

Population based study of serum lipid levels in Al-Kharj Health Center, Saudi Arabia

Danny O. Ogbeide, FWACP, FRCGP, Anjum Karim, MRCGP, MRCP,
Ibrahim M. Al-Khalifa, MBBS, FRCGP, Saima Siddique, MBBS, MRCGP.

ABSTRACT

Objective: Previous studies have shown high prevalence of diabetes mellitus, hypertension, obesity and smoking in this community. The aim of this study is to determine the prevalence and factors associated with hyperlipidemia.

Methods: A questionnaire was administered on all patients <13-years of age seen by investigators between April 2002 and October 2002 in Al-Kharj Health Centre, Kingdom of Saudi Arabia. Questions were asked regarding demography; weight and height were measured and blood was collected after 14 hours fasting for lipid levels.

Results: Four hundred and twenty-three (56.7%) of the study population had cholesterol level <5.2 mmol/L. Three hundred and twenty-three (43.3%) had cholesterol

level >5.2 mmol/L (desirable level according to National Cholesterol Education Program [NCEP]). Mean serum cholesterol level for males and females were 5.08 mmol/L and 5.19 mmol/L; 462 (59.80%) had triglycerides level <1.7 mmol/L and 311 (40.20%) had level >1.7 mmol/L (NCEP). Age ≤50 years, education less than high school (12 years), family history of hyperlipidemia and high triglyceride levels were strongly associated with hyperlipidemia.

Conclusion: The study points to high prevalence of total cholesterol, triglyceride and low density lipoprotein in this population. We suggest further studies and steps to reverse these factors, which are modifiable by changes in lifestyle.

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Earlier studies¹⁻³ in our population showed a high prevalence of diabetes mellitus, obesity, hypertension and smoking. Other noticeable factors in this population are poor eating habits and sedentary lifestyle with little or no exercise. Another important risk factor for cardiovascular diseases already proven in other studies⁴ is hyperlipidemia. Some of these studies have also shown that early and timely detection and treatment of hyperlipidemia can considerably reduce morbidity and mortality caused by ischemic heart disease and stroke. Studies in other communities have also shown racial differences in circulating levels of serum lipids. From literature search there

is no study in our population on serum lipid levels and associated factors.

Methods. The sample for this prospective study consisted of all patients above 13-years of age seen by the investigators in Al Kharj Health Centre, Al Kharj, Kingdom of Saudi Arabia (KSA) between April and October 2002. A simple questionnaire was administered on the patients, questions were asked with regards to demographic data viz age, gender, educational level and occupation. An inquiry was also made regarding presence of chronic diseases in the family. In addition, blood was collected after 14 hours fasting for lipid profile.

From the Department of Family and Community Medicine, Al-Kharj Military Hospital, Al-Kharj, Kingdom of Saudi Arabia.

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Address correspondence and reprint request to: Dr. Danny O. Ogbeide, Consultant Family and Community Medicine, Al-Kharj Military Hospital, Al-Kharj, Kingdom of Saudi Arabia. Tel. +966 (1) 5451870. Fax. +966 (1) 5451870. E-mail: odogbeide@yahoo.com/odogbeide@hotmail.com

The height and weight were measured (height without shoes and weight with only light cloths on). Prevalence of hyperlipidemia was estimated as equal to subjects with self-reporting plus those with fasting cholesterol level > 5.2 mmol or triglyceride level > 1.7 mmol.

The data was analyzed by using SAS (6.11) for primary care. Preliminary examination of the data included analysis of study participants. T test or Chi-square test as appropriate was used for any statistically significant differences between groups. All the analyses were performed at 0.05 significance level.

Results. The study sample consisted of 994 individuals. The majority of the participants were females (54.5%) (60.9%) were less than 50-years of age and (82.8%) had less than high school (less than 12-years of school) education (61.4%) were not working. The prevalence of smoking was approximately 11% (Table 1), 12% of study participants (124 persons) were taking antihyperlipidemic drugs (Table 2). The cholesterol level were checked for 746 study participants, 423 (56.7%) had cholesterol level <5.2 mmol (desirable level by National Cholesterol Education Program [NCEP]).⁵ Forty-three point three percent (323) persons had cholesterol levels > 5.2 mmol/L (Table 3). The mean serum cholesterol level for males and females were 5.08 mmol/L (SD 1.12) and 5.19 mmol/L (SD 1.08) (Table 3). The <20-years age group had lowest mean cholesterol (4.08 mmol/L), the level increased with age and the 51-60 years age group in this study had highest mean cholesterol level (5.45 mmol) (Table 3). The triglyceride levels

were checked for 773 participants, 462 (59.8%) had triglyceride level < 1.7mmol/L and 311 (40.2%) had triglyceride level >1.7 mmol/L (Table 2). The associations between hyperlipidemia and various risk factors are shown in Table 4. Age above 50 years, education less than high school, family history of hyperlipidemia and high triglycerides were strongly associated with increased risk of hyperlipidemia and the findings were statistically significant. Low density lipoprotein (LDL) levels were checked for 152 of the study participants, 11 (7.2%) had level <2.6mmol/L, 40 (26.3%) had level between 2.6-4.2 and 101 (66.4%) had level above 4.2 mmol/L which is high according to third report of NCEP.⁵ High density lipoprotein (HDL) levels were also checked for 152 participants, 43 (28.3%) had level <1.04 mmol/L (low level), 94 (61.8%) had between 1.04-1.55 mmol/L and 17 (11.2%) had level >1.56 mmol/L (high) (Table 5).

