Prevalence of Dyslipidaemia among Healthy University Students: Fayoum Governorate, Egypt

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ABSTRACT

Objectives: To estimate the prevalence and patterns of serum lipid profiles and associated factors among university students.
Study Design: A descriptive cross-sectional study was conducted on a group of 384 students.
Methods: An interview-based questionnaire was used to gather information about demographic and lifestyle data. Weight, height, waist circumference and blood pressure measurements were taken for each student. Fasting blood samples were collected from all participants and assayed for fasting total cholesterol (TC), triglyceride (TG), high-density lipoprotein (HDL) and low-density lipoprotein (LDL).
Results: According to the National Cholesterol Education Program-Adult Treatment Panel III criteria, the overall prevalence of dyslipidaemia was 63.8%, hypercholesterolemia prevalence was 38.8%, hypertriglyceridemia 29.7%, low HDL-C 27.1% and high LDL-C 33.1%. Significant associated factors of dyslipidaemia among study participants were urban residence, increasing age, physical inactivity, overweight and obesity, abdominal obesity, frequent fast food consumption and low fruit and vegetables consumption.
Conclusion: The prevalence of dyslipidaemia is high among Fayoum university students. Important associated factors are obesity and overweight, physical inactivity, unhealthy dietary habits that need to be tackled through intervention programmes.

Key words: Dyslipidaemia, prevalence, hypercholesterolemia, hypertriglyceridemia CHD.

INTRODUCTION

Dyslipidaemia is a state that occurs as a result of abnormalities in the plasma lipids. These abnormalities could be due to elevated plasma total cholesterol (TC), elevated low-density lipoprotein cholesterol (LDL-C), elevated triglycerides (TG) and reduced high-density lipoprotein cholesterol (HDL-C) levels, occurring either singly or in combinations [1].

The burden of dyslipidaemia is enormous in terms of morbidity, mortality and medical costs [2]. According to what WHO estimates in 2002, globally dyslipidaemia accounted for 18% and 56% of ischemic heart disease (IHD) and stroke, and more than four million deaths per year [3].

Dyslipidaemia is a well-known major modifiable risk factor for IHD, as elevated levels of TG, TC, LDL-C and low levels of HDL-C are documented risk factors for

atherogenesis [4, 5]. It has also been reported that serum TC levels are continuously correlated with CHD risk over a wide range of cholesterol values in various populations throughout the world [6].

Assessing the prevalence and risk factors of this condition is important for preventing and controlling cardiovascular disease (CVD) and its sequelae. Most (80%) lipid disorders are related to diet and lifestyle, although familial disorders (20%) are important as well [7]. The prevalence of dyslipidaemia is increasing worldwide [8, 9, 10]. Many studies in Arab countries have been conducted: they concluded increased dyslipidaemia prevalence and owed this to increased prevalence of both obesity and type 2 diabetes mellitus, which are linked to changes in lifestyle associated with modernisation and socioeconomic development [11, 12, 13].

Increased prevalence of dyslipidaemia was detected also among adolescents and young adults. This was a distressing finding, as increased prevalence of this condition in adulthood, and increases the prevalence of CHD later on life [10]. It is reported that a cholesterol level determined at age 22 predicts the rate of CHD development over the ensuing 30 to 40 years. Moreover, nearly half of young adults with high TC have five times the risk of CHD and nine times the risk of myocardial infarction in comparison with those having low TC levels over the following 30 to 40 years [14, 15].

In Egypt, CVD mortality accounts for 46% of total deaths, all ages and both sexes. According to WHO (2014), the probability of premature death (age 30- 70 years) due to common non-communicable diseases including (CVD) is still 25% [16]. This is owed to change country profile and increased prevalence of risk factors that are related to unhealthy lifestyle as physical inactivity, smoking, obesity [17, 18]. According to the most recent study for CV disease risk factors conducted by the Ministry of Health and Population in collaboration with the WHO office in Egypt in the years 2011-12, on people aged 15-65 years, the prevalence of high cholesterol and fasting triglycerides levels were 36.7% and 10.2% respectively [19].

