Clinical research

Awareness among the general population about lipid profile screening in individuals over 20 years old in Alriyadh, Saudi Arabia

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Abstract

Introduction: Plasma cholesterol and triglycerides are clinically important because their abnormally high levels are major treatable risk factors for cardiovascular disease. This study aimed to evaluate the awareness, general knowledge, and attitudes about regular lipid profile screening among adult individuals in Al-Riyadh.
Material and methods: This is a cross-sectional study collected by convenience sampling method. Residents of Riyadh region older than 20 years were targeted through an electronic questionnaire distributed via Twitter and WhatsApp. The study was conducted between November 28, 2016 and December 31, 2016. Study results were analysed using the SPSS system.
Results: This study included 1383 participants; 646 (46.7%) were male and 737 (53.3%) female. Of them, 905 (65.4%) did not screen for their lipid profiles, while 478 (34.6%) screened. A visit to a primary health care facility or hospital was the reason for screening of lipid profile in 195 (14.1%) of the participants, whereas 64 (4.6%) of them were ordered by doctors.
Conclusions: More educated participants were found to be more aware of the importance of screening lipid profile. Our results reflect poor awareness among the population regarding the importance of regular screening of lipid profiles. A visit to primary health care or hospital was the most frequent reason for screening of lipid profile. Screening lipid profiles was predominant among males and it was significantly related to the gender, age, and educational level. This shows the strong need in the community for health education about the importance of screening lipid profile at different levels of health care delivery.

Key words: lipid profile, cholesterol, lipoproteins, screening.

Introduction

There are three main classes of lipids in our blood, which include cholesterol, triglycerides (TG), and phospholipids. Functions of lipids include structural components of cellular membrane, energy storage as triglyceride, and cellular signalling. The initial steps in lipid cycle begin when it is

absorbed from the gastrointestinal tract and mobilised throughout the body. Due to water insolubility nature of lipid molecules, lipids must be integrated within specific proteins called lipoproteins whenever this molecule is circulating within the blood [1]. Lipoproteins are classified on the basis of lipid-protein ratio, starting with chylomicrons, which carry dietary lipids from the intestines to various organs including liver, skeletal muscle, and adipose tissue. Very-low-density lipoproteins (VLDL) transport synthesised lipid from the liver to adipose tissue [2]. Low-density lipoproteins (LDL) are the main circulating lipoproteins, occasionally referred to as "bad" lipoprotein because it plays a major role in the formation of atheromatous plaques [3]. High-density lipoproteins (HDL) gather lipid molecules from the body's cells to transport it again to the liver. In contrast to LDL, HDL is referred to as "good" lipoprotein due to the correlation between higher concentration of HDL and improvement of health quality and atherosclerotic regression [4].

Plasma cholesterol and triglycerides are clinically important because their abnormally high levels are major treatable risk factors for cardiovascular disease; severe hypertriglyceridaemia also predisposes to acute pancreatitis. An increase in atherogenic lipoproteins, such as LDL, in the blood contributes to the development of atherosclerosis by subendothelial accumulation of these lipoproteins followed by their oxidation triggering an inflammatory response, which is mediated by macrophages to ultimately form foam cells, which in turn leads to endothelial dysfunction [5].

Coronary artery disease (CAD) is considered to be a very big threat to health in Saudi Arabia, being the third leading cause of mortality. Atherosclerosis is the underlying cause of CAD according to Kumosani *et al.* [6]. However, a study showed that the prevalence of CAD in Saudi Arabia was 5.5% [7]. Lipid profile screening studies in Saudi Arabia has started to show the magnitude of the problem. One study found that the prevalence of hypercholesterolaemia was 54.9% and 53.2% for males and females, respectively; hypertriglyceridaemia was 47.6% and 33.7% in males and females, respectively [8]. In the town of Al-kharj, a study showed that the prevalence among people above 13 years old was 43.3% [9]. Another study in Saudi Arabia documented that among Saudi adults, the level of dyslipidaemia ranges from 20% to 44% with triglycerides abnormal at the top; 25% out of them expressed low levels of HDL [10].

