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_huria64@yahoo.com

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(m^2). 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 measure-ements 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:

$$BMI = Weight\ (kg)/\ Height\ (m^2),$$

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 85^{th} and less than 95^{th} percentile for age and sex, and obesity was defined as BMI more than 95^{th} 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 1: Overweight /obesity of subjects on the basis of gender and BMI categories

Parameter			BMI category				Total
			Under-Weight	Normal	Over-Weight	Obese	
Gender	**Female**	Count	**2**	**9**	**77**	**64**	**152**
		% of Total	**0.8%**	**3.7%**	**31.4%**	**26.1%**	**62.0%**
	Male	Count	**12**	**13**	**21**	**47**	**93**
		% of Total	**4.9%**	**5.3%**	**8.6%**	**19.2%**	**38.0%**
Total		Count	**14**	**22**	**98**	**111**	**245**
		% of Total	**5.7%**	**9.0%**	**40.0%**	**45.3%**	**100.0%**

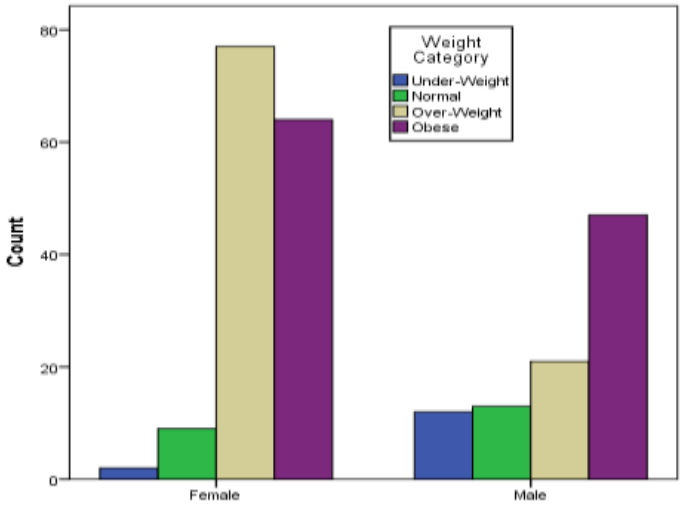

Figure 1: Relationship of sex of Libyan children with BMI

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**

Gender				Weight category				Total
				Under-Weight	Normal	Over-Weight	Obese	
Female	**Socio-Economic Level**	Low Standard Level	Count	**1**	**6**	**22**	**10**	**39**
			% of Total	**0.7%**	**3.9%**	**14.5%**	**6.6%**	**25.7%**
		Middle Standard Level	Count	**1**	**2**	**25**	**16**	**44**
			% of Total	**0.7%**	**1.3%**	**16.4%**	**10.5%**	**28.9%**
		High Standard Level	Count	**0**	**1**	**30**	**38**	**69**
			% of Total	**0.0%**	**0.7%**	**19.7%**	**25.0%**	**45.4%**
	Total		Count	**2**	**9**	**77**	**64**	**152**
			% of Total	**1.3%**	**5.9%**	**50.7%**	**42.1%**	**100.0%**

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

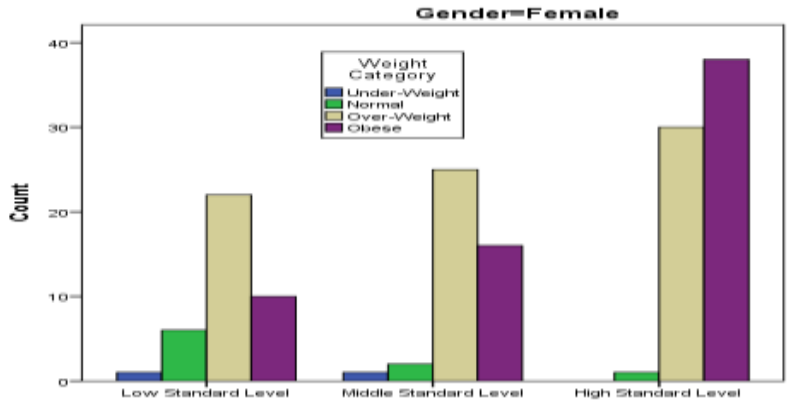

Table 3 and figure 3 show that 26.9% (25/93) males classified as low standard level, among them 6.5% (6/93), 5.4% (5/93), 5.4% (5/93), and 9.7% (9/93) their weight categories were underweight, normal, overweight and obese. It has also been found 26.9% (25/93) were grouped as a middle standard level, 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**

Gender				Weight Category				Total
				Under-Weight	Normal	Over-Weight	Obese	
Male	Socio-Economic Level	Low Standard Level	Count	6	5	5	9	25
			% of Total	6.5%	5.4%	5.4%	9.7%	26.9%
		Middle Standard Level	Count	4	4	6	11	25
			% of Total	4.3%	4.3%	6.5%	11.8%	26.9%
		High Standard Level	Count	2	4	10	27	43
			% of Total	2.2%	4.3%	10.8%	29.0%	46.2%
	Total		Count	12	13	21	47	93
			% of Total	12.9%	14.0%	22.6%	50.5%	100.0 %