Discussion. Our results show that mean cholesterol level increased from 20-years age group to 51-60-years age group. This trend has been reported in other studies.^{6,7} Fifty six point seven percent of the study population had cholesterol level of less than 5.2 mmol/L, and 43.3% had a level of equal to or more than 5.2 mmol/L. The mean cholesterol level for males and females were 5.08 and 5.19. This compares favorably with the findings in another study in KSA.⁷ However, the findings of 50% prevalence for hypertriglyceridemia in the same study is quite different from our findings. This may be due to the fact that while we adopted the NCEP with a cut off equal to 1.7, that study adopted a cut off point of 2.5 mmol/L. The

Table 1 - Characteristics of the study participants.

Characteristics	n (%)
Gender	
Male	452 (45.5)
Female	542 (54.5)
Age (years)	
<20	103 (10.4)
21-30	110 (11.2)
31-40	191 (19.4)
41-50	196 (19.9)
51-60	179 (18.2)
>60	207 (21)
Education	
Uneducated	435 (44.1)
Elementary - 6 years	201 (20.4)
Middle - 9 years	181 (18.4)
High school - 12 years	127 (12.9)
University or above	42 (4.3)
Occupation	
Student	83 (8.8)
Employed	282 (29.8)
Unemployed	585 (61.4)
Smoking	
Yes	100 (10.8)
No	834 (89.2)

Table 2 - Prevalence of hyperlipidemia and its risk factors.

Factor	n (%)
Hyperlipidemia	
Yes	124 (12.5)
No	870 (87.5)
Body mass index	
<30	550 (58.6)
≥30	388 (41.4)
Triglyceride	
≤1.7 mmol/L	462 (59.8)
≥1.7 mmol/L	311 (40.2)
Cholesterol	
<5.2 mmol/L	423 (56.7)
>5.2 mmol/L	323 (43.3)
Diabetes	
Yes	404 (40.6)
No	590 (59.4)
Smoking	
Yes	100 (10.8)
No	834 (89.1)
Family history of hyperlipidemia	
Yes	94 (9.5)
No	900 (90.5)

Table 3 - Blood cholesterol levels by gender and age.

Gender	N	Mean	SD	Range
Male	331	5.08	1.12	1.1 - 9.41
Female	429	5.19	1.08	2.73 - 10.5
Age group (years)				
20	64	4.08	0.82	2.49 - 6.33
21-30	70	4.51	0.94	2.73 - 6.73
31-40	137	5.03	0.95	3.12 - 8.08
41-50	167	5.41	0.97	2.71 - 8.13
51-60	150	5.45	1.15	1.1 - 9.4
>61	165	5.39	1.08	2.75 - 10.5

Table 4 - Association between hyperlipidemia and various risk factors.

Factor	Odds ratio	95% Confidence intervals
Gender		
Female	1.0	0.54 - 1.57
Male	1.79	
Age (years)		
<50	1.0	309 - 7.11
>50	4.69	
Education		
>High school >12 years of education	1.0	1.42 - 5.76
<High school <12 years	2.86	
Family history of hyperlipidemia		
No	1.0	3.79 - 9.69
Yes	6.06	
Diabetes		
No	1.0	3.83 - 9.20
Yes	5.94	
Body mass index		
<30.0	1.0	0.63 - 1.38
>30.0	0.933	
Triglyceride		
≤1.70	1.0	2.08 - 4.76
>1.70	3.14	
Cholesterol		
≤5.2	1.0	1.06 - 2.38
>5.2	1.59	
Smoking		
No	1.0	0.49 - 1.75
Yes	0.93	

Table 5 - Low density lipoprotein level.

Factors	n	(%)
LDL level total (n=152)		
<2.6 mmol/L	11	(7.2)
2.6 - 4.2 mmol/L	40	(26.3)
>4.2 mmol/L	101	(66.4)
HDL level total (n=152)		
<1.04 mmol/L (low)	43	(28.3)
1.04 - 1.55	94	(61.8)
>1.56 mmol (high)	17	(11.2)
LDL - low density lipoprotein, HDL - high density lipoprotein		

strong association between hyperlipidemia and age above 50-year, family history of hyperlipidemia, high triglyceride which was shown in this study have been mentioned in earlier studies.⁸ From our study, the prevalence of high LDL and high HDL were 66.4% and 11.2%. Although the values compares with findings in other studies, we think that this requires further investigation. The findings have shown rather high prevalence of total cholesterol (TC), triglyceride and HDL and LDL compared with other communities. Ethnic differences have been mentioned in other studies.⁹ This study points to high prevalence of TC, triglyceride and LDL. Earlier studies have shown high prevalence of diabetes, hypertension, obesity, smoking and physical inactivity. These are known risk factors for CVD. We therefore, suggest further studies and steps to reverse the situation as many of these factors are modifiable by changes in lifestyle.

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