Lipid Profile Analysis of Patients in a Saudi University Clinic

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Abstract: Dyslipidemia is a risk factor for the development of cardiovascular disease, the leading cause of mortality in Saudi Arabia. Abnormal lipid levels are asymptomatic but detected by fasting lipid profile analysis. This study sought to determine the patterns of lipid levels of King Faisal University (KFU) clinic patients and to identify any gender, nationality and age group differences in the mean levels of total cholesterol (TC), triglyceride (TG), high-density lipoprotein cholesterol (HDL-C) and low-density lipoprotein cholesterol (LDL-C). The results of lipid profile examination of 1,541 KFU clinic patients were compiled and subjected to descriptive and analytical statistics using SPSS version 20. The National Institutes of Health Adult Treatment Panel III (ATP III) was used for classifying the lipid profiles. Majority of the patients had desirable and borderline high levels of TC and TG as well as optimal and near optimal LDL-C. Most of the patients had borderline and low HDL-C. Hypercholesterolemia and hypertriglyceridemia were more common among men than in women. Men also tend to have low HDL-C and high LDL-C. Hypercholesterolemia, low HDL-C, high and very high LDL-C were more common among Saudis while hypertriglyceridemia was more common among non-Saudi patients. Hypercholesterolemia was more common in the 50 – 59 age group. High TG, high LDL-C, and low HDL-C were more common among 40 – 49 year old patients. The mean values of TC, TG, and HDL-C differed significantly across gender and nationality groups. The mean values of all four components of the lipid profile differed significantly across age groups. Lipid profile varies across gender, nationality and age. The risk for CVD related to lipid abnormalities is greater for Saudi men who are 40 – 59 years old. The university should develop age and gender-specific strategies for primary and secondary prevention of CVD such as therapeutic lifestyle change and lipid screening guidelines.

Keywords: Cardiovascular Disease Risk Reduction, Hyperlipidemia, Dyslipidemia, Hypercholesterolemia, Hypertriglyceridemia, Lipid Profile

1. Introduction

King Faisal University is a government educational institution located in Hofuf, Al-Ahsa, Saudi Arabia. The university has a total student population of 41,757 students (37,658 bachelor program; 2,623 graduate program; 1,476 diploma course), 2,019 faculty members and 1,615 administrative staff.

The university clinic provides emergency and outpatient services to university students as well as faculty and administrative staff and their dependents. Its services range from medical specialties such as obstetrics and gynecology, internal medicine, pediatrics and surgery to dental as well as diagnostic laboratory and physical therapy.

Cardiovascular disease (CVD) is the leading cause of morbidity and mortality around the world and is recognized as a global health problem [1]. The World Health Organization as cited by [2], reports that 30% of deaths around the world is due to CVD. An estimated 20 million people have died of CVD in 2015.

The most common CVD are coronary artery disease and stroke. Coronary artery disease (CAD) is a persistent public health problem worldwide [3, 4]. CAD is a major public health problem in both developing and developed countries

and is the leading cause of death in the USA [5]. Stroke is another leading cause of death. It is the most common neurological disorder worldwide [6].

CVD incidence has been increasing over the past 10 years in Saudi Arabia [7]. The prevalence of CVD in KSA is 5.5% [7, 8]. Several factors believed to contribute to the increase in CVD are related to lifestyle changes such as a shift to westernized diet. Smoking, obesity, hypertension and DM are recognized contributory factors.

Hypercholesterolemia (hyperlipidemia), along with diabetes mellitus, cigarette smoking, obesity and sedentary lifestyle, is a major factor in the occurrence of CVD [2, 4]. Elevated cholesterol is a major risk factor for the development of CVD [1]. Elevated LDL cholesterol and low HDL are related to the progression of atherosclerosis [9].

Hyperlipidemia is a risk factor for atherosclerotic disease [8]. Lipid metabolism errors include elevated TG, or elevated LDL-C [10].

The usual lipid profile consists of total cholesterol, HDL-C (good cholesterol), LDL-C (bad cholesterol), and TG [1]. It is used for screening for risk for CVD. The National Institutes of Health recommends that all adults aged 20 years or older should have fasting lipid profile every 5 years [11].

Hypercholesterolemia confers risk for cardiovascular disease. However, abnormal lipid levels are usually asymptomatic and the KFU Polyclinic does not conduct routine screening for this condition. Evidence from this study may be used to develop strategies for primary and secondary prevention of CVD through lipid screening and promotion of therapeutic lifestyle change.

This study sought to determine the patterns of lipid levels among students, faculty and administrative staff of King Faisal University and to identify gender, nationality and age group differences in the mean levels of TC, TG, HDL-C and LDL-C levels of KFU clinic patients. The ultimate goal was to collect information required to formulate health promotion strategies against hypercholesterolemia and subsequently decrease the risk for cardiovascular disease.

2. Materials and Methods

This study utilized a descriptive non-experimental design. The data on lipid profile of patients of the KFU clinic covering the period April 1, 2014 to March 7, 2016 was retrieved from the clinic records. Data was considered valid when all components of the lipid profile namely, TC, TG, HDL - C and LDL - C were present. Cases with incomplete information were not included in the final analysis. From an initial 2,732 cases, only 1,541 cases were used in the final analysis.

Cases were grouped according to gender, age group, and nationality. The lipid values were classified according to the *Detection, Evaluation, and Treatment of High Blood*

Cholesterol in Adults (Adult Treatment Panel III) guidelines of the National Institutes for Health. TC samples were classified into three categories: desirable (< 200 mg/dl), borderline High (200-239 mg/dl), and high (≥ 240 mg/dl). TG samples were classified into four categories: desirable (<150 mg/dl), borderline (150-199mg/dl), high (200– 499 mg/dl), and very high (≥ 500 mg/dl). HDL-C samples were classified into three categories: high (≥ 60 mg/dl), borderline low (40-59 mg/dl), and low (< 40 mg/dl). Finally, LDL-C samples were classified as optimal (< 100 mg/dl), near optimal (100 – 129 mg/dl), borderline high (130-159 mg/dl), high (160 – 189 mg/dl), and very high (≥ 190 mg/dl).

Independent t-test was used to compare the means of TC, TG, LDL-C, and HDL-C across gender and nationality groups while analysis of variance (ANOVA) was used to determine differences in the means of the four lipid profile components across age groups. Descriptive and analytical statistics were done using SPSS Version 20.

3. Results

3.1. Profile of KFU Patients

Of the 1541 cases analyzed, 864 (56.07%) are males and 677 (43.93%) are females. The patients consisted of 947 (61.45%) Saudis and 594 (38.55%) non-Saudis. The latter group consisted of various nationalities namely, Egyptian, Sudanese. Jordanian, Indian, Tunisian, Pakistani, Filipino, Syrian, Algerian, British, American, Canadian, German, Bangladeshi, Australian, Nigerian, Moroccan, Azerbaijani, Bahraini, French and Lebanese.

The frequency and percentage for age groups are as follow: less than 20 (59, 3.8%), 20-29 (120, 7.8%), 30-39 (219, 14.2%), 40-49 (468, 30.4%), 50-59 (414, 26.9%), 60-69 (211, 13.7%), 70-79 (39, 2.5%), and 80 and above (11, 0.7%).

3.2. Lipid Profile Distribution across Demographic Variables

3.2.1. Total Cholesterol and Triglyceride

Analysis of the TC levels of the 1541 samples showed that 787 (51%) were within desirable TC levels, 541 (35%) were within the borderline high range while the remaining 213 (14%) fall in the high TC category.