A cross-sectional study conducted on samples from different countries in the middle east – including Saudi Arabia – reported low HDL in 55.5%, and people with very high LDL comprised 58.4%, high LDL were 36.2%, and moderate LDL were 47.2% [11].

In USA Hispanic/Latino adults, a study showed that half of Hispanic/Latino adults with hypercholesterolaemia did not know that they were dyslipidaemic at the time of research screening [12].

This study aimed to evaluate awareness, general knowledge, and attitudes about positive and negative aspects of regular lipid profile screening among adult individuals over the age 20 years in Al-Riyadh city, Saudi Arabia.

Material and methods

This is a cross-sectional survey study collected by convenience sampling method. All residents of Riyadh region who are older than 20 years were targeted through a self-constructed electronic questionnaire assessing the general knowledge, attitude, and awareness of lipid profile screening distributed via Twitter and WhatsApp. The questionnaire contained closed end and multiple selection questions and was revised by experts. The study was conducted between November 28, 2016 and December 31, 2016.

The sample size was calculated by OpenEpi version three [13], employing the following considerations: the study population was about 5,500,000 inhabitants [14], keeping the confidence interval (CI) at 95%. The sample size was calculated to be 1083 participants, which represents a confidence level of 99.9%. For correction of any possible data loss the total sample would be 1383.

At the beginning of the survey the participants were asked to provide some personal information: gender, age, marital status, educational level, occupation, place of residence, and pattern of lifestyle – including smoking and physical activity. Smoking was grouped into three categories "No" meant never smoked at all, "Yes" meant active smoker, and "used to smoke" meant used to smoke but not now.

Physical activity was grouped into six categories "No", "Sometimes" meant irregular exercise, "Once weekly", "Twice weekly", "Three times weekly", and "More than three times weekly". If the response was other than "No", the follow-up question should be answered "How strenuous is your physical activity?", which was grouped into two categories: "With sweating and increase of respiratory rate" and "Without sweating and increase of respiratory rate".

The participant was then asked if he/she had screened his/her lipid profile, and a further follow-up question if the answer was "Yes" was about the reason for screening, which was grouped into two categories: "Instruction from my doctor" or "Regular check-up ", and the participant was given a blank space to mention any other causes if any. Finally, a question about history of chronic diseases was included: "diabetes,

hypertension, obesity, and other chronic diseases" as well as their opinion about regular lipid profile screening tests with the following choice of answers: "Strongly agree", "Agree", "Neither agree nor disagree", "Disagree", and "Strongly disagree".

The most common reasons for use of an electronic questionnaire over traditional paper style are: 1 – decreased expenses, 2 – rapid response, and 3 – increased response rate [15].

Ethics

Approval of the study was obtained from the institutional Ethics Committee.

Statistical analysis

The study results were analysed using the SPSS (V22) system, the following statistical tests were used: frequencies, multiple response sites, and bar charts. Relationships between questionnaire variables and gender, age, and personal or family history of chronic diseases were examined using the χ^2 test.

Results

This study included a total of 1383 participants; 646 (46.7%) were male and 737 (53.3%) were female. Most of the participants (1027 (74.3%)) were in the age group 20 to 35 years, and 176 (12.7%) of them were over 35 years old.

Our results showed that 1057 (76.4%) participants' academic qualification was bachelor's degree or higher, 310 (22.4%) had high school or equivalent, and 16 (1.2%) had intermediate school or lower. Highly educated participants, with bachelor's degree, were more commonly females. The educational level was found to be statistically significantly related to gender (Table I) and screening for lipid profile (Table II).

Furthermore, 502 (36.3%) participants were unemployed, 432 (31.2%) were employed, and 24 (1.7%) were retired. Most of the jobless participants (314 (22.7%)) were females, whereas most of the employees (305 (22.1%)) were males, with a statistically significant relation between job status and gender (Table I).

Also, 1147 (82.9%) respondents were non-smokers, 66 (4.8%) had stopped smoking, and only 170 (12.3%) were smokers. Smoking was predominant among males (159 (11.5%)), and it was significantly related to gender (Table I).

Exercise practicing was reported by 830 (60.1%) of the participants, with 496 (35.9%) of them practiced sometimes, and 198 (14.4%) of them exercising three times or more per week. However, 553 (40%) of the participants did not practice exercise at all. Exercise practicing was more common among males, and it was significantly related to gender (Table I).

Regarding history of chronic diseases, 1086 (78.5%) of the participants had no disease, 130 (9.4%) had obesity, 22 (1.6%) had diabetes mellitus, 17 (1.2%) had hypertension, 98 (7.1%) reported another disease, and 25 (1.8%) of them had more than one disease. History of chronic diseases was significantly related to the gender and age (Tables I and III).

Moreover, 905 (65.4%) of the respondents had not screen for their lipid profiles, while 478 (34.6%) of them had screened. A visit to a primary health care (PHC) facility or hospital was the reason for screening of lipid profile in 195 (14.1%) of the participants; whereas 64 (4.6%) of them were instructed by doctors, and 170 (12.3%) of them mentioned other causes. Screening of lipid profiles was predominant among males, and it was significantly related to the gender, age, and educational level (Tables I–III).

Majority of the respondents (1093 (79%)), agreed with regular lipid profile screening testing, but 40 (2.9%) of them disagreed, and 250 (18.1%) of them expressed a neutral opinion. There was no statistically significant relation found between the respondents' opinion and their gender or their age (Tables I and III).

Discussion

Our results showed that 76.4% of the total 1383 participants' academic qualification was bachelor's degree or higher, 22.4% high school or equivalent, and 1.2% intermediate school or lower. Highly educated participants, with a bachelor's degree, were more commonly females. Educational level was found to be statistically significantly related to gender (Table I) and screening for lipid profile (Table II). This reflects the improvement of community education in comparison to a previous study – Ogbeide *et al.* found that 82.8% of their sample from Alkharj had less than high school education [9]. More educated participants were found to be more aware of the importance of lipid profile screening, in agreement with other studies [16, 17].

Furthermore, 36.3% of the participants were unemployed, 31.2% were employed, and 1.7% of them were retired. Most of the jobless participants (22.7%) were females, whereas most of the employed respondents (22.1%) were males, with a statistically significant relation between job status and gender (Table I). Most of the participants who did not undertake lipid profile screening were among the jobless group, in accordance with another study [17]; this may be attributed to decreased physical activity.

Moreover, 82.9% of the respondents were non-smokers, 4.8% had stopped smoking, and