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

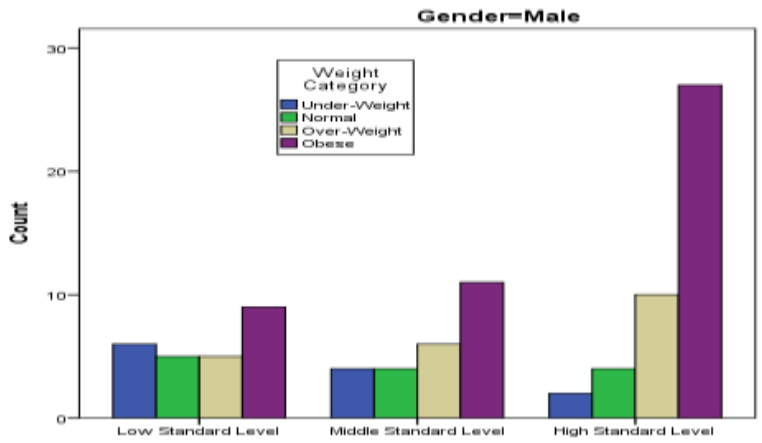

Table 4 and figure 4 show the relationship between the risk factor (fast food meals), weight category, and their effects on prevalence of overweight and obesity among (3-19 yrs.) female Libyan children. The table demonstrates 13.2% (20/152) females classified (categorized) as do not eat fast food meals, 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**

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

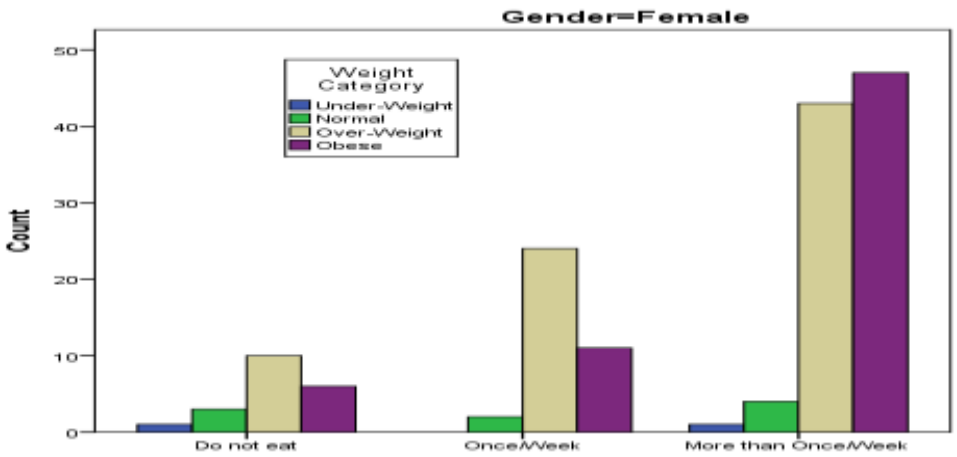

Figure 4: Risk factor (fast food meals) for weight category / female

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**

Gender				Weight Category				Total
				Under-Weight	Normal	Over-Weight	Obese	
Male	Fast Food Meals	Do not eat	Count	2	5	4	4	15
			% of Total	2.2%	5.4%	4.3%	4.3%	16.1%
		Once/Week	Count	4	2	7	8	21
			% of Total	4.3%	2.2%	7.5%	8.6%	22.6%
		More than Once/Week	Count	6	6	10	35	57
			% of Total	6.5%	6.5%	10.8%	37.6%	61.3%
	Total		Count	12	13	21	47	93
			% of Total	12.9%	14.0%	22.6%	50.5%	100.0%

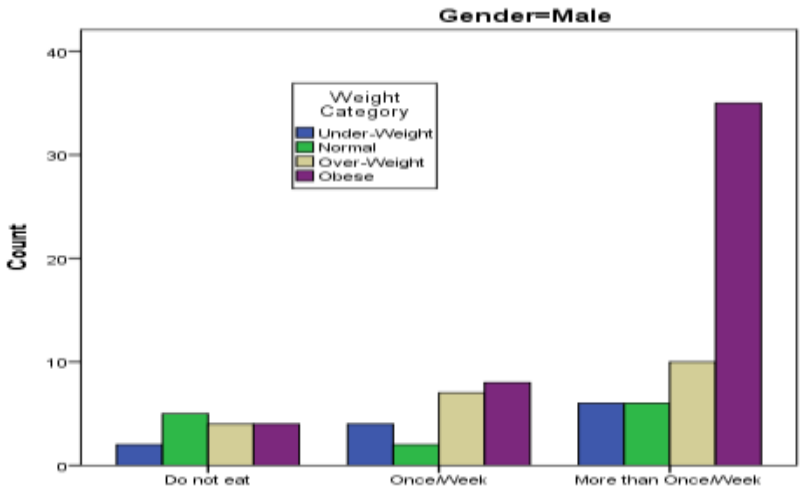

Figure 5: Risk factor (fast food meals) for weight category / male

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.

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