and managed postnataly. The aim of this article is to review the literature on the management of this condition and to identify infants requiring further investigation and management.

Keywords: Antenatal hydronephrosis, urinary tract abnormalities, ultrasonography

Introduction

Antenatal hydronephrosis (ANH) is defined as dilatation of the collecting system of the fetal kidney. It is a common finding of antenatal ultrasound examination. In nearly 1% of pregnancies, a significant fetal anomaly is detected by ultrasonography. 20-30% of these anomalies are genitourinary in origin. 50% of them manifest as hydronephrosis (1-3). 41-88% of infants with ANH resolves by birth or during infancy (4 - 6) and most pelvic dilation is a transient finding (7). However, urinary obstruction can lead to renal injury and end stage renal disease. If these anomalies are not detected by antenatal US and subsequently managed, many of these abnormalities manifest later in life as pyelonephritis, hypertension and end stage renal disease. Several systems are used to grade antenatal hydronephrosis by ultrasonography (US). Two main classifications exist (8). The first is grading system developed by the Society of Fetal Urology (SFU). It is based on the long axis sonographic appearance of renal parenchyma and pelvicalyceal system (9, 10) as shown in Table 1.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Central renal complex</th>
<th>Renal parenchymal thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Slight splitting of pelvis</td>
<td>Normal</td>
</tr>
<tr>
<td>2</td>
<td>Evident splitting of pelvis and calyces</td>
<td>Normal</td>
</tr>
<tr>
<td>3</td>
<td>Wide splitting of pelvis and calyces</td>
<td>Normal</td>
</tr>
<tr>
<td>4</td>
<td>Further splitting of pelvis and calyces</td>
<td>Reduced</td>
</tr>
</tbody>
</table>

Measurements based on the long axis of the kidney
The second and more widely used classification for antenatal hydronephrosis is based on the measurement of the maximum antroposterior diameter of renal pelvis or the renal pelvis diameter (RPD) and the gestational age (7) as shown in table 2.

Table 2: grading system of fetal hydronephrosis by renal pelvis diameter (RPD) measurement

<table>
<thead>
<tr>
<th>Gestation (weeks)</th>
<th>RPD (mm)</th>
<th>Grading of hydronephrosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 to 20</td>
<td>4 to 7</td>
<td>Mild</td>
</tr>
<tr>
<td>&gt; 7</td>
<td>Moderate</td>
<td></td>
</tr>
<tr>
<td>&gt; 30</td>
<td>5 to 8</td>
<td>Mild</td>
</tr>
<tr>
<td>&gt; 30</td>
<td>&gt; 15</td>
<td>severe</td>
</tr>
</tbody>
</table>

RPD measurement based on the maximum antroposterior diameter of the renal pelvis.

However mild renal pelvic dilation shows no clinical impact on normal renal development (4, 11), while moderate and severe renal pelvis dilation associated with increasing risk of significant congenital abnormalities of kidney and urinary tract (12 - 14). The controversy exists as to the threshold beyond which the fetal RPD is considered abnormal. Most recent studies suggest that antenatal hydronephrosis exist when RPD exceeds 5mm before 24weeks gestation or when over 7mm beyond 25 weeks of pregnancy (11, 15-17). It has been suggested that using both methods in combination is superior to using each method alone (18). The reported incidence of antenatal hydronephrosis is ranged from 0.6-4.5% in different studies (4, 11, 20, 21). In 20-40% are bilateral (20). Antenatal hydronephrosis is more common in boys than girls (2:1) (19). Five years cohort study (22) compare the incidence of renal abnormalities from 1999 to 2003 with those reported previously from 1989 to 1993. They concluded that there was increased incidence of renal abnormalities detected antenatal. The incidence was 7.6\(\frac{1000}{\text{birth}}\) in recent cohort study versus 3\(\frac{1000}{\text{live birth}}\) of previous one.

Causes of antenatal hydronephrosis:
Antenatal hydronephrosis may due to non-obstructive or obstructive causes. Non obstructive lesions such as primary vesicoureteric reflux (VUR) and multicystic dysplastic kidney (MCDK). Obstructive lesions particularly bilateral lesions are more harmful to developing kidneys. These include pelviureteric junction obstruction (PUJO), vesicoureteric junction obstruction (VUJO) and posterior urethral valve (PUV). Transient and physiological hydronephrosis is by far the most common form of antenatal hydronephrosis. It is accounted for 30-50% of cases (12). A study done at Tripoli Children's Hospital [36] which conducted 90 neonates (125 renal units) had presented with antenatal hydrohronephrosis from 1995 to 2007. Pelviureteric junction obstruction (PUJO) was found in 25.5% of cases, vesicoureteric reflux (VUR) was found in 14.4%, Posterior Urethral valve (PUV) was found in 17.7%, multicystic dysplastic kidney (MDK) was found in 20% of
cases, uretero-vesical junction obstruction (UVJO) was found in 6.6% and transient hydronephrosis found in 15.5% of cases.

Management of antenatally detected hydronephrosis: Management of infants with hydronephrosis detected antenatally is a challenge to pediatric nephrologists and urologists. The aim of postnatal management of these infants is to identify those infants with severe congenital anomalies of kidneys and urinary tract while avoiding unnecessary testing in infants with transient dilation.

Antenatal management: Detailed family history is important to exclude any genetic predisposition. If other anomalies are present amniocentesis for karyotyping should be strongly considered (23). If RPD exceed 5mm in the second trimester, a repeat fetal US scan in the third trimester is required to assess its progression. If RPD exceed 7mm in the third trimester, a plane for postnatal management of newborn becomes mandatory (11). Antenatal intervention either by direct and repeated bladder drainage or placement of vesico-amniotic shunt of infant with antenatal detected hydronephrosis remain controversial and has failed to improve the natural course of congenital urinary tract obstruction. The main causes of failure of this type of management are renal dysplasia and pulmonary hypoplasia which are associated with urinary tract obstruction and are irreversible by the time the urinary dilation is first noticed by antenatal US. The main indication of invasive antenatal management is presence of markers of abnormal renal function. Which include presence of oligohydraminos and poor cortico-medullary differentiation in kidney with increased echogenicity (8). It is important to counsel the parent when fetal hydronephrosis is detected in sensitive way including reassurance that the majority will turn out to be transient and benign. If fetal hydronephrosis persistent in the third trimester a multidisciplinary approach is needed which include neonatologist, pediatric nephrologists, pediatric urologist and geneticist as necessitated by the underlying condition.

Postnatal management: Clinical examination will take place after birth to ensure that there are no other associated anomalies. If baby is well with no evidence of abdominal mass and passing urine with only unilateral lesion then discharge home should not be delayed. The role of prophylactic antibiotics is still controversial. Infants with minor postnatal dilation do not need prophylactic antibiotics, as the urinary tract infection is uncommon in infants with two normal postnatal US examinations (24). A prophylactic antibiotic is given for those neonates who had evidence of obstruction due to posterior urethral valve. Antibacterial prophylaxis is conventionally given to infants with VUR and for the first 6 months of life to infants demonstrating moderate to severe hydronephrosis (14). Renal US should always be performed in neonates who had persistent hydronephrosis in the third trimester (17, 25). It should be done after 48 hrs after birth to ensure that the infant is well hydrated and urine flow is established. However, renal US can be done early when there is severe bilateral hydronephrosis or a palpable abdominal mass at birth. The optimal timing of US at around 7 to 10 days of life, applying the same standard grading system to antenatal scan (26). Most infants with postnatal hydronephrosis undergo voiding cystoureterogram (VCUG) to exclude VUR and bladder outlet obstruction. It should be performed, usually within 4 weeks in majority of cases (27). However, it must be done within
48 hours of birth in any infant suspected to have posterior urethral valve. Several studies have recently demonstrated that gross degree of VUR can be associated with minimal or no dilation on post natal US (28, 29). Some controversies still exist regarding the need of VCUG for cases of MCDK, PUJO and UVJO. The radionuclide imaging is usually delayed until 3 months after birth unless clinically indicated (palpable mass at birth or severe pelvic dilation). A technetium-99m dimercaptosuccinic acid scan (DMSA) is performed to confirm the non-function kidney and to define the differential function in infants with VUR and MCDK. 99mTc mercaptoacetyltriglycin (MAG3) is radionuclide scan of choice because of its high initial renal uptake to demonstrate the differential function and excretion in infants with hydronephrosis and usually associated with diuretic injection. Alternatively, 99 mTc diethyl triamine pentaacetic acid (DTPA) may be used (11).

