Evaluation of risk factors for hypertension and diabetic mellitus in Libyan patients

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Abstract: Hypertension (HTN) is a challenge for public health professionals all over the world. It is the leading and most important modifiable risk factor for coronary heart disease (CHD), congestive heart failure (CHF), stroke, renal diseases and retinopathy. The aims of the present study were to determine the most identifiable risk factors of hypertension such as age, gender, marital status, tobacco smoking, patient life style and with associated diseases (dyslipidemia and diabetes) on attendants in Tripoli Medical Centre (TMC). This was a cross sectional prospective study which was carried out at TMC, from October 2013 to January 2014. We included 200 consecutive patients 102 females and 98 males who are ≥ 30 years old who came for follow up. During this study, variables like age, gender, diabetes, smoking and dyslipidemia were taken into account in relation to hypertension disease in Tripoli. In addition, we also assorted some important findings as total cholesterol, triglycerides, LDL, HDL and fasting blood glucose range in our population and compared them with existing literature. Our findings revealed that in our local population not only old age and male gender are potential threat for an early hypertensive disease but other variables like diabetes, cardiovascular diseases, dyslipidemia, obesity, migraine and obstructive apnea are also playing important role in hypertension disease. It is also concluded that our population is more prone to hyperglycemia and high pulse pressure with hypertension in majority of survey population.

Keywords: Hypertension, risk factors, diabetes mellitus, coronary heart disease, Libya,

Introduction

The blood pressure can be generally defined as the force of blood pushing up against the blood vessel walls. The higher the pressure the harder the heart has to pump. Every time the human heart beats, it pumps blood to the whole body through the arteries. Hypertension or high blood pressure, sometimes called arterial hypertension, is a chronic medical condition in which the arteries have transitory or sustained elevation of systemic arterial blood pressure to a level likely to induce cardiovascular damage or other adverse consequences (1). Hypertension is a common condition that will catch up with most people who live into older age, it affects millions even children and teens (2). Hypertension is classified as primary (essential) hypertension or as secondary hypertension. Thus, 90 – 95% of the cases are categorized as primary hypertension which means high blood pressure with no obvious underlying medical cause (3). Though essential hypertension remains somewhat mysterious, it has been linked to certain risk factors. High blood pressure tends to run in

families and is more likely to affect men than women, age and race also play a role. Essential hypertension is also greatly influenced by diet and lifestyle, the link between salt and high blood pressure is especially compelling. Other factors that have been associated with essential hypertension include obesity; diabetes; stress; insufficient intake of potassium, calcium, and magnesium; lack of physical activity; and chronic alcohol consumption (4). Secondary hypertension consists of the remaining 5 - 10% of the cases and caused by other conditions such as chronic kidney disease, disorders of the adrenal gland (pheochromocytoma or Cushing syndrome), hyperparathyroidism, sleep apnea, alcohol addiction, pregnancy or preeclampsia and coarctation of the aorta (a narrowing of the aorta that you are born with that can cause high blood pressure in the arms). Medications such as birth control pills specifically those containing estrogen, diet pills, some cold medicines, migraine medicines, medications that constrict blood vessels., narrowed artery that supplies blood to kidney (renal artery stenosis) and thyroid dysfunction. In such cases, when the root cause is treated, blood pressure usually returns to normal or is significantly lowered (5, 6). Preeclampsia and eclampsia are diseases of pregnancy that involve the development or worsening of high blood pressure during the second half of pregnancy (7). The main goal of treatment for hypertension is to lower blood pressure to less than 140/90 in people younger than 60 and less than 150/90 in people older than 60 or even lower in some groups such as people with diabetes and people with chronic kidney diseases. Treating hypertension is important for reducing the risk of stroke, heart attack and heart failure (1). Treatment for hypertension has been associated with reductions in stroke (reduced an average of 35 - 40%), heart attack (20 - 25%) and heart failure (> 50%) according to research (8). High pressure may be treated medically, by changing lifestyle factors, or a combination of both. Important lifestyle changes include losing weight, quitting smoking, eating a healthful diet, reducing Na intake, exercising regularly and limiting alcohol consumption (1). Cohen and others reported at the "28th Annual Scientific Meeting" that yoga is effective in reducing blood pressure (9). The same lifestyle changes that can be followed to help control blood pressure will also help prevent high blood pressure from occurring in most cases (10).