As seen in Table 1, the highest proportion of TC are of desirable level for male and female patients are 54.5% and 46.7%, respectively. Among the males, over half (54.5%) had desirable TC levels. The other male patients had either borderline high (32.9%) or high (12.6%) TC levels. The same pattern is observed among females. Those with desirable constitute 46.7% of cases, followed by those categorized as borderline high and high levels at 38.0%, and 15.4%, respectively.

Table 1. *Total Cholesterol and Triglyceride Distribution.*

Profile Variable	Total Cholesterol						Triglyceride						Total
	Desirable	%	Borderline High	%	High	%	Desirable	%	Borderline High	%	High	%	
Gender													
Male	471	54.5	284	32.9	109	12.6	599	69.3	91	10.5	174	20.1	864
Female	316	46.7	257	38.0	104	15.4	527	77.8	62	9.2	88	13.0	677
Nationality													
Saudi	503	53.1	328	34.6	116	12.2	749	79.1	75	7.9	123	13.0	947
Non-Saudi	284	47.8	213	35.9	97	16.3	377	63.5	78	13.1	139	23.4	594
Age group													
<20	46	78.0	8	13.6	5	8.5	53	89.8	2	3.4	4	6.8	59
20-29	80	66.7	24	20.0	16	13.3	104	86.7	5	4.2	11	9.2	120
30-39	112	51.1	77	35.2	30	13.7	135	61.6	28	12.8	56	25.6	219
40-49	209	44.7	202	43.2	57	12.2	325	69.4	43	9.2	100	21.4	468
50-59	195	47.1	148	35.7	71	17.1	310	74.9	45	10.9	59	14.3	414
60-69	116	55.0	68	32.2	27	12.8	160	75.8	27	12.8	24	11.4	211
70-79	22	56.4	12	30.8	5	12.8	32	82.1	1	2.6	6	15.4	39
≥80	7	63.6	2	18.2	2	18.2	7	63.6	2	18.2	2	18.2	11
Total	787	51.1	541	35.1	213	13.8	1126	73.1	153	9.9	262	17.0	1541

Total Cholesterol: Desirable <200 mg/dl; Borderline High = 200-239 mg/dl; High ≥ 240 mg/dl
Triglyceride: Desirable <150 mg/dl; Borderline = 150-199mg/dl; High = 200mg/dl – 499; Very High ≥ 500 mg/dl

Over half (53.1%) of Saudis had desirable TC while 12.2% had high TC. A considerable proportion (34.6%) of Saudis had borderline high TC values. In the case of non-Saudis, only 47.8% had desirable TC and the remainder had either borderline high (35.9%) or high (16.3%) TC.

When the age groups are considered, patients who are younger than 20 years old had the highest proportion (78.0%) of cases with desirable TC levels. On the other hand, those who are 40 - 49 had the lowest proportion (44.7%) of cases with desirable TC levels. The youngest age group also had the lowest proportion (8.5%) of cases falling in the high TC category. Patients who are 80 years old or older had the highest proportion (18.2%) of cases of high total cholesterol. The 40 – 49 age group also had the highest proportion of borderline TC (43.2%). Three other age groups had high proportions of borderline high TC, namely, 50 – 59 (35.7%), 30 – 39 (35.2%), and 60 – 69 (32.2%).

Analysis of the TG levels showed that 1126 (73.1%) were within desirable TG levels, 153 (9.9%) were within the borderline high range while only 262 (17.0%) fall in the high TG category.

This TG category pattern is apparent in the gender and nationality groups. Twenty percent of the male patients had TG levels in the high category while the highest proportion (69.3%) were in the desirable TG category. Similarly, for females, the highest proportion (77.8%) of cases were in the desirable TG category while only 13.0% were in the high TG category. Both gender groups had low proportion of cases that fell in the borderline high category.

Examination of the nationality groups showed that 79.1% of Saudis had desirable TG and only 13.0% had TG in the high category. For non-Saudis, 63.5% had desirable TG levels while 23.4% had high TG levels.