Table I. Relationship between questionnaire variables and gender

Variable	Answer	Gender			*P*-value
		Male *N* (%)	Female *N* (%)	Total *N* (%)	
Educational level	Intermediate school or lower	5 (0.4)	11 (0.8)	16 (1.2)	0.024*
	High school or equivalent	157 (11.4)	153 (11.1)	310 (22.4)	
	Bachelor's degree	429 (31.0)	532 (38.5)	961 (69.5)	
	Higher	55 (4.0)	41 (3.0)	96 (6.9)	
	Total	646 (46.7)	737 (53.3)	1383 (100)	
Job	None	188 (13.6)	314 (22.7)	502 (36.3)	< 0.001*
	Employee	305 (22.1)	127 (9.2)	432 (31.2)	
	Other	90 (6.5)	137 (9.9)	227 (16.4)	
	Free works	44 (3.2)	73 (5.3)	117 (8.5)	
	Housekeeper	1 (0.1)	80 (5.8)	81 (5.9)	
	Retired	18 (1.3)	6 (0.4)	24 (1.7)	
	Total	646 (46.7)	737 (53.3)	1383 (100)	
Smoking	Yes	159 (11.5)	11 (0.8)	170 (12.3)	< 0.001*
	No	423 (30.6)	724 (52.3)	1147 (82.9)	
	I was but then I quit	64 (4.6)	2 (0.1)	66 (4.8)	
	Total	646 (46.7)	737 (53.3)	1383 (100)	
Exercise	No	255 (18.4)	298 (21.5)	553 (40.0)	
	Sometimes	190 (13.7)	306 (22.1)	496 (35.9)	< 0.001*
	Once per week	45 (3.3)	26 (1.9)	71 (5.1)	
	Twice per week	40 (2.9)	25 (1.8)	65 (4.7)	
	Three times per week	29 (2.1)	34 (2.5)	63 (4.6)	
	More than three times per week	87 (6.3)	48 (3.5)	135 (9.8)	
	Total	646 (46.7)	737 (53.3)	1383 (100)	
Intensity	With sweating and heavy breathing	260 (33.6)	266 (34.4)	526 (68.0)	0.091
	Without sweating and heavy breathing	106 (13.7)	141 (18.2)	247 (32.0)	
	Total	366 (47.3)	407 (52.7)	773 (100)	
Chronic disease	None	478 (34.6)	608 (44.0)	1086 (78.5)	< 0.001*
	Diabetes	16 (1.2)	6 (0.4)	22 (1.6)	
	Hypertension	8 (0.6)	9 (0.7)	17 (1.2)	
	Heart problem	3 (0.2)	2 (0.1)	5 (0.4)	
	Obesity	78 (5.6)	52 (3.8)	130 (9.4)	
	Other disease	44 (3.2)	54 (3.9)	98 (7.1)	
	More than one disease	19 (1.4)	6 (0.4)	25 (1.8)	
	Total	646 (46.7)	737 (53.3)	1383 (100)	
Screening	Yes	258 (18.7)	220 (15.9)	478 (34.6)	< 0.001*
	No	388 (28.1)	517 (37.4)	905 (65.4)	
	Total	646 (46.7)	737 (53.3)	1383 (100)	
Reason for screening	Visit to PHC or hospital	92 (6.7)	103 (7.4)	195 (14.1)	< 0.001*
	Instructed by doctor	35 (2.5)	29 (2.1)	64 (4.6)	
	Other cause	105 (7.6)	65 (4.7)	170 (12.3)	
	None	26 (1.9)	23 (1.7)	49 (3.5)	
	Did not perform	388 (28.1)	517 (37.4)	905 (65.4)	
	Total	646 (46.7)	737 (53.3)	1383 (100)	

Table I. Cont.

Variable	Answer	Gender			*P*-value
		Male *N* (%)	Female *N* (%)	Total *N* (%)	
Opinion	Strongly agree	239 (17.3)	259 (18.7)	498 (36.0)	0.418
	Agree	264 (19.1)	331 (23.9)	595 (43.0)	
	Neutral	120 (8.7)	130 (9.4)	250 (18.1)	
	Disagree	19 (1.4)	15 (1.1)	34 (2.5)	
	Strongly disagree	4 (0.3)	2 (0.1)	6 (0.4)	
	Total	646 (46.7)	737 (53.3)	1383 (100)	

**P-value determined by χ^2-test means there is a statistically significant relationship at the level of significance (0.05 or less).*

Table II. Relationship between educational level, lipid profile screening, and opinion

Parameter	Educational level, *N* (%)				Total	*P*-value
	Intermediate school or lower	High school or equivalent	Bachelor's degree	Higher		
Screening:						< 0.001*
Yes	5 (0.4)	80 (5.8)	342 (24.7)	51 (3.7)	478 (34.6)	
No	11 (0.8)	230 (16.6)	619 (44.8)	45 (3.3)	905 (65.4)	
Total	16 (1.2)	310 (22.4)	961 (69.5)	96 (6.9)	1383 (100)	
Opinion:						0.380
Strongly agree	5 (0.4)	109 (7.9)	343 (24.8)	41 (3.0)	498 (36.0)	
Agree	8 (0.6)	131 (9.5)	421 (30.4)	35 (2.5)	595 (43.0)	
Neutral	2 (0.1)	63 (4.6)	168 (12.1)	17 (1.2)	250 (18.1)	
Disagree	1 (0.1)	6 (0.4)	26 (1.9)	1 (0.1)	34 (2.5)	
Strongly disagree	0 (0.0)	1 (0.1)	3 (0.2)	2 (0.1)	6 (0.4)	
Total	16 (1.2)	310 (22.4)	961 (69.5)	96 (6.9)	1383 (100)	

**P-value determined by χ^2-test means there is a statistically significant relationship at the level of significance (0.05 or less).*

only 12.3% were smokers. Smoking was predominant among males (11.5%), and it was significantly related to the gender (Table I). Several studies reported the prevalence of smoking in Saudi Arabia ranging from 2.4% to 52.3% with a median of 17.5% [18]. This may be due to differences in study designs and populations. Tobacco is an important risk factor in ischaemic heart diseases and more atherogenic lipid profile [19]. Some studies showed raised levels of total cholesterol, triglycerides, LDL-C, and VLDL-C as well as low levels of HDL-cholesterol in smokers [20, 21].