Studies in Egypt to measure prevalence of dyslipidaemia among university students are lacking. This study attempts to estimate the prevalence and patterns of serum lipid profiles and associated factors among university students in Fayoum University.

SUBJECTS & SUBJECTS

Study design and setting

A cross-sectional study was conducted during the period from March to June 2015 in Fayoum University, that is located in Fayoum Governorate, Upper Egypt, Egypt. Fayoum University has in total 25000 students, 60% female and 40% males.

Sampling population

The study included a total of 384 students aged 17-24 years chosen randomly using multistage random sample technique. First, four faculties were chosen from sixteen Fayoum University faculties. From these faculties, stratified random sample technique was used to include students from first to fourth academic years. Inside each faculty in each academic year, students were selected using cluster technique. Students in these faculties are divided into small groups for practical and tutorial lessons, the number of students per group ranged from 20 to 50 students. One or two cluster was randomly selected in each academic year. Overall, a total of 400 students were sampled and requested to participate in the field survey, 384 of these students completed the survey and were included in the final analysis. Diabetic or hypertensive, pregnant or people receiving medication that may affect blood lipid are not included. Students were asked to be fasting 8-12 hours before the time of study. The study sample was statistically calculated based on 36% prevalence of hypercholesterolemia in Egypt according to 2011 STEP wise non-communicable disease surveillance, significance level 0.05 and power of study 90%. The estimated sample size was 348.

Ethical consideration

This study was approved by the Medical Research and the Ethical Committee of Faculty of Medicine, Fayoum University. An oral verbal consent was obtained from all students prior to participation. A written approval from the dean of selected faculties was obtained.

Data collection

Researchers visited each selected faculty to determine appropriate days for data collection from target students. An announcement about days, aim and requirement of survey was ensured.

In all study subjects after discussing the purpose and importance of study, an interviewer-administered questionnaire was used to obtain demographic (age, sex, residence) and health related habits and dietary habits (smoking habits, physical exercise, frequency of fast food, fruit and vegetable consumption). Weight, height and waist circumference were measured and body mass index (BMI) was calculated. Blood pressure was recorded using sphygmomanometers as the mean of two readings taken five minutes apart.

Height and weight were measured twice using a height-weight scale that had been calibrated before subjects stood with bare feet and wore light clothing, and then the averages were calculated. Body mass index

(BMI) was calculated as weight (kg) divided by height (m) squared. Waist circumference (WC) was measured twice on standing participants at the midpoint between the lower edge of the costal arch and the upper edge of the iliac crest, and means were calculated.

Blood sample of 5 ml was collected after the participants had abstained from eating at least 8 hours. Samples were examined for total cholesterol, triglycerides, high-density lipoprotein (HDL), low-density lipoprotein (LDL) using the Reflotron_Plus (Roche Diagnostics GmbH, Germany).

Definition of variables

National Cholesterol Education Programme (NCEP III) guidelines [20] were used for definition of dyslipidaemia as follows: hypercholesterolemia – TC ≥ 200 mg/dl; hypertriglyceridemia – TG levels ≥ 150 mg/dl; low HDL cholesterol – HDL cholesterol levels less than 40 mg/dl; high LDL cholesterol – LDL cholesterol levels ≥ 130 mg/dl; isolated hypertriglyceridemia was defined as having serum triglycerides ≥ 150 mg/dl and total cholesterol < 200 mg/dl; isolated hypercholesterolemia was defined as having total cholesterol ≥ 200 mg/dl and triglycerides < 150 mg/dl; mixed hyperlipidaemia was defined as having triglycerides ≥ 150 mg/dl and total cholesterol ≥ 200 mg/dl; isolated low HDL-C was defined as having HDL-C ≤ 40 mg/dl in male and ≤ 50 mg/dl in female without hypercholesterolemia nor hypertriglyceridemia [20].

According to World Health Organisation guidelines overweight was defined as a BMI ≥ 25.0 kg/m2 and < 30.0 kg/m2, and obesity was defined as a BMI ≥ 30 kg/m2 [21]. Central obesity was defined according to WHO expert consultation report as waist circumference ≥ 102 cm in men and ≥ 82 in women [22]. Regular physical activity was defined as participation in moderate or vigorous activity for ≥ 30 minutes/day at least five days per week. Frequent fast consumption is considered with at least three times per week consumption of foods like hamburger, pizza, fried chicken. Hypertension was defined when systolic blood pressure is more than or equal to 140 mmHg and diastolic blood pressure more than or equal to 90 mmHg [23].