Hypertension is the most important preventable risk factor for premature death worldwide (11). It increases the risk of ischemic heart disease (12), stroke (5), peripheral vascular disease (13), and other cardiovascular diseases, including heart failure, aortic aneurysms, diffuse atherosclerosis, and pulmonary embolism (5). Hypertension is also a risk factor for cognitive impairment, dementia, and chronic kidney disease (5). Other complications include hypertensive retinopathy and hypertensive nephropathy (14). Hypertension is a risk factor for development and worsening of many DM complications and likewise having DM increases the risk of developing high blood pressure (15). Men whose testosterone levels are low have been found to have a higher risk of developing type II DM. Researchers from the University of Edinburgh, Scotland, said that low testosterone levels are linked to insulin resistance (16). The proportion of people with DM increases with age. However, the incidence of DM is increasing in all age groups. Type I DM is increasing in children (especially those aged < 5 years), and type II DM is increasing, particularly in black and minority ethnic groups (17). Gestational DM (GDM) resembles type II DM in several respects, involving a combination of relatively inadequate insulin secretion and responsiveness. It occurs in about 2-5% of all pregnancies and may improve or disappear after delivery. Gestational DM is fully treatable, but requires careful medical supervision throughout the pregnancy. About 20-50% of affected women develop type II DM later in life. Though it may be transient, untreated gestational DM can damage the health of the fetus or mother (18, 19). Gestational DM usually resolves after delivery

(20). Pregnant women with DM and DM patient undergoing a surgery or illness cannot be managed by oral anti-diabetic drugs; they need to be given insulin injections. Treatment of gestational DM is regular insulin injections as oral pills for blood sugar control cannot be used in pregnant women (they can harm the unborn baby) (21-23). With gestational DM, risks to the unborn baby are even greater than risks to the mother; risks to the baby include abnormal weight gain before birth, breathing problems at birth, and higher obesity and DM risk later in life. Risks to the mother include needing a caesarean section due to an overly large baby, as well as damage to heart, kidney, nerves and eye (24, 25).

Management concentrates on keeping blood sugar levels as close to normal (eu-glycaemia) as possible, without causing hypoglycemia. This can usually be accomplished with diet, exercise and use of appropriate medications. Patient education, understanding, and participation is vital, since the complications of DM are far less common and less severe in people who have well-managed blood sugar levels. The goal of treatment is an HbA1C level of 6.5%, but should not be lower than that, and may be set higher (26-28).Other forms of DM include congenital DM, which is due to genetic defects of insulin secretion, latent autoimmune diabetes of adult (LADA), cystic fibrosis-related DM, steroid DM induced by high doses of glucocorticoids and several forms of monogenic DM or maturity onset diabetes of the young (MODY) (29). DM, impaired glucose tolerance and Obesity are associated with a substantially increased prevalence of hypertension, cardiovascular disease (CVD) and chronic renal disease. The prevalence of hypertension in patients who have type II DM is up to three times higher than in patients without DM. Further, the coexistence of hypertension in diabetic patients greatly enhances their likelihood of developing CVD and chronic kidney disease (30, 31). One of the factors that may influence the choice of blood pressure lowering agents in DM is the influence of the agents on metabolic parameters, especially glucose metabolism. In this regard, thiazide diuretics and conventional β-blockers may worsen insulin sensitivity and glucose tolerance, especially in the setting of obesity (32-34). Indeed, studies conducted in the Framingham population with DM type (I) indicated that the presence of hypertension in these participants was a resulting risk factor for the presence of CVD. This data and other studies suggested that a two-fold increased risk of CVD events and deaths in diabetic persons with hypertension compared with those with normal blood pressures.

The increased association between hypertension and DM can be explained, in part, by the presence of a maladaptive interaction of factors, such as excessive caloric intake/decreased activity and associated insulin resistance (IR), chronic activation of the renin–angiotensin (Ang. II)–aldosterone system (RAAS), the sympathetic nervous system and abnormalities of innate immunity, inflammation, and oxidative stress (30, 35). Despite the differential effects of various antihypertensive agents on glucose metabolism, it is unclear which agents or combination of agents have the most beneficial effects on CVD and renal outcomes in patients with DM and hypertension. In the Nagoya Heart Study composite, CVD outcomes were comparable between valsartan- and amlodipine-based treatments in Japanese patients with glucose intolerance. However, admission to hospitals because of heart failure was significantly less in the valsartan-treated group (36). The epidemic of obesity and sedentary lifestyle, and the aging of populations worldwide have contributed to the current high prevalence of DM and hypertension. Resistant hypertension is defined as hypertension that remains above goal blood pressure in spite of concurrent use of three antihypertensive agents belonging to different antihypertensive drug classes. Guidelines for treating resistant hypertension

have been published in the UK (37) and USA (38). It has been proposed that a proportion of resistant hypertension may be the result of chronic high activity of the autonomic nervous system; this concept is known as neurogenic hypertension (39).

The aims of this study were to characterize the profile of two leading cardiometabolic conditions, hypertension and type-2 diabetes. Thus, this study was aimed to investigate and address some cases in our society especially with the most common risk factors related to the Libyan patients with hypertension and diabetes mellitus followed up at the TMC. Different factors related to the Libyan life style, genetic and environmental were mainly studied. The second aim was to find factors that reduce the risk and to improve the quality of life in our society and Libyan health care system as well as to invest governmental funds in health sector.

Subjects and Methods

Subjects

Individuals aged $\geq$ 30 years with only one participant was < 30, who provided informed consent, were invited to participate in the study. This study was performed in TMC on 200 hypertensive Libyan patients during the period of October 2013 to January 2014. We identified a sex- and age-stratified random sample (30-40, 41-50 and > 50 years) of potentially eligible subjects. This paper was performed to characterise the profile of two cardio-metabolic conditions, hypertension and diabetes in patients who having both diseases (109 patients, 54.5%). In addition, emphasis was placed on the magnitude of the associations between these cardiometabolic conditions and modifiable risk factors in these circumstances.

Data collection

By using a questionnaire prepared by staff-members of the Pharmacology and Clinical Pharmacy department, Faculty of Pharmacy, University of Tripoli, 2013. The Questionnaire was about the prevalence and risk factors related to the hypertensive subjects which mainly contain three major parts with specific different variables related to the disease.

Part 1: Socio-demographic characteristics.
Part 2: Personal, Family history of Medical problems and life style.
Part 3: Medication profile and coronary risk factors.

Statistical analysis: After collecting the data, a statistical program called Statistical Package for the Social Sciences (SPSS) version 20 was used to summarize and analysis data.

Results

Data from 200 hypertensive participants, 49% male and 51% females were analysed. Individuals who invited to participate in the study divided into four age subgroups, the percentage of age groups were of < 30 and 30-40 was 0.5% and 2% respectively, whereas, for 41-50 group, the percentage was 13.5% and for > 50 was 84%. The ratio between Arab and others patients was 1.9: 0.1, and between white and black patients was 1.84: 0.16. It has been found that marital status were studied for Single, married, married polygamous, divorced and widowed status and percentage was calculated for 2, 60.5, 8.5, 1.5 and 27.5% respectively. Regarding family size of the participants it can be seen that the largest number of patients of study was in family size > 5 (88 patients), with no big different with patient in 3-5 family size (81 patients), and the lowest number was in patients with < 3 family size (31 patients).