The patients who are less than 20 years old had the highest proportion of TG at desirable levels and the lowest (6.8%) proportion of cases of high TG. The age group with the highest proportion of high TG was the 30 – 39 group. The same age group had the lowest proportion (61.6%) of desirable TG. The TG pattern observed in gender and nationality groups apply to the age groups with the exception of the 60 – 69 and the 80 and above groups. For the former, the proportion of cases falling in the borderline category exceeded those in the high category. For the 80 and above group, an equal proportion (18.2%) of cases fell in the borderline high and high TG categories.

3.2.2. HDL – Cholesterol

Less than 10% of the 1541 cases included in this study had HDL-C that fell in the desirable levels. Half of the cases were within the borderline levels while the remaining 40% were in the low HDL-C category. The distribution of HDL-C according to the profile variables is seen in Table 2.

A higher proportion (52.3%) of males had HDL-C that fell in the low HDL-C category than the borderline category (44.8%). A very low proportion (2.9 %) of males had desirable HDL-C levels. In the case of females, however, the pattern followed the general distribution of this lipoprotein for the 1541 cases in this study. Less than 20% of females had HDL-C in the high category while 24.4% had low levels of HDL-C. Alarmingly, 57.8% of females had HDL-C at borderline levels.

Table 2. *HDL - Cholesterol Distribution.*

Profile Variable	HDL - Cholesterol						Total
	Desirable	%	Borderline	%	Low	%	
Gender							
Male	25	*2.9*	387	*44.8*	452	*52.3*	864
Female	121	*17.9*	391	*57.8*	165	*24.4*	677
Nationality							
Saudi	99	*10.5*	488	*51.5*	360	*38.0*	947
Non-Saudi	47	*7.9*	290	*48.8*	257	*43.3*	594
Age Group							
<20	9	*15.3*	31	*52.5*	19	*32.2*	59
20-29	17	*14.2*	64	*53.3*	39	*32.5*	120
30-39	18	*8.2*	111	*50.7*	90	*41.1*	219
40-49	42	*9.0*	214	*45.7*	212	*45.3*	468
50-59	37	*8.9*	224	*54.1*	153	*37.0*	414
60-69	18	*8.5*	109	*51.7*	84	*39.8*	211
70-79	4	*10.3*	19	*48.7*	16	*41.0*	39
≥80	1	*9.1*	6	*54.5*	4	*36.4*	11
Total	146	*9.5*	778	*50.5*	617	*40.0*	1541

HDL-C: High ≥ 60 mg/dl; Borderline = 40-59 mg/dl; Low < 40 mg/dl

The distribution of HDL-C is similar for Saudis and non-Saudis where the highest proportion of cases fell in the borderline category and the lowest fell in the desirable category. In the case of Saudis, only 10.5% had desirable HDL-C while only 7.9% of non-Saudis fell in this category. Although there is generally a higher proportion of patients who had low HDL–C than those with high HDL-C, the condition was more prevalent among non-Saudis (43.3%) than among Saudis (38.0%). However, it must be noted that the majority of Saudi patients had HDL-C at borderline levels.

With regards to age groups, most of patients had HDL-C that fell in the borderline category. With the exception of the 70 – 79 age group, the proportion of HDL-C for all other groups for borderline category exceeded 50%. The 80 and above and the 50 – 59 groups had the highest proportion of cases that fell in the borderline category, at 54.5% and 54.1%, respectively. The 40 – 49 group had the highest proportion of cases in the low HDL-C category. In contrast, the less than 20 group had the lowest proportion of cases that fell in the low HDL-C category.

3.2.3. LDL-Cholesterol

Table 3 shows that most of the KFU patients had either optimal (29.2%) or near optimal (32.7%) LDL-C levels. Patients with high or very high LDL-C comprised 9.3% and 3.5% of the cases only. This distribution was apparent when gender groups were considered together and when male and female groups were considered separately. Only 9.6% and 2.9% of males had LDL-C in the high or very high LDL- C categories, respectively. In the case of females, 9.0% and 4.3% fell in the high and very high LDL-C categories, respectively.