Statistical Analysis

Data entry and statistical analysis were done using SPSS 16.0 statistical software package. Results were presented as the frequencies, per cent for qualitative data, mean and standard deviation for quantitative variables. Chi-square test was used to assess association of dyslipidaemia with qualitative variables. A multivariate Logistic regression model was used to predict factors associated with these disorders. Statistical significance was considered at p-value < 0.05.

RESULTS

A total of 384 participants (136 males and 248 females) aged from 17 to 24 years old with mean age 20.36±1.8 were enrolled in the study, 61.2% of participants were rural. The students were selected to be 71, 70, 124 and 119 from faculties of nursing, computer & information, medicine and social science respectively. Overweight and obese students were represented by 13% and 30.2%, abdominal obese students were 19.3% of participants. The per cent of students who practise regular moderate or vigorous exercise were 10% of students. Smoker participants were only 9 students (table 1).

Table 2 showed mean lipid values and other measurements among study participants; male female difference was detected in mean systolic and diastolic blood pressure measurements, with higher values in males than females. No male female difference reported in BMI and lipid values.

Table 3 showed prevalence of dyslipidaemia of 384 participants. The prevalence of hypercholesterolemia, hypertriglyceridemia, high LDL-C and low HDL-C were 38.8%, 29.7%, 33.1% and 27.1% respectively. The prevalence of dyslipidaemia (at least one parameter affected) was 63.8%. Mixed dyslipidaemia with both hypercholesterolemia and hypertriglyceridemia was 24.2%. The prevalence of isolated hypercholesterolemia, isolated hypertriglyceridemia and isolated low HDL-C were 3.1%, 4.67%, and 18.75% respectively (Figure 1).

Regarding factors associated with lipid abnormalities, significant association of low HDL-C with older age (> 20 year) was reported (p = 0.032). Association with urban residence was detected with p values: 0.005, 0.007 and 0.005 for hypercholesterolemia, hypertriglyceridemia and high LDL cholesterol respectively. Significant difference of dyslipidaemia prevalence between faculties was reported with higher per cent of these abnormalities among medicine and computer & science students (table 4).

Significant association of dyslipidaemia with body weight was detected with higher proportion of hypercholesterolemia, hypertriglyceridemia and increased LDL among obese and overweight than among normal weight students with p values 0.001, 0.04 and 0.01 respectively. Significant association between abdominal obesity and all types of dyslipidaemia was also reported. Higher proportion of hypercholesterolemia among participants with systolic and diastolic hypertensive participants than normotensive participants (table 5).

Significant association between physical inactivity and dyslipidaemia was reported with higher prevalence of hypercholesterolemia, hypertriglyceridemia and increased LDL-C among physically inactive participants

TABLE 1. Basal characteristics of study participants.

VARIABLES	LEVELS	NUMBER (%) = 384
Age	<20 years ≥20 years	173(45.1) 211(54.9)
Sex	Male Female	136(35.4) 248(64.6)
Residence	Rural Urban	235(61.2) 149(38.8)
Faculty	Nursing Medicine Social Science Computer & Information	71(18.5) 124(32.2) 119(31.0) 70(18.2)
Weight	Normal Overweight Obese	218(56.8) 116(30.2) 50(13.0)
Abdominal obesity	Yes No	74(19.3) 310(80.7)
Exercise	No Irregular Regular	215(56.0) 129(3.6) 40(10.4)
Smoking	Yes No	9(2.3) 375(97.7)

TABLE 2. Mean concentration of lipid profile and other measurements according to sex.