For distributions of Education level, Socio-professional group, Total family income/month, and Residence state among study patients. From table 1 most of study patients were illiterate (97 patients), the other patients education level distributed between primary (52 patients),

secondary (18 patients), and University graduate patients (33 patients). There were 45.5% of patients who are house-wives (91 patients), and the other patients (54.5%, 109 patients) were salary own distributed between retired which represents the largest number of patients (68.8%, 75 patients), with less number of patients was Government employee (23, 21.1% patients), and with almost no different patient number between self-employed (7 patients, 6.4%), private sector employee and un-employed (2 patients for each, 1.8%), where they represents the lowest number of patients.

Another parameter is total family income per month among patients. It was distributed between < 750LD/Month for most patients (142 patients), 750-1200LD/Month for less patients number (41 patients), and the income that > 1200LD/Month represents the smallest patient population (17 patients). It was notable that the largest population of patients was live in urban areas (153 patients), and the lowest population live in rural areas (47 patients).

Table 1: Demographics of patients used for this study

Category		Frequency	Percent
Patients Age subgroup	< 30	1	23
	30-40	4	36.50
	41-50	27	46.41
	➢ 50	168	68.96
Gender	Male	98	49%
	Female	102	51%
Ethnicity	Arab	190	95%
	Others	10	5%
Colour	White	184	92%
	Black	16	8%
Marital status	Single	4	2%
	Married	121	60.5%
	Married polygamous	17	8.5%
	Divorced	3	1.5%
	Widowed	55	27.5%
Family size	< 3	31	15.5%
	3-5	81	40.5%
	> 5	88	44%
Education level	Illiterate	97	48.5%
	Primary	52	26%
	Secondary	18	9%
	Uni graduate	33	16.5%
Total family	< 750	142	71%

income/month	750-1200		41	20.5%
	> 1200		17	8.5%
Socioprofessional group	House wife		91	45.5%
	Salary own		109	54.5%
Salary own (employement)	Government		23	21.1%
	Private sector		2	1.8%
	Self		7	6.4%
	Retired		75	68.8%
	Unemployed		2	1.8%
Residence	Rural		47	23.5%
	Urban		153	76.5
Tobacco smoking	Never		69	34.5%
	Former		44	22%
	Current		25	12.5%
	Passive		62	31%
Physical activity level (exercise)	<= 2 Times/Wk		9	4.5%
	> 2 Times/Wk.		17	8.5%
	Missing		174	87%
Consumption of vegetables D/WK	No		5	2.5%
	<= 1		21	10.5%
	2-3		39	19.5%
	>= 4		135	67.5%
Consumption of fruits D/WK	No		2	1%
	<= 1		30	15%
	2-3		68	34%
	>= 4		100	50%
Consumption of animal protein D/WK	No		9	4.5%
	<= 1		35	17.5%
	2-3		34	17%
	>= 4		122	61%
Dietary salt intake	Low		85	42.5%
	Medium		105	52.5%
	High		10	5%
CNS stimulant liquid	No		10	5%
	Coffee	Yes	127	63.5%
		No	63	31.5%
	Tea	Yes	179	89.5%
		No	11	5.5%
	Soda	Yes	109	54.5%
		No	81	40.5%

One more parameter is distribution of patient life style in respondents. It can also be seen that the patients history of tobacco smoking were distributed between 69 patients with no history of smoking (never), and 131 patients distributed between 44 patients with former history of tobacco smoking, 25 patients with current history of tobacco smoking, and 62 patients with passive history of tobacco smoking. A large population patients were missing the physical activity (exercise) (174 patients, 87%), 17 patients with > 2 times/wk. of exercise (8.5%), and only 9 patients with physical activity level ≤ 2

times/wk. (4.5%). Most of study patients consume vegetables 4 days or more per week (135 patients), less patients consume vegetables 2-3 days per week (39 patients), or once weekly (21 patients), and only 5 patients that don't consume dietary vegetables. Also, most study patients consume fruits 4 days or more per week (100 patients), less patients consume fruits 2-3 days per week (68 patients), or once weekly (30 patients), and only 2 patients that don't consume fruits at all. Furthermore, most study patients consume animal protein 4 days or more per week (122 patients), fewer patients consume animal protein about 2-3 days per week (34 patients), or once weekly (35 patients), and only 9 patients that don't consume animal protein. The highest number of patients was there dietary salt intake medium (105 patients), with almost no different with low salt intake (85 patients), and the lowest number of patients was with high salt intake (10 patients). Also, most study patients consume coffee (127 patients), tea (179 patients), and soda (109 patients) on almost daily basis, with only 10 patients that don't consume any CNS stimulant liquid. Another interesting aspect that this paper looked at was the body mass index. BMI is classified according to WHO into group 1 under-weight (BMI < 19), normal weight (BMI: 19.9-24.9), overweight (BMI: 26.9-29.9), obese (BMI: 29.9-39.9) and morbid obesity (BMI > 40). The BMI classification for patient included in this study and is shown in Figure 1.
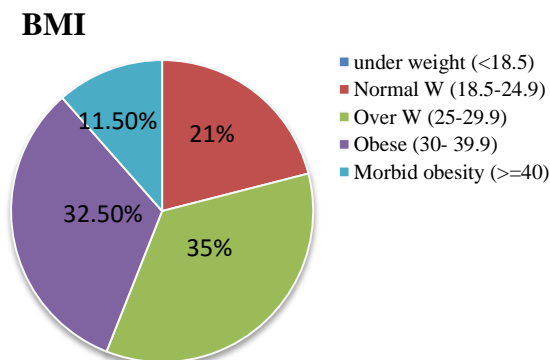

Figure1: Different BMI groups' classification of patients included in this study

In Figure 1, there was no significant difference between overweight and obese patients that represent the largest patients population 35 and 32.5% respectively. With less percent of patients were considered their weigh in normal weight range (21% of patients), and fewer patients (11.5% of patients) were within morbid obesity range. Generally, there are some important blood measurements for patients' BP such systolic and diastolic as clarified in Figure 2.
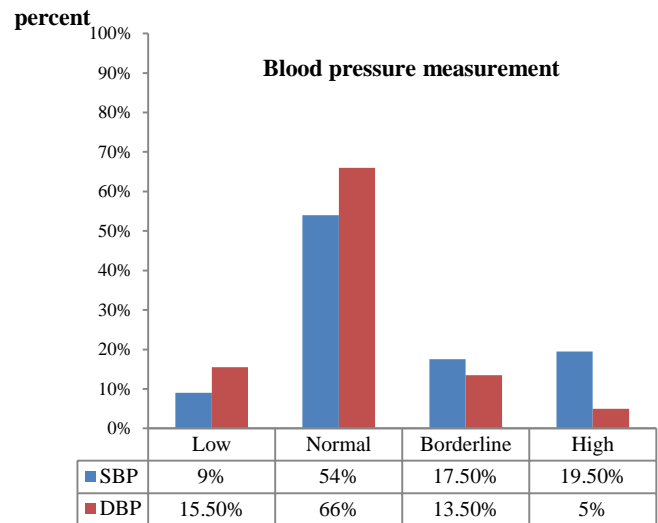

	Low	Normal	Borderline	High
SBP	9%	54%	17.50%	19.50%
DBP	15.50%	66%	13.50%	5%

Figure 2: Systolic and diastolic blood pressure measurements

It can be illustrated that there is a significant difference between normal systolic and diastolic BP measure (54% normal SBP, 66% normal DBP) and the rest of the participants. Furthermore, the systolic BP measures of other patient were distributed between low, borderline, and high with percentages of 9, 17.50 and 19.50 respectively and their diastolic BP measure were 15.50, 13.50 and 5% as shown above. It is fundamental to discover the medication history of the patient that is associated with particular diseases. Table 2 illustrates this aspect. It was designed to show diseases and medication history for patients and distribution of history of hypertension in pregnancy, history of abortion, and number of deliver among the female patients. For the family history of hypertension,

it can be seen that the number of patients with a family history of hypertension was (76 patients), history of maternal hypertension (67 patients), paternal hypertension (36 patients) and brother/ sister hypertension was (79 patients).

Regarding the distribution of history of hypertension in pregnancy, history of abortion, and number of deliver among the female patients, it can be seen that the number of patients of study that has family history of cardio-vascular diseases was (71 patients); family history of diabetes mellitus was (120 patients). Furthermore, the number of female patient that has history of hypertension in pregnancy was 21 patients, and history of abortion was 39 patients. Also; the number of female patient that has large number of delivery (> 5) was 79 patients, with less number of delivery (1-5) was 20 patients, and only one patient with no delivery. For the distribution of disease state of the patients largest number of patient collectively was with history of cardio-vascular diseases (160 patients), diabetes mellitus (109 patients), less patient number with respiratory diseases (82 patients), renal diseases (35 patients), thyroid dysfunction (16 patients), and 25 patients have other diseases. The largest population of patients were with no history of migraine (191 patients), and 9 patients were with history of migraine distributed between 6 patients with former attack, and 3 patients with current attack. Also, 183 patients were with no history of obstructive sleep apnea; with 14 patients already have OSA, and 3 patients with intermittent OSA. For the number of patients who use paracetamol drug on almost daily basis ($\geq$ 4 days /wk.) was 15 patients, with 34 patients using this drug 2- 3 days/week. and the largest patient number (151 patients) using paracetamol drug once weekly, rarely, or never do. Moreover, the number of patients who use NSAIDs (aspirin, ibuprofen,…) on almost daily basis ($\geq$ 4 days/wk.) was 101 patients, with 27 patients using those drugs 2-3 days/wk, and 72 patients

using those drugs also once weekly, rarely, or never do.

One more interesting point that this paper determined was the treatment duration of hypertension disease as illustrated in Figure 3. In diagram 3, there is no big difference between the number of patients who take 1 and 2-3 anti-hypertensive drugs with equal percent among patients that use their medication for 1 year or more (40% of each), but with small different in treatment duration for less than 1 year (14.5% for 1 drug, 5% for 2-3 drugs). Otherwise, only 0.5% patients who take their anti-hypertensive medication for more than one year duration.

One additional important aim was looking at the distribution of pulse pressure, and pulse rate among study participants is presented. Also, TC, LDL, HDL, Fasting blood glucose range are mentioned in Table 3.

Table 2: Patient's family, medical and drug history

Parameters		Frequency	%
Family history of Hypertension	YES	76	38%
	No	88	44%
	Don't know	36	18%
History of maternal Hypertension	YES	67	33.5%
	No	103	51.5%
	Don't know	30	15%
History of Paternal Hypertension	YES	36	18%
	No	133	66.5%
	Don't know	31	15.5%
History of brother/sister Hypertension	YES	79	39.5%
	No	101	50.5%
	Don't know	20	10%
Family history of Cardio-Vascular diseases	YES	71	35.5%
	No	110	55%
	Don't know	19	9.5%
Family history of diabetes mellitus	YES	120	60%
	No	69	34.5%
	Don't know	11	5.5%
History of Hypertension in pregnancy	YES	21	21%
	No	66	66%
	Don't know	13	13%
History of abortion	YES	39	39%
	No	54	54%
	Don't know	7	7%
Number of deliver	0	1	1%
	1-5	20	20%
	> 5	79	79%
Renal diseases	YES	35	17.5%
	No	165	82.5%
Thyroid diseases	YES	16	8%

	No	184	92%
DM	YES	109	54.5%
	No	91	45.5%
Cardio-Vascular diseases	YES	160	80%
	No	40	20%
Respiratory diseases	YES	82	41%
	No	118	59%
Other diseases	YES	25	12.5%
	No	175	87.5%
History of migraine	Never	191	95.5%
	Former	6	3%
	Current	3	1.5%
History of OSA	YES	14	7%
	No	183	91.5%
	Often	3	1.5%
Frequency of paracetamol use D/W	<= 1	151	75.5%
	2-3	34	17%
	>= 4	15	7.5%
Frequency of NSAIDs (Aspirin/Ibuprofen) use D/W	<= 1	72	36%
	2-3	27	13.5%
	>= 4	101	50.5%

Most study patient's pulse pressure was widened (130 patients), but only 3 patients was with narrowed pulse pressure and 67 patients with normal pulse pressure. Also, most study patients was with normal pulse rate (166 patients), and only fewer patients was with abnormal pulse rate (8 with low abnormal pulse rate & 6 with high abnormal pulse rate). The TC level in most of study patients was in desirable range (117 patients); with only 13 patients their cholesterol level was in borderline high range, and fewer patients (5 patients) was in high risk range. Also, TG level was in optimal range in 56 patients with no difference in patients number (42 patients), those were in normal triglycerides range; and almost no different in patients number between borderline high range (19 patients), and high risk range (17 patients).
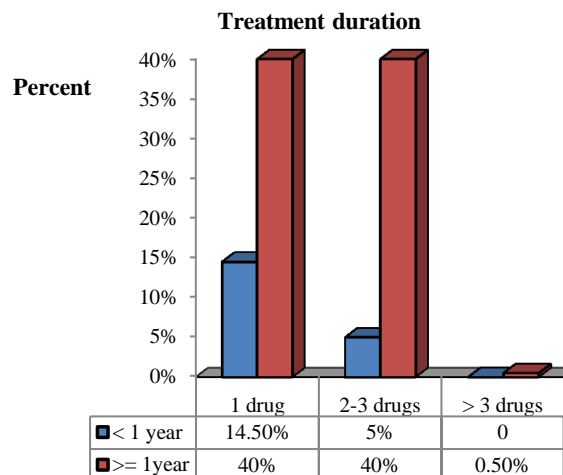

Figure 3: The distribution of patient number and duration of hypertension treatment

Also, the LDL level was in optimal range in 84 patients, in normal range in 30 patients, in borderline high range in 12 patients, and only 2 patients in very high risk LDL range. Otherwise, large number of study patients was in high risk HDL range (83 patients), where only 16 patients were in normal range and 10 patients were in desirable range; with the notification of HDL ranges difference between male and female patients. Most of study patients were with high blood glucose level (106 patients), with only 29 patients with normal blood glucose level, and only 3 patients with low blood glucose level.

Table 3: Distribution of pulse pressure, pulse rate, TCl, TG, LDL, HDL and FBG

Variables		(N)	(%)	Normal Range
Pulse Pressure(PB)	Normal PB	67	33.5%	30-40
	Low or Narrowed PB	3	1.5%	< 30
	High or Widened PB	130	65%	> 40
Pulse Rate(PR)	Normal	166	83%	60-100
	Low abnormal	8	4%	< 60
	High abnormal	6	3%	> 100
	None	20	10%	None
Total cholesterol	Desirable	117	58.5%	< 200 mg/dl
	Borderline high	13	6.5%	200-239 mg/dl
	High risk	5	2.5%	>= 240 mg/dl
	None	65	32.5%	None
Triglycerides	Optimal	56	28%	< 100 mg/dl
	Normal	42	21%	100-149 mg/dl
	Borderline high	19	9.5%	150-199 mg/dl
	High risk	17	8.5%	200-499 mg/dl
	Very high risk	0	0%	>= 500 mg/dl
	None	66	33%	None
LDL	Optimal	84	42%	< 100 mg/dl
	Normal	30	15%	100-129 mg/dl
	Borderline high	12	6%	130-159 mg/dl
	High risk	0	0%	160-189 mg/dl
	Very high risk	2	1%	>= 190 mg/dl
	None	72	36%	None
HDL	High risk	83	41.5%	< 40 mg/dl for men,< 50 mg/dl for women
	Normal	16	8%	40-49 mg/dl for men,50-59 mg/dl for women
	Desirable	10	5%	>= 60 mg/dl for both gender
	None	91	45.5%	None
Fasting blood glucose range	Hypo-glycemic	3	1.5%	< 70 mg/dl
	Normal blood sugar	29	14.5%	70-120 mg/dl
	Hyper-glycemic	106	53%	> 120 mg/dl
	None	62	31%	