Table 3. *LDL - C Distribution.*

Profile Variables	LDL- Cholesterol										Total
	Optimal	%	Near Optimal	%	Borderline High	%	High	%	Very High	%	
Gender											
Male	247	*28.6*	268	*31.0*	241	*27.9*	83	*9.6*	25	*2.9*	864
Female	203	*30.0*	236	*34.9*	148	*21.9*	61	*9.0*	29	*4.3*	677
Nationality											
Saudi	288	*30.4*	315	*33.3*	225	*23.8*	86	*9.1*	33	*3.5*	947
Non-Saudi	162	*27.3*	189	*31.8*	164	*27.6*	58	*9.8*	21	*3.5*	594
Age Group											
<20	28	*47.5*	21	*35.6*	7	*11.9*	3	*5.1*	0	*0.0*	59
20-29	39	*32.5*	43	*35.8*	22	*18.3*	9	*7.5*	7	*5.8*	120
30-39	60	*27.4*	74	*33.8*	49	*22.4*	25	*11.4*	11	*5.0*	219
40-49	121	*25.9*	145	*31.0*	141	*30.1*	50	*10.7*	11	*2.4*	468
50-59	102	*24.6*	143	*34.5*	114	*27.5*	37	*8.9*	18	*4.3*	414
60-69	81	*38.4*	64	*30.3*	45	*21.3*	16	*7.6*	5	*2.4*	211
70-79	15	*38.5*	12	*30.8*	8	*20.5*	3	*7.7*	1	*2.6*	39
≥80	4	*36.4*	2	*18.2*	3	*27.3*	1	*9.1*	1	*9.1*	11
Total	450	*29.2*	504	*32.7*	389	*25.2*	144	*9.3*	54	*3.5*	1541

LDL-C: Optimal < 100 mg/dl; Near Optimal = 100 – 129 mg/dl; Borderline High = 130-159 mg/dl; High = 160 – 189 mg/dl; Very High ≥ 190 mg/dl

The distribution of LDL-C across the ATP III classification follows the same pattern for nationality groups. Saudis and non-Saudis had the highest proportion of patients having near optimal LDL and the least with very high LDL category. There were 30.4% Saudis with optimal LDL-C and 33.3% with near optimal LDL levels. Among the non-Saudis, 27.3% had optimal and 31.8% had near optimal LDL-C levels. Non-Saudi had a higher proportion of cases that fell in the borderline high LDL-C category compared to Saudis. Non-Saudis also had a slightly higher proportion of cases that fell in the high LDL-C category compared to Saudis. However, both groups had an equal proportion of cases that fell in the very high LDL-C category.

Patients who are below 20 years old had the highest proportion (47.5%) of cases with optimal LDL-C. In contrast, those in the 50 – 59 group had the lowest proportion (24.6%) of LDL-C that fell in this category. The 40-49 age group had the highest proportion of cases with borderline high LDL-C at 30.1% followed by the 50 - 59 and ≥80 age groups at 27.5% and 27.3%, respectively. However, the 30 - 39 age group had the highest proportion of cases with high LDL-C at 11.4% closely followed by the 40 - 49 age group at 10.7%.

3.3. Comparison of Mean Lipid Levels

3.3.1. Gender

Table 4 shows that the means of the lipids of male and female patients differed significantly for three of the lipid variables considered in this study, namely, TC ($t= -3.184, p = 0.001$), TG ($t = 5.107, p = 0.000$), and HDL-C ($t= -15.382, p = 0.000$). However, there was no significant gender difference in terms of HDL-C ($t = 0.44, p= 0.660$).

