ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Relationship between Hypercholesterolemia, and Age, Gender and Body Mass Index.

Ahmed Mohammed Ahmed[1]*, Abdelrahman Abdelwahab Rhmtallah[2], and Hussein Yousif Eledum[3]

[1]Department of Medical Laboratory-College of Applied Medical Science – Taibah University-Almadinah Almunawara – Kingdom of Saudi Arabia.
[2]Saudi Red Crescent – Almadinah Almunawara branch – Kingdom of Saudi Arabia.
[3]Department of Mathematics (Biostatistics) – College of Science – Almadinah Almunawara – Kingdom of Saudi Arabia.

ABSTRACT

Hypercholesterolemia is one of the most important factors causing cardiovascular disease (CVD). To determine the relationships between the presence of hypercholesterolemia and age, gender and Body Mass Index (BMI)among different age groups, BMI categories and gender in individuals withHypercholesterolemia. Total cholesterol (TC), Low Density Lipoprotein cholesterol (LDL), High Density Lipoprotein cholesterol (HDL)and BMI were determined in blood samples collected from 200 hypercholesterolemicpatients' participants in this study. There were no significant difference between males and females when compared mean of age, BMI, TC, LDL and HDL of study groups. There were no significant different in all age groups between males and females except in age group range from 50-59 year, which was high in females than males ($p<0.01$).TC level according to BMI categories, shows higher in overweight subjects compared to normal weight subjects ($p<0.05$); and higher in obese subjects compared to both, overweight subjects and normal weight subjects ($p<0.01$). Hypercholesterolemia significant higher in the obese and overweight subjects than normal weight, the strongesteffect of obesity on the risk of hypercholesterolemia hasbeen found in female subjects aged 50–59 years.

Keywords: Hypercholesterolemia, TC level, age group, BMI.

Corresponding author

ISSN: 0975-8585

INTRODUCTION

Hypercholesterolemia is a well-documented and established risk factor for coronary heart disease (CHD)[1].Recent guidelines recommend that it is important to maintain low cholesterol levels in order to reduce mortality from cardiovascular disease, and also several studies have consistently shown that both absolute total fat and adipose tissue distribution are strongly associated with the risks of hyperlipidemia as well as diabetes and hypertension [2]. Many epidemiologic data suggest that hypercholesterolemia is the main contributor for atherogenesis [3, 4]. Several studies have suggested that hypercholesterolemia is associated with lifestyle habits, like dietary, smoking and physical inactivity status. Despite these considerations, the management of blood lipids levels is difficult, especially in older adults. The effect of abnormal blood lipids levels on cardiovascular system is enhanced with increased age. The burden of hypercholesterolemia in the future is also expected to increase at alarming rates[5].There were many studies done in different countries about hypercholesterolemia and relation with BMI, age and gender, but no data about correlation of hypercholesterolemia with BMI, age and gender, so this study was undertaken to measure the relation between hypercholesterolemia and BMI in different age groups and gender.

SUBJECTS AND METHODS

Subjects

A representative samples of two hundred Sudanese hypercholesterolemic subjects (97 male, 103 female), a mean average age of 45.6±6.2 year (ranged from 20.3 to 78 year), collected in different hospitals and medical centers as patients, co-patients, staff and volunteer visitorsin Khartoum(Sudan), (the baseline of selection was cholesterol level ≥ 200 mg/dl), were enrolled in the study. Ethically; the objectives of this study were verified for all subjects to obtain their consent.

Methods

Blood samples collected from a subjects when they were fasting, (3ml) in plain containers using disposable syringes. All blood samples were allowed to clot at room temperature and then centrifuged at 4000 R.P.M to obtain the serum and stored at 2-8 C° prior to processing.TC, LDL and HDL levels were measured enzymatically using by Roche/Hitachi 902full-automated analyzer. Body mass index (BMI): height and weight were measured was calculated according to standardized protocol, [6] then BMI calculate as weight in kilograms divided by the square of the height in meters(Kg/m^2). Statistical analysis: the data were analyzed using SPSS version 19.

RESULTS

There were no significant difference between males and females when compared mean of age, BMI, TC, LