A study on the Prevalence of Dyslipidemic Disorder Among Residents of Karbala City.

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ABSTRACT:

BACKGROUND:

Dyslipidemia is a common health problem.

OBJECTIVE:

The present study was to estimate the prevalence of dyslipidemia as defined by the NCEP ATP3 criteria among people living in Karbala city.

SUBJECTS AND METHODS:

The investigations were performed on a sample of 130 subjects selected arbitrarily from those attending the public clinic in AL- Hussainy teaching hospital in Karbala for consultation and from some subjects accompanying the patients. Fasting blood samples for routine lipid analyses from each subject were obtained after informing them about the project and having their approval.

RESULTS:

In this sample of subjects it was found that 72.3% of them had a plasma TC level lower than 200mg/dl**.** This study also determined a prevalence of hypertriglyceridemias in 23.3% of study subjects who have a borderline TG level. The prevalence of high and very high TG among them were 6.9% and 4.4% respectively. The frequency of LDL-C levels above 160 mg/dl was found to be about 1% of the sample. Borderline levels of LDL-C was found in 7.3%of the sample. In the meantime the prevalence of low HDL-C levels in this study was found to be 39.2% of the subjects who had a serum level of HDL-C less than 40mg/dl.

CONCLUSION:

In conclusion this study demonstrated a very high prevalence of dyslipidemia among Iraqi adult subjects living in Karbala city. A public health strategy for prevention, detection and treatment of this disorder is needed.

KEYWORDS: dyslipidemia, lipid profile, karbala city

INTRODUCTION:

Dyslipidemia is a common health problem worldwide [1,2]. The prevalence of which is rising steadily [3]. It included elevated serum total cholesterol(TC),low-density lipoprotein cholesterol(LDL-C), triglycerides(TGs), and low level of high density lipoprotein cholesterol(HDL-C) levels.

Coronary artery disease (CAD) is the leading cause of death worldwide[3]. The association between serum total cholesterol (TC) and the risk of CAD is well-established and has been taken into account in various guidelines[4]. It has been suggested that gender-specific differences and interactions of TG with other lipid fractions, including high density lipoprotein cholesterol (HDL-C), should also be considered when evaluating the contribution of TG-containing lipoproteins to atherosclerosis progression, and the incidence of cardiovascular events [5].

Epidemiological evidence based on data from western countries support the concept of an inverse relationship between plasma TG and HDL-C levels [6]. In a pathologic state such as the metabolic syndrome, pro-atherogenic plasma levels of high TG and low HDL-C in tandem occur at a higher frequency, which cannot be considered as a coincidental [7]. Gender appears to exert some influence on the lipid profile. In general, men have less favorable heart disease risk factors than women, and tend to have lower mean levels of HDL-C and higher TG levels; on the other hand socioeconomic factors (household income and occupation) exert an effect on lipid profile [8].

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The objective of the present study was to estimate the prevalence of dyslipidemia as defined by the NCEP ATP3 (The Third Report of National Cholesterol Education Program (Adult Treatment Panel 3)) criteria among people living in Karbala city. Impact age, gender and BMI will be investigated.

SUBJECTS AND METHODS:

The study was carried out in the central province of Karbala city and the investigations were performed on 130 subjects who were selected arbitrarily from those attended the public clinic in AL- Hussainy teaching hospital in Karbala and from some other subjects accompanying them. All the subjets were non-diabetic and with no heart problems or renal dysfunction. Anthropometric measurements for each subject were recorded after having their approval.

Blood samples (5 mls.) were obtained in the morning from an ante cubital vein and placed in vacunator tubes without anticoagulant after 10-12 hours fasting for lipid profile measurements. Blood was allowed to clot for 2 hours at room temperature and the serum was obtained by centrifugation (3000 xg) for 15 minutes. Sera obtained were transferred to the laboratory in cold boxes filled with ice for analyses.

Serum level of TC, TG and HDL-C were measured using enzymatic colorimetric method using Biomaghreb company- France Kit.

Serum VLDL-C and LDL-C levels were calculated in patients using the Friedewald formula[9].

The body mass index (BMI) was calculated according to standardized procedures.

Statistical analyses:Comparisons between groups for quantitative data and prevalence of dyslipidemia were performed using t- test.

RESULTS:

The body mass index of the study group was classified into three categories:

1. Acceptable (lean) with a BMI □25 kg/m^2
2. Overweight with a BMI =25-29.9 kg/m^2
3. Obese with a BMI≥ 30 kg/m^2. Table 1

The study group was also classified into three groups according to the level of cholesterol in their blood:-

1. Group 1: subjects having less than 200mg/dl which is considered as the desirable group
2. Group 2: subjects having cholesterol level at 200-239mg/dl which is considered as the bourderline group.
3. Group 3: subjects having cholesterol level more than 240mg/dl which is considered as the high level group. Table 2.

To study the level of TG among the studied subjects the group was classified into four divisions according to the level of TG in the blood.

1. Normal where TG level is less than 150mg/dl.
2. Borderline where TG level is between 150-199mg/dl
3. High level where TG level is between 200-399mg/dl
4. Very high level where TG level is greater than 400mg/dl, table 3.

Table 1 :Distribution of study group by body mass index

		Studied group		
		Gender		
		Male	Female	Total
acceptable(<25)	No.	8	29	37
	% within gender	10.7	52.7	
	% within group	21.6	78.4	
	% of Total	6.1	22.2	28.5%
overweight(25-29.9)	No.	58	19	77
	% within gender	78.3	34.5	
	% within group	72.7	21.3	
	% of Total	44.6	24.6	59.2%
obese(30+)	No.	9	7	16
	% within gender	12.2	12.7	
	% within group	56.1	43.7	
	% of Total	6.9	5.3	12.3%

Table 1 shows that lean subjects represent 28.5 % , while in overweight and obese subjects the BMI distribution for them is 59.2% and in for obese group the BMI distribution was 12.3% .

Table 2: Distribution of study group by total cholesterol level

			Studied group		
			Gender		
			Male	Female	Total
total cholesterol categories (tcc)	less than 200mg/dl(desirable)	No.	53	41	94
		% within gender	70.6	74.7	
		% within group	56.3	43.7	
		% of Total	40.7	31.6	72.3%
	200-239mg/dl (borderline)	No.	18	10	28
		% within gender	24	18.1	
		% within group	64.3	65.7	
		% of Total	14.6	7.6	21.5%
	more than 240mg/dl (high)	No.	4	4	8
		% within gender	5.3	5.3	
		% within group	50	50	
		% of Total	3	3	6.2%

This table (table 2) shows the distribution of TC among studied groups. 72.3% of the subjects show to have a desirable level of cholesterol, while 21.5% of the subjects have a borderline level. The prevalence of high level i.e. greater than 240mg/dl represented only by 6.2% of the studied sample.

Table 3: Distribution of study group by triglycerides categories

			Studied group		
			Gender		
			Male	Female	Total
triglycerides categories (tgc)	normal triglycerides(<150 mg/dl)	No.	42	43	85
		% within gender	56	78.2	
		% within group	49.4	50.6	
		% of Total	32.3	33.1	65.4%
	borderline high(150-199mg/dl)	No.	23	17	30
		% within gender	30.6	4.4	
		% within group	76.2	23.8	
		% of Total	17.6	1.5	23.3%
	high(200-399 mg/dl)	No.	9	0	9
		% within gender	100	0	
		% within group	100	0	
		% of Total	100	0	6.9%
	very high(>400 mg/dl)	No.	6	0	6
		% within gender	100	0	
		% within group	100	0	
		% of Total	10.7	0	4.4%
		% of Total	62.0%	38.0%	100.0%

Table 3 shows that 65.4% of the studied subjects have normal level of TG i.e. below 150 mg/dl. However, 23.3% of the subjects show borderline levels i.e. TG between 150-199mg/dl.
The high and very high levels of TG are only found among 6.9% and 4.4% of the subjects respectively.

In table 4 subjects have been classified as to their level of their HDL-C into two categories:

1. Low level with less than 40mg/dl HDL-C
2. Normal level with a range of 41-59mg/dl HDL-C, table 4

Table 4 :Distribution of study group by high-density lipoprotein categories.

			Studied group		
			Gender		
			Male	Female	Total
high density lipoprotein categories (hdlc)	low (less than 40 mg/dl)(bad)	No.	27	24	51
		% within gender	36	43.3	
		% within group	52.9	47.1	
		% of Total	20.7	18.3	39.2 %
	normal (41-59 mg/dl)	No.	48	31	79
		% within gender	64	56.3	
		% within group	60.8	39.2	
		% of Total	36.9	23.9	60.8 %
		% of Total	62.0%	38.0%	100.0 %

As the table shows 39.2% of the subjects have low levels of HDL-C i.e. less than 40mg/dl. The remaining 60.8% of the subjects proved to have levels of HDL-C within the normal rang i.e. 41-59mg/dl.

In the meantime the level of LDL-C was studied by deviding the group into three categories (table 5):
1. Optimal: when the level of LDL-C is ≤ 129mg/dl
2. Borderline high: when the level of LDL-C is between130-159mg/dl
3. High level of LDL-C when it is ≥ 160mg/dl.

Table 5 :Distribution of study group by LDL categories

			Studied group		
			Gender		
			Male	Female	Total
low density lipoprotein categories (ldlc)	optimal(=<129 mg/dl)	No.	68	52	120
		% within gender	90.6	94.6	
		% within group	56.6	45.4	
		% of Total	52.3	40	92.0%
	borderline high(130-159 mg/dl)	No.	6	3	9
		% within gender	8	5.4	
		% within group	64.4	35.6	
		% of Total	4.6	2.3	7.3%
	high(=>160 mg/dl)	No.	1	0	1
		% within gender	100	0	
		% within group	100	0	
		% of Total	0.8	0	0.3%

Table 5 shows that the prevalence of borderline and high LDL-C are very low as they represent 7.3% and 0.3% respectively. This means that 92% of the studied subjects have optimal range of serum LDL-C.

Table 6 and 7 show all the data obtained in this study arranged in relation to the BMI of the subjects (table 6) and the age of the subjects (table7) to see if there is any kind of dependencies to these two parameters.

Table 6: Mean ± SD of Parameters studied the studied group subdivided in relation to BMI

		Age	BMI	TC	TG	HDL-C	LDL-C	VLDL-C
BMI□25	M (n=8)	46.75±11.08	24.1±0.76	186.87±22.7	192.6±36.7	53.25±7.88	111.75±8.0	41.5±10.66
	F (n=28)	43.06±10.2	23.5±1.21	182.86±22.2	107.0± 32.5	45.65±8.75	97.75±13.92	34.62±11.02
BMI≥25	M (n= 58)	42.89±10.45	27.25±1.42	184.82±22.16	122.14±25.75	45.54±7.85	104.52±16.62	41.42±12.62
	F(n=10)	36.42±6.45	27.96±1.56	173.91±30.45	102.34±28.23	38.25±7.34	102.35±14.85	35.75±5.87
BMI>30	M (n= 8)	45.63±12.83	34.12±2.9	196.75±28.33	181.87±52.47	44.25±10.63	120.37±23.7	36.25±10.47
	F (n=7)	41.12±9.65	32.52±1.01	196.65±33.65	110.24±36.42	46.52±7.53	122.30±29.62	31.34±11.02
total	n= 130	41.71±11.52	25.63±5.87	177.06±39.24	116.87±42.61	45.25±10.62	101.78±24.2	36.52±12.35

Table 7 :Mean ± SD of Parameters studied in controls and patients subdivided in relation to Age

		Age	BMI	TC	TG	HDL-C	LDL-C	VLDL-C
Age (20-29)	M (n=7)	26.63±3.46	28.12±3.22	193.12±7.27	141.53±45.72	40.52±8.62	104.53±12.2	40.41±13.78
	F (n=6)	27.45±1.57	26.87±3.78	171.97±24.62	100.42±21.21	40.03±7.65	108.89±20.25	28.88±9.79
Age (30-39)	M (n= 15)	39.66±3.35	27.57±2.26	188.52±18.35	134.23±31.62	47.75±7.21	109.99±25.35	35.93±6.25
	F(n=15)	39.12±3.21	25.69±2.71	178.93±25.62	109.10±23.57	43.35±10.82	96.27±17.64	34.52±8.78
Age (40-49)	M (n= 26)	44.64±2.65	27.68±2.84	183.15±24.25	119.82±28.52	47.52±8.52	100.26±13.42	45.25±9.58
	F (n=18)	43.95±3.12	25.52±3.91	191.63±17.53	104.11±13.25	47.49±5.92	110.32±11.35	35.29±11.78
Age (50-)	M (n= 26)	56.45±4.24	27.51±1.52	178.72±29.62	119.52±24.24	47.71±7.13	99.53±13.25	45.53±11.25
	F (n=16)	55.73±4.10	25.46±2.42	181.78±24.32	104.58±15.35	47.52±6.351	104.62±19.45	35.65±12.53
Total	n= 130	40.43±13.3	25.64±5.61	176.04±40.52	130.6±47.57	43.56±10.75	101.63±24.4	36.4±12.33

DISCUSSION:

It is well known that dyslipidemia is a common health problem in the developing countries which seems to follow the trend of increasing steadily [10].

As the results show, 72.3% of the subjects under study have serum TC level lower than 200mg/dl (table2). The maximum TC level recorded for females was 211mg/dl while the maximum for males was 247mg/dl. However, the mean value of serum TC level was 177.06±39.24 with a definite trend to be slightly higher in males than in females (tables 6 and 7). Thus these results clearly show that the prevalence of hypercholesterolemia tends to be lower in eastern countries particularly Asians than in western countries. New reports showed that over the past two decades, the prevalence of hypercholesterolemia showed a tendency for an increase in the economically developing countries [11]. However, differences in the methodology between the national surveys make international comparison a little bit difficult [12].

The prevalence of low HDL-C levels in this study is 39.2 % of the subjects who have a serum level of HDL-C less than 40mg/dl. The alteration in the reference values according to the new recommendations [13] brought about some difficulties when compared with previous studies. So, the present findings cannot agree with most of previous studies [14]. Abnormally low HDL-C levels are risk factors for CHD [15]. In the third report of the NCEP ATP3 it was reaffirmed that HDL-C levels less than 40mg/dl are major risk factors for CHD while HDL-C levels greater than 60mg/dl are protective ones. Usually a low HDL-C level is linked with elevated levels of serum TG and remnant lipoproteins [13]. The low level of HDL-C level is also associated with high LDL-C [14]. Thus a low HDL-C can be a sign of insulin resistance and is associated with metabolic risk factors. Therefore; dyslipidemia along with abdominal obesity, which correlates with adverse serum lipids and lipoproteins[16] seems to be a problem among Iraqi adults in Karbala city, which may be attributed to the special life style of the inhabitance.

The relationship between dyslipidemia and obesity represented by BMI is clearly shown in both males and female subjects. Obesity not only increases the prevalence of dyslipidemia, but also directly associated with diabetes and CHD [17]. Dyslipidemia in obesity may be a result of insulin resistance. We observed some associations among the dyslipidimic and obese subjects. The prevalence of dyslipidemia increased in line with blood pressure and BMI levels. Table 5 shows that total cholesterol increase steadily with increasing BMI in both males and female subjects with a significant change P□ 0.01. These results suggest a biological interrelation between blood lipid levels and blood pressure and consequently, an association with the risk for CHD.

Abdominal obesity is associated with an increase in the portal free fatty acid concentration, which leads to hyperinsulinemia [18]. This hyperinsulinemia is linked to cardiovascular disease risk factors. Life style factors such as smoking, unhealthy diet and decreased physical activity might play an important role in abdominal obesity. However, a broad range LDL-C levels was observed and the higher the level the higher the risk of coronary heart disease.

Although the prevalence of high LDL-C level was not very much high in our study samples (table 5) but nevertheless it gives an indication that the possibility of having high LDL-C levels may be expected. 85% of female subjects showed to have TG levels less than 100mg/dl and the maximum level recorded was 198 mg/dl. On the other hand 46.8% of the male subjects had TG levels less than 150mg/dl, the maximum level recorded was 243mg/dl. The mean values for the males with a BMI less than 25 $kg/m^2$was 192.6±36.7 while it was 107 .0±32.5 for females. This trend of low TG values continues with all BMI categories. These figures are in any case less than any recorded data.

In a study conducted in Turkey [14] the TG level for females was 126.0 mg/dl while that for males was 149.0 mg/dl. Although these results agree with our results for men but they are quite different for females, which gives females of the city of Karbala a characteristic feature in this respect.

Males with BMI less than 25 showed the highest level of TG. Hypertriglyceridemia is thought to be an important risk factor . Onat et al [14] reported a prevalence of hypertriglyceridemia greater or equal to 150.0 mg/dl of 39.6 % for males and 29.2% for females in Turkey. In the Turkish heart study the prevalence was 13% for males and 6 % for females in Trabzon [19]. However in another study, the prevalence of hypertriglyceridemia was 30.4% .

Smoking has been clearly established as a modulator of plasma lipid levels and as an independent risk factor for CHD [20]. Smoking is known to impair insulin action and may lead to insulin resistance [21]. The inverse relationship between cigarette smoking and weight is also well documented. As they showed to have higher cholesterol levels [21] and lower HDL-C levels [22].

In current study, the prevalence of smoker subjects was not much but it can suggest that smoker subjects with low HDL-C must be higher than other subjects a fact that could not be achieved in our investigation which may be due to the sample size, age of the subjects, environmental and cultural conditions.

A significant correlation was found to exist between BMI and TC (r^2=0.003) in our subjects. On the other hand, a significant correlation was found to exist between BMI and LDL-C level.

A positive relationship was reported to exist between serum TG levels and incidence of CHD [12], it seems however that the higher prevalence of hypertriglyceridemia may be related to high intake of carbohydrate (especially through bread and dates consumption) and fat (especially through saturated fat and margarines, fried food and butter) by people of the area as a part of their routine diet.

Between the age of 30-60 years the mean level of lipids shows a good correlation with age, but not below 30 and above 60 years of age. However the exact mechanisms of the impact of age on lipid levels are yet unknown. They may however be related to hereditary characteristics and degenerative processes.

Alcohol drinking showed to have a great effect on serum lipid levels. Reports showed that the prevalence of hyperlipidemia is positively correlated with alcohol consumption [22].

CONCLUSION :

This study demonstrates a very high prevalence in Iraqi adult subjects living in Karbala city which needs a certain public health strategy for prevention, detection and treatment of this disorder.

However, females of the city showed to have the lowest level of serum TG contrary to what have been recorded elsewhere.

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