Exercise practicing was reported by 60.1% of the participants; with 35.9% of them practicing sometimes and 14.4% of them exercising three times or more per week. However, 40% of the participants did not practice exercise at all. Exercise practicing was more common among males, and it was significantly related to gender (Table I). This reflects that most of the participants did not practice the regular advisable exercise, a finding that is approximately consistent with other studies [22, 23]; they reported, respectively, that 58.5% and 60% of the Saudi adult population is physically inactive. Regular exercise plays an essential role in improving many body systems and biomarkers, including lipid profile, as well as reduction of the risk of non-communicable diseases [24]. Kannan *et al.* reported that LDL and diastolic blood pressure were significantly reduced with high intensity exercise [25].

Regarding history of chronic diseases, 78.5% of the participants had no chronic disease. However, 21.5% of the respondents reported a chronic disease: 9.4% had obesity, 1.6% had diabetes mellitus, 1.2% had hypertension, and 1.8% of them had more than one disease. History of chronic diseases was significantly related to the gender and age (Tables I and III). These findings are not consistent with other studies regarding the prevalence of these chronic diseases. It has been reported that the prevalence of these non-communicable chronic diseases among Saudi adult population was 28.7% for obesity [26], 24% for diabetes mellitus [27], and 15.2% for hypertension [28].

Majority of the respondents (65.4%) did not screen for their lipid profiles; this reflects poor

Table III. Relationship between questionnaire variables and age

Variable	Answer	Age [years], *N* (%)				*P*-value
		From 20 to 35	Older than 35	Other	Total	
Educational level	Intermediate sch. or lower	4 (0.3)	6 (0.4)	6 (0.4)	16 (1.2)	< 0.001*
	High school or equivalent	159 (11.5)	30 (2.2)	121 (8.7)	310 (22.4)	
	Bachelor's degree	790 (57.1)	123 (8.9)	48 (3.5)	961 (69.5)	
	Higher	74 (5.4)	17 (1.2)	5 (0.4)	96 (6.9)	
	Total	1027 (74.3)	176 (12.7)	180 (13.0)	1383 (100)	
Smoking	Yes	114 (8.2)	43 (3.1)	13 (0.9)	170 (12.3)	< 0.001*
	No	869 (62.8)	120 (8.7)	158 (11.4)	1147 (82.9)	
	I was but then I quit	44 (3.2)	13 (0.9)	9 (0.7)	66 (4.8)	
	Total	1027 (74.3)	176 (12.7)	180 (13.0)	1383 (100)	
Exercise	No	410 (29.6)	73 (5.3)	70 (5.1)	553 (40.0)	0.847
	Sometimes	368 (26.6)	60 (4.3)	68 (4.9)	496 (35.9)	
	Once per week	49 (3.5)	9 (0.7)	13 (0.9)	71 (5.1)	
	Twice per week	47 (3.4)	10 (0.7)	8 (0.6)	65 (4.7)	
	Three times per week	45 (3.3)	9 (0.7)	9 (0.7)	63 (4.6)	
	More than three times per week	108 (7.8)	15 (1.1)	12 (0.9)	135 (9.8)	
	Total	1027 (74.3)	176 (12.7)	180 (13.0)	1383 (100)	
Intensity	With sweating and heavy breathing	70 (9.1)	54 (7.0)	402 (52.0)	526 (68.0)	0.138
	Without sweating and heavy breathing	35 (4.5)	37 (4.8)	175 (22.6)	247 (32.0)	
	Total	105 (13.6)	91 (11.8)	577 (74.6)	773 (100)	
Disease	Nothing	837 (60.5)	115 (8.3)	134 (9.7)	1086 (78.5)	< 0.001*
	Diabetes	13 (0.9)	5 (0.4)	4 (0.3)	22 (1.6)	
	Hypertension	8 (0.6)	7 (0.5)	2 (0.1)	17 (1.2)	
	Heart problem	0 (0.0)	2 (0.1)	3 (0.2)	5 (0.4)	
	Obesity	98 (7.1)	11 (0.8)	21 (1.5)	130 (9.4)	
	Other disease	65 (4.7)	22 (1.6)	11 (0.8)	98 (7.1)	
	More than one disease	6 (0.4)	14 (1.0)	5 (0.4)	25 (1.8)	
	Total	1027 (74.3)	176 (12.7)	180 (13.0)	1383 (100)	
Screening	Yes	353 (25.5)	83 (6.0)	42 (3.0)	478 (34.6)	< 0.001*
	No	674 (48.7)	93 (6.7)	138 (10.0)	905 (65.4)	
	Total	1027 (74.3)	176 (12.7)	180 (13.0)	1383 (100)	
Reason for screening	Visit to PHC or hospital	129 (9.3)	53 (3.8)	13 (0.9)	195 (14.1)	< 0.001*
	Instructed by doctor	39 (2.8)	19 (1.4)	6 (0.4)	64 (4.6)	
	Other cause	145 (10.5)	7 (0.5)	18 (1.3)	170 (12.3)	
	Unmentioned cause	40 (2.9)	4 (0.3)	5 (0.4)	49 (3.5)	
	Did not perform	674 (48.7)	93 (6.7)	138 (10.0)	905 (65.4)	
	Total	1027 (74.3)	176 (12.7)	180 (13.0)	1383 (100)	
Opinion	Strongly agree	377 (27.3)	64 (4.6)	57 (4.1)	498 (36.0)	0.569
	Agree	432 (31.2)	82 (5.9)	81 (5.9)	595 (43.0)	
	Neutral	189 (13.7)	23 (1.7)	38 (2.7)	250 (18.1)	
	Disagree	25 (1.8)	6 (0.4)	3 (0.2)	34 (2.5)	
	Strongly disagree	4 (0.3)	1 (0.1)	1 (0.1)	6 (0.4)	
	Total	1027 (74.3)	176 (12.7)	180 (13.0)	1383 (100)	

**P-value determined by χ^2-test means there is a statistically significant relationship at the level of significance (0.05 or less).*

awareness among the population regarding the importance of regular screening of lipid profiles. This finding is consistent with one study [29] but higher than that reported by another [16]. Hypercholesterolaemia and hypertension are prevalent medical problems affecting nearly half of the adult Saudi population [8].

A visit to a primary health care (PHC) facility or hospital was the reason for screening of lipid profile in 14.1% of the participants; whereas 4.6% of them were instructed by doctors, and 12.3% of them mentioned other causes. Screening of lipid profiles was predominant among males, and it was significantly related to the gender, age, and educational level (Tables I–III). This shows the strong need in the community for health education about the importance of screening lipid profiles at different levels of health care delivery, especially at PHCs. Several studies have reported the effectiveness of health counselling during PHC visits [24, 30].

The majority of the respondents (79%) agreed with regular lipid profile screening tests, but 2.9% of them disagreed, and 18.1% of them expressed a neutral opinion. This shows that the majority of the community are ready to change to a better healthy lifestyle and practices according to the efforts of health care providers.

In conclusion, more educated participants were found to be more aware of the importance of screening lipid profile. Most participants who did not screen for lipid profiles were among the jobless group. The majority of the participants did not practice regular advisable exercise. Furthermore, 65.4% of the respondents did not screen for their lipid profiles; this reflects poor awareness among the population regarding the importance of regular screening of lipid profiles. A visit to a primary health care facility or hospital was the most frequent reason for screening of lipid profile. Screening of lipid profiles was predominant among males, and it was significantly related to gender, age, and educational level. This shows the strong need in the community for health education about the importance of screening for lipid profiles at different levels of health care delivery.

Recommendations: More studies about lipid profiles should be conducted, including different community groups. Implementation of fundamental policies including periodical screening of lipid profile at PHCs for all individuals ≥ 40 years old or with a risk factor. Health promotion campaigns about lipid profile screening to improve health education in the general population.

Conflict of interest

The authors declare no conflict of interest.

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