Discussion

Our findings indicate the risk factors of hypertension and type-2 diabetes prevalence within 200 hypertensive patients in TMC. In this study, it has been found that most of the patients were elderly people (over 50 years), this might be because as human advances in age, as they will be at a greater risk of developing diabetes or hypertension as shown in Table 1, the majority of cases were more than 50 years old. Although no particular evidence shows that younger patients suffer from primary hypertension; it have been found that one

patient did suffer from secondary hypertension as the latest was suffering from renal artery stenosis.

Furthermore; the incidence of females suffering from hypertension is more than males the reason will be explained later, also Arabs were occupied the vast majority of the cases. In addition, the marital status has an important role as married folks were highly susceptible more than single or divorced and so on, and of course we have concluded as family sizes increases the risk of developing the disease increase also, this may be due to the increase of risk of developing gestational hypertension in females and increasing the financial demands in the family

which is the males responsibility speaking in the mentality of a married person in our domestic population. Although we did have as strong correlation between finance and chances of having hypertension and diabetes, we have found that the more the income the lesser the chance of developing the diseases. It is important to mention that most of the cases were retired people, may be due to advanced age or may be due to lesser physical activity. Family history of diabetes was also a risk factor and as previously mentioned females that developed gestational hypertension are at risk of developing hypertension in this study, as the increasing number of child delivery; the more the chance of developing hypertension. Obesity is always a risk factor for many diseases, diabetes and hypertension aren't an exception, we found that overweight and obese patients were occupying the highest number. Other important risk factors for developing hypertension are diabetes mellitus, cardiovascular disease, migraine and obstructive sleep apnea. Taking Paracetamol or NSAIDs was common among the patients may be because it relieves the headache that arises during hypertension and also taking CNSs stimulants such as coffee, tea or energy drinks was also highly present among the individuals that participated in our study. The highest percentage of cases denied any history of smoking but the summation of passive, former, and current smokers was about two-folds more than the non-smokers, whereas most of the cases were females, this does not mean that they are smoker but does not exclude that they were passive smokers. The consumption of fruits and vegetables according to WHO recommendation was low. Increased animal protein consumption is a major risk factor in developing hyper-lipidemia which is one of the hazards that leads to hypertension and diabetes mellitus.

Most cases included in this study had normal systolic and diastolic blood pressure with normal pulse rate because those patients were under treatment control. As for the lipid profile most patients had cholesterol, triglycerides, and LDL levels of optimal range in those individuals due to treatment control; but few patients were not in desirable HDL range which might need some critical modification in their life style.

Conversing the duration of treatment, most patients were taking medication for a long period which exceeds one year; there was no big difference between taking one medication and two or three drugs but we must put in mind that the increase in number of drug administration may lead to drug-drug interaction which might lead to other complication. Also there was correlation between the increase in number of drug administrated and the decrease in patient drug compliance.

In conclusion, the findings of this study show that in the local population of the sample not only old age and male gender are potential threat for an early hypertensive disease but other variables like diabetes, cardiovascular diseases, dyslipidemia, migraine and obstractive apnea are also playing essential role in hypertension disease. It is also concluded that our population is more prone to hyperglycemia and high pulse pressure with hypertension in majority of population.

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