Common specific etiology of antenatal hydronephrosis

1) **Transient hydronephrosis:** It is the commonest cause of antenatal hydronephrosis (12). The majority will resolve spontaneously either in third trimester or in early infancy (30). No need for prophylactic antibiotics and no further investigation apart from post natal US is needed.

2) **Uretero-pelvic junction obstruction (UPJO):** is the most common cause of non physiological obstruction. Its prevalence is approximately 1 in 2000 children with a male to female ratio in infancy of 3:1. 20-25% of cases had bilateral obstruction (12). Its management depends on the MAG3 renogram, if it is more than 40% a serial follow up by US is recommended while when the differential function is less than 40% with poor excretion surgical reconstruction is recommended (31).

3) **Posterior urethral valve:** It is one of most cause of antenatal hydronephrosis in male infants. It was accounted for 17.7% of cases presented with antenatal hydronephrosis in (36). A study done at Tripoli children’s hospital, 80 children with Chronic Kidney Disease (CKD) was conducted, from 2001 to 2010. Of the group 42(53%) of cases due to congenital nephropathy , PUV accounted for 52% of cases with late presentation to pediatric nephrologists (35). Antenatal intervention is required in severe cases with markers of impaired renal function and severe hydronephrosis by US, the bladder is generally decompressed using a percutaniously placed vesicoamniotic catheter or percutaneous endoscopic in utero ablation of the valve. These intrauterine procedures should be carried out in highly specialized centre. It carries many risks like fetal injury, intrauterine infection and premature labor. The risk of fetal mortality is 43% of cases (32). After diagnosis is established with postnatal VCUG, a small polyethylene tube is inserted. Foley catheter should not be used because the balloon may cause severe bladder spasm and may produce severe bladder obstruction. Early referral to pediatric urologist is recommended.
4) **Multi cystic dysplastic kidney (MCDK):** It is usually unilateral. Bilateral MCDK is incompatible with life. It is easily recognized by cystic appearance on pre and postnatal US with no function at all on the DMSA scan. Its management is usually conservative in (33) approach and they documented progressive involution with time 3% of cases disappear and 33% of cases reduced in size by 2 years of age (Figure 2).

![Figure 2: Multicystic dysplastic kidney (postmortem and US)](image)

5) **Vesicoureteric reflux (VUR):** It constitutes between 10 to 38% of cases of antenatal hydronephrosis (8). When diagnosis is made by postnatal VCUG then the infants require a DMSA scan to define differential renal function and presence of renal scaring. It is predominates in males with high resolution rate 65% within 2 years (34).

6) **Uretero-vesical junction obstruction (UVJO):** It is a rare condition and it is diagnosed when there is a dilated ureter as well as hydronephrosis without VUR on VCUG and it is confirmed by MAG3 renography.
Postnatal scheme of management of antenatal hydronephrosis as adopted from (33) is shown below:

In conclusion, antenatal detected hydronephrosis is commonly associated with significant morbidity in early life. It can lead to parental anxiety extending well beyond the current pregnancy. The indication for choice to evaluate an infant with antenatal hydronephrosis should be based on evidence-based protocols and guidelines. Multidisciplinary approach remains the best way to offer a good care for these children.
References