	MALES	FEMALES	TOTAL	P VALUE
BMI	24.88±4.05	24.86±4.5	24.87±4.3	0.96
WC	85.7±17.5	78.36±17.2		0.00
SBP	117.38±8.4	113.7±11.7	115±10.8	0.001
DBP	77.3±8.2	73.95±8.8	75.14±8.7	0.00
TC	184.5 1±55.01	184.8±51.6	184.7±52.8	0.95
TG	135.8±71.3	125.2±63.65	128.9±66.6	0.134
LDL-C	109.4±39.8	112.7±40.3	111.5±40.12	0.717
HDL-C	45±8.3	44.6±10.5	44.7±9.8	0.44

TABLE 3. Prevalence of dyslipidaemia among study participants.

PREVALENCE OF	N=384 %
Hypercholesterolemia	149(38.8)
Hypertriglyceridemia	114(29.7)
High LDL-C	127(33.1)
Low HDL-C	105(27.1)
Isolated hypercholesterolemia	12(3.1)
Isolated hypertriglyceridemia	18(4.68)
Isolated low HDL-C	72(18.75)
Mixed hyperlipidaemia	93(24.2)
Dyslipidaemia(at least one character affected)	245(63.8)

(41.9%, 32.6%, 34.9%) and those practicing irregular exercise (41.9%, 31.8%, 36.4%) in comparison with physically active participants (12.5%, 7.5%, 12.5%) with p values 0.001, 0.005 and 0.013. Significant relation between dietary habits and types of dyslipidaemia was reported; increased prevalence of hypercholesterolemia, hypertriglyceridemia and increased LDL among participants who frequently eat fast food (daily or at least three per week) with per cents 50.3%, 40.8% and 42.3% in comparison with those participants with rare fast food consumption 31.8%, 23.1% and 27.7%. Lower prevalence of some types of dyslipidaemia (hypercholesterolemia, hypertriglyceridemia and increased LDL-C) among participants with daily fruit and vegetables consumption (table 6). No significant association of dyslipidaemia with other dietary habits related to milk & cheese, meat, chicken and fish consumption.

TABLE 4. Association of dyslipidaemia with demographic characteristics.

DEMOGRAPHIC		HIGH TC N=149	HIGH TG N=114	HIGH LDL-C N=127	LOW HDL-C N=105
SEX	Male	54(39.7)	45(33.1)	47(34.6)	35(25.7)
	Female	95(38.3)	69(27.8)	80(32.3)	70(28.2)
	P value	**0.78**	**0.28**	**0.65**	**0.60**
AGE (YEARS)	<20	67(38.7)	46(26.6)	55(31.8)	38(22.0)
	≥20	82(38.9)	68(32.2)	72(34.1)	67(31.8)
	P value	**0.98**	**0.23**	**0.63**	**0.032**
RESIDENCE	Rural	78(33.2)	58(24.7)	65(27.7)	61(26.0)
	Urban	71(47.7)	56(37.6)	62(41,6)	44(29.5)
	P value	**0.005**	**0.007**	**0.005**	**0.444**
FACULTY	Medicine	67(54.0)	43(34.7)	59(47.6)	36(50.7)
	Nursing	5(7.0)	13(18.3)	2(2.8)	28(22.6)
	Social science	23(19.3)	6(5.0)	24(20.0)	25(21.0)
	Computer&Information	54(77.1)	52(74.3)	42(60.0)	16(22.9)
	P value	**0.00**	**0.000**	**0.00**	**0.00**

TABLE 5. Association of dyslipidaemia with Health related factors.

		HIGH TC	HIGH TG	HIGH LDL	LOW HDL
OBESITY	Normal	66(30.3)	54(24.8)	60(27.5)	58(26.6)
	Overweight	60(51.7)	44(37.9)	51(44.0)	35(30.2)
	Obese	23(46.0)	16(32.0)	16(32.0)	12(24.0)
	P value	**0.000**	**0.04**	**0.01**	**0.67**
WC	Normal	105(33.9)	83(26.8)	91(29.4)	76(24.5)
	Abdominal obesity	44(59.5)	31(41.9)	36(48.6)	29(39.2)
	P value	**0.00**	**0.011**	**0.002**	**0.011**
DBP	<90mmHg	143(37.8)	102(29.7)	108(31.5)	95(27.7)
	≥90mmHg	6(100.0)	12(29.3)	19(46.3)	10(24.4)
	P value	**0.002**	**0.95**	**0.056**	**0.65**
SBP	<140mmHg	125(36.8)	111(29.4)	124(32.6)	104(27.5)
	≥140mmHg	24(54.5)	3(50.0)	3(36.4)	1 (16.7)
	P value	**0.002**	**0.28**	**0.374**	**0.99**

Logistic stepwise analysis in table 7 revealed frequent fast food consumption, urban residence and diastolic BP > 90mmhg to be significant risk factors for dyslipidaemia with Odd ratio 4.1 (2.5-6.9), 1.8 (1.14-2.97) and 2.4 (1.15-5.2) respectively, while daily vegetable consumption and exercising were protective factors.