Table 4. *Differences of the Means of Lipids by Gender.*

Lipid Profile	Gender	Mean	SD	t statistic	p value
TC	Male	195.92	39.757	-3.184	0.001
	Female	202.52	41.215		
TG	Male	177.71	90.296	5.107	0.000
	Female	155.46	77.466		
HDL – C	Male	40.03	9.105	-15.382	0.000
	Female	49.17	14.112		
LDL - C	Male	120.55	35.041	0.44	0.660
	Female	119.74	36.655		

3.3.2. Nationality

Differences in the means of three of the lipid variables (TC, TG, and HDL-C) were significantly different for Saudi and non-Saudi patients with t and p values of -2.992, 0.003 (TC), -6.758, 0.00 (TG), and 2.666, 0.008 (HDL-C). However, the means of LDL-C of Saudi and non-Saudi patients did not significantly differ (t= -1.068, p = 0.286).

Table 5. *Differences of the Means of Lipids by Nationality.*

Lipid Profile	Nationality	Mean	SD	t statistic	p value
TC	Saudi	196.38	41.224	-2.992	0.003
	Non-Saudi	202.71	39.103		
TG	Saudi	156.43	81.236	-6.758	0.000
	Non-Saudi	186.27	89.150		
HDL - C	Saudi	44.71	12.146	2.666	0.008
	Non-Saudi	42.98	12.804		
LDL - C	Saudi	119.42	35.924	-1.068	0.286
	Non-Saudi	121.42	35.467		

3.3.3. Age Group

The means of the lipid values of the different age groups differed significantly for TC ($F = 6.419, p = 0.000$), TG ($F = 10.227, p = 0.000$), HDL-C ($F = 2.403, p = 0.019$), and LDL-C ($F = 4.276, p = 0.000$).

Table 6. *Differences of the Means of Lipids by Age Group.*

Lipid Profile	Age Group	Mean	SD	F statistic	p value
TC	<20	171.34	44.009	6.419	0.000
	20-29	190.84	39.277		
	30-39	202.44	40.409		
	40-49	201.61	36.720		
	50-59	202.9	41.066		
	60-69	193.63	40.266		
	70-79	194.87	45.366		
	>80	202.36	77.566		
TG	<20	118.56	86.543	10.227	0.0000
	20-29	126.24	77.108		
	30-39	185.67	96.487		
	40-49	180.35	90.532		
	50-59	167.03	76.377		
	60-69	162.64	68.269		
	70-79	165.38	89.791		
	>80	150.73	91.855		
HDL - C	<20	47.73	15.162	2.403	0.019
	20-29	46.05	11.397		
	30-39	43.25	11.859		
	40-49	42.69	11.626		
	50-59	44.76	11.880		
	60-69	44.01	14.842		
	70-79	45.59	13.558		
	>80	43.64	10.865		
LDL - C	<20	103.00	29.04	4.276	0.000
	20-29	118.18	35.327		
	30-39	122.42	38.461		
	40-49	122.56	33.253		
	50-59	123.19	35.945		
	60-69	113.12	35.388		
	70-79	115.41	34.998		
	>80	129.18	71.467		

4. Discussion

Majority of the patients had TC within desirable levels. Among those within the high TC group, hypercholesterolemia was more common among males (51.2%) than among females (48.8%). Similarly, although most of the patients had TG within desirable levels, hypertriglyceridemia was also more commonly seen among men (66.4%) than women (33.6%) within the high TG group.

Majority of patients had either borderline or low HDL-C. However, risky levels of HDL-C is more common among males (73.3%) than among females (26.7%) within patient

groups categorized as having low HDL-C levels.

Most of patients examined had either optimal or near optimal LDL-C values. However, 25.2% of patients had borderline high LDL-C values. There are more males (62.0%) than females (38.0%) whose LDL-C falls in the borderline high category. Although only 9.3% of patients had high LDL-C, it was more common among males (57.6%) than among females (42.4%). The presence of elevated LDL-cholesterol in this study is relevant. Elevated LDL in itself increases the risk for developing coronary artery disease [12].

The relationship between atherosclerotic CVD and CAD varies in different populations [4]. The population in this study is heterogeneous. Due to large discrepancy in relative sizes, the other nationalities have been grouped as non-Saudis. Out of the 213 patients who had hypercholesterolemia, 54.5% are Saudis while the remaining 45.5% are non-Saudis. On the other hand, 53.1% of hypertriglyceridemia cases were non-Saudis while the remaining 46.9% are Saudis. More Saudis (58.3%) had low HDL-C than non-Saudis (41.7%). Among patients with high LDL-C, 59.7% are Saudis while only 40.3% are non-Saudis. On the other hand, among the 54 cases with very high LDL-C, 61.1% are Saudis while only 38.9% are non-Saudi.

Examination of the different components of the lipid profile is important. For instance, it has been reported that measurement of non-HDL cholesterol predicts the risk for CVD better than LDL [13].

Patients who are in the 50 – 59 age group represent 33.3% of hypercholesterolemia cases among KFU patients. Moreover, the cumulative prevalence of patients who are 40 - 49 and 50 – 59 age groups comprise 60.1% of hypercholesterolemia cases. Hypertriglyceridemia was most prevalent in the 40 – 49 year old age group constituting 38.2% of cases. The cumulative prevalence of hypertriglyceridemia among the 30 – 39, 40 – 49, and 50 – 59 age groups represent 82.1% of cases. It must be noted that hypertriglyceridemia is independently identified as a risk factor for heart diseases [11].

Among patients with low HDL-C levels, 34.4% are in the age group 40 – 49. The combined 30 – 39, 40 -49 and 50 – 59 year old groups represent 73.8% of all cases of low HDL-C. Of the 144 cases with high LDL-C, majority (34.7%) are from the 40 – 49 age group. The 50 – 59 group had the highest proportion of cases with very high LDL-C. The cumulative percentage for 30 – 39, 40 – 49, and 50 – 59 groups is 77.8% and 74.1% for high and very high LDL - cholesterol, respectively.

Significant differences in the mean values of TC, TG and HDL-C among gender and nationality groups were observed. However, mean difference in LDL-C was only significantly different within age groups.

5. Conclusion

There are gender, nationality and age - group variabilities in the lipid profile of KFU Polyclinic patients. Hypercholesterolemia and hypertriglyceridemia are both prevalent among KFU patients. Hypercholesterolemia and hypertriglyceridemia was more common among men. Men also had lower HDL-C levels and higher LDL-C. Saudis had higher cases of hypercholesterolemia lower HDL-C levels and higher LDL-C. Hypertriglyceridemia is more common among non-Saudis. Hypercholesterolemia is more common in the 50 – 59 age group. Hypertriglyceridemia, high LDL-C and low HDL-C are more common in the 40 – 49 age group. The mean values for total cholesterol, triglyceride, and HDL-C significantly differed across gender and nationality. Finally, the mean values for total cholesterol, TG, and HDL-C significantly differed and age group.

It is necessary to develop gender-specific strategies to reduce the risk related to abnormal lipid levels, especially targeting male KFU Polyclinic clients. The KFU Polyclinic must promote routine lipid screening for all adult KFU patients who are 30 years old and older. Those with borderline high levels of TC, TG and LDL-C as well as those with borderline HDL-C should be closely followed-up.

The university should enhance health promotion activities by creating an environment conducive to therapeutic lifestyle change (TLC) regarding diet, weight management, increasing physical activity and smoking cessation. Diet advice for clinic patients should emphasize on decreasing intake of food with high saturated fat and cholesterol. Trans-fats should be avoided as this increases TC [14]. Diet should also include soluble fiber and plant sterols. Weight management and increasing physical activity should be promoted following BMI targets and WHO recommendations for physical activity.

Acknowledgement

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