DISCUSSION

The lifestyle and population behaviour play a crucial role in determining health, illness, disability and premature mortality in Egypt. According to the 2011/12 STEP wise surveillance there is a growing increase in cardiovascular diseases and associated risk factors prevalence among the adult population including 24% prevalence of smoking and a growing use of shisha tobacco. Egypt is one of the most overweight population in the world, with 32% prevalence of obesity, higher prevalence among females (42%) and almost three quarters of the population not involved in vigorous activity. Low consumption of fruits and vegetables was reported among the majority of population [19].

The increasing prevalence of dyslipidaemia has become a worldwide public health problem; the prevalence varies widely according to the socioeconomic, cultural and ethnic characteristics. This study is a pioneer study in Egypt to analyse the prevalence of dyslipidaemia among university students. In our study, the overall prevalence of dyslipidaemia among students was 63.8% and the prevalence of hypercholesterolemia, hypertriglyceridemia,

TABLE 6. Association of dyslipidaemia with lifestyle factors and dietary habits.

		HIGH TC	HIGHTG	HIGH LDL	LOW HDL
SMOKING	No	147(39.2)	112(29.9)	125(33.3)	103(27.5)
	Yes	2(22.2)	2(22.2)	2(22.2)	2(22.2)
	P value	**0.3**	**0.62**	**0.48**	**0.72**
EXERCISE	Sedentary	90(41.9)	70(32.6)	75(34.9)	55(25.6)
	Irregular	54(41.9)	41(31.8)	47(36.4)	37(28.7)
	Regular	5(12.5)	3(7.50)	5(12.5)	13(32.5)
	P value	**0.001**	**0.005**	**0.013**	**0.61**
FAST FOOD CONSUMPTION	Rare	77(31.8)	56(23.1)	67(27.7)	76(29.3)
	Frequent at least three per week	72(50.3)	58(40.8)	60(42.3)	29(23.2)
	P value	**0.00**	**0.00**	**0.003**	**0.21**
FRUIT CONSUMPTION	Less	72(44.7)	63(39.1)	62(38.5)	47(31.3)
	Daily	77(34.5)	51(22.9)	65(29.1)	58(24.8)
	P value	**0.043**	**0.001**	**0.054**	**0.32**
VEGETABLE CONSUMPTION	Less	93(47.4)	75(38.3)	76(38.8)	46(29.7)
	Daily	56(29.8)	39(20.7)	51(27.1)	59(25.8)
	P value	**0.00**	**0.000**	**0.015**	**0.4**
MILK-CHEESE	Rare consumption	35(43.2)	29(35.8)	28(34.6)	22(27.2)
	At least once daily	114(37.6)	85(28.1)	99(32.7)	83(27.4)
	P value	**0.359**	**0.175**	**0.74**	**0.96**
CHICKEN	Rare consumption	43(42.2)	33(32.4)	29(28.4)	32(31.4)
	At least once/week	106(37.6)	81(28.7)	98(34.8)	73(25.9)
	P value	**0.417**	**0.49**	**0.245**	**0.287**
MEAT	Rare consumption	28(32.9)	16(18.8)	23(27.1)	26(30.6)
	At least once/week	121(40.5)	98(32.8)	104(34.8)	79(26.4)
	P value	**0.209**	**0.013**	**0.182**	**0.447**
FISH	Rare consumption	115(37.6)	89(29.1)	100(32.7)	80(26.1)
	At least once/week	34(34.6)	25(32.1)	27(34.6)	25(32.1)
	P value	**0.331**	**0.609**	**0.74**	**0.296**

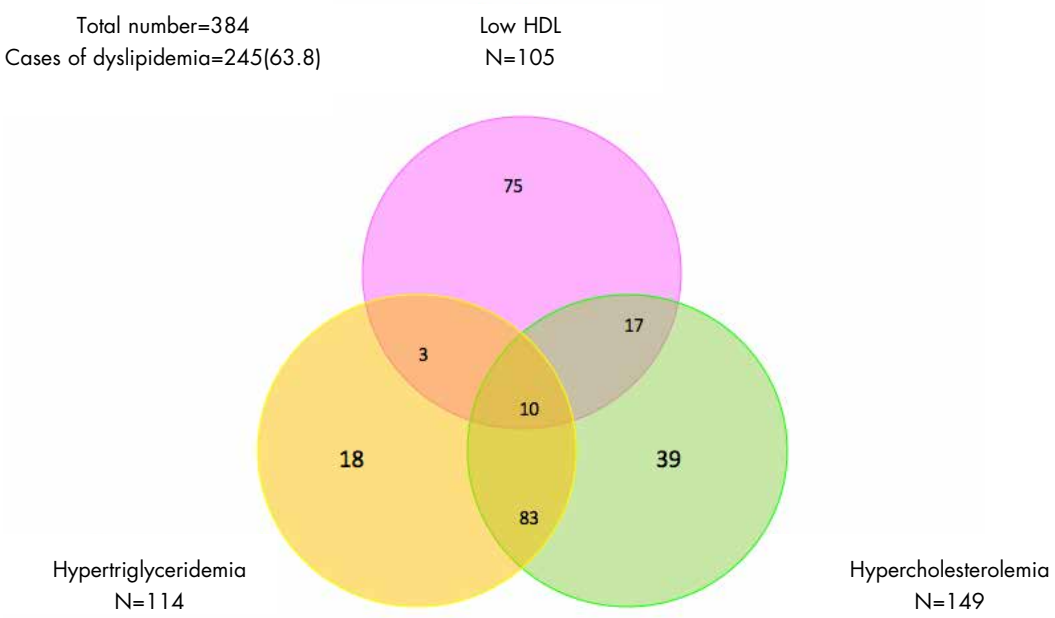
TABLE 7. Predictors of dyslipidaemia by multivariate backward logistic regression analysis.

PREDICTORS	P VALUE	OR (95%CI)
Frequent fast food consumption (at least three per week)	0.00	4.1 (2.5-6.9)
Urban residence	0.012	1.8 (1.14-2.97)
Daily fresh vegetable intake	0.000	0.21 (0.13-0.33)
Diastolic blood pressure> 90mmHg	0.021	2.4 (1.15-5.2)
Physical activity	0.01	0.6 (0.43-0.89)

high LDL-C and low HDL-C were 38.8%, 29.7%, 33.1% and 27.1% respectively.

Our figures seem to be high specially by comparing our results to similar studies conducted on this age group. In Kuwait, prevalence of dyslipidaemia among colleague students was 10.6% [24]. In Oman, the prevalence of hypercholesterolemia among group of university students aged from 16 to 30 years old was 15.6% [25] and in Sudan the prevalence of MS among first year university students was 7.8% [26]. In Saudi Arabia, a study conducted on a group of 1390 boys and girls aged 9-12 years in Riyadh city has revealed increased prevalence of

FIGURE 1. Venn diagram showed interaction between dyslipidemia types. Three circles: green circle for hypercholesterolemia, yellow circle for hypertriglyceridemia, pink circles for low HDL-C.



hypercholesterolemia (TC > 200mg) to be 32.7%, high LDL-C (> 130 mg/dl) to be 33.1% [27].

Comparing our results to previous studies in Egypt, Ella et al. [28] through a study on adolescents have reported prevalence of high TC, TG, LDL-C and low HDL-C to be 6%, 7.5%, 8.2% and 9.4% respectively. Our figures are higher: this may be due to the older age group of our study participants and more recent study with more modernisation and accumulation of risk factors and quality of life of university students. WHO stepwise non-communicable diseases surveillance 2011-12 on adults aged from 15 to 65 years old have reported prevalence of dyslipidaemia based on hypercholesterolemia and hypertriglyceridemia to be 36.7% and 10.2% [19].

The current study showed significant increased prevalence of dyslipidaemia among urban students than among rural counterparts. This was consistent with other studies [10, 26]. This may be related to urban lifestyles, sedentary life, dietary habits of fast food and high fat diet.

An interesting finding in the present study is the increased level of dyslipidaemia in the form of low HDL with increasing age. Although the narrow age interval in our study, between 17 and 24 years, it is a significant association. This was consistent with AlMajed et al. [24] findings through their research on colleague students. Qi et al. [29] have concluded through their study that the prevalence of dyslipidaemia peaking for men was from 30 to 39 years and then declined gradually, whereas in women, it increases with age and peaking was at 60 years and older. Ibrahimi et al. [30] have concluded similar findings in Iran.

The current study revealed no significant difference between males and females in prevalence of dyslipidaemia and this was consistent with previous studies [31, 32]. Other studies showed higher prevalence in males than in females in this age group [24, 25, 33].

An interesting finding in the current study is increased dyslipidaemia prevalence among students of medicine and computer & information faculties than nursing and social science students. Our explanation may be due to better economic level of those students accompanied by increased out of pocket related to over consumption and buying of unhealthy and fast food. In addition, type of study in these faculties encourage students to stay physically inactive long time either reading lessons or on computers.

A general inverse relationship between regular physical activity and dyslipidaemia prevalence was reported, with increased hypercholesterolemia, hypertriglyceridemia and high LDL-C prevalence among physically inactive students. This was in accordance with several previous studies [25, 29, 32]. Moreover, intervention studies have demonstrated improvements in lipid profile with increases in exercise [34, 35, 36] as physical activity mainly results in a reduction in triglyceride levels and an increase in HDL-C [36]. Thus, an appropriate community based prevention strategy emphasising behavioural changes, especially promoting physical activity, is required to control the epidemic of dyslipidaemia.

It is documented that obesity is a major cause for dyslipidaemia: the present study has reported overweight, obesity and central obesity as a significant risk factors of dyslipidaemia. This was similar to previous research [29, 38, 39, 40]. Obesity-associated dyslipidaemia is atherogenic as obese individuals have increased atherogenic small, dense LDL particles and elevated levels of apolipoprotein B [41]. It has been proved from epidemiological studies that the association between dyslipidaemia and abdominal obesity is mediated through an etiopathological mechanism [42]. So, high BMI and WC may be considered screening tools to detect dyslipidaemia individuals as first-stage.

It has been shown that prevalence of risk factors for non-communicable diseases in childhood and adolescence increases the tendency towards development of disease in adulthood [43]. Thus, screening adolescents and young adults for dyslipidaemia especially high risk overweight and obese ones is of paramount importance. Pletcher et al. [44] have reported that non-optimal levels of high LDL and low HDL cholesterol during young adulthood are independent associated with CHD two decades later. Assessing prevalence of this problem help to reduce its cost through signalling on a major modifiable risk factor for CHD.

The current study revealed significant association of dyslipidaemia in the form of hypercholesterolemia with systolic and diastolic hypertension. This was consistent with previous research [32, 45], but cause effect relationship cannot be assessed through this cross-sectional study.

We studied through this work some dietary habits and their association with dyslipidaemia prevalence. Important findings have been concluded: a significant association of frequent fast food consumption, characterised by increased its carbohydrates and fat content, with increased hypercholesterolemia, hypertriglyceridemia and increased LDL-C prevalence. This was consistent with other research findings [46]. Also daily vegetable intake has been identified through logistic stepwise regression analysis to be a protective factor against dyslipidaemia. This was in accordance with Takahashi findings [47].

Conclusion and Recommendation

The prevalence of dyslipidaemia is high among apparently healthy Fayoum University students. Factors associated are urban residence, obesity and overweight, increased waist circumference, physical inactivity and unhealthy dietary habit. We recommend intervention programmes to university students even at an earlier age through screening, health education and counselling. Increasing student awareness of importance of adopting healthy dietary habits and increasing physical activity is of paramount importance to reduce dyslipidemia prevalence and prevent its complications.

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Conflict of Interest

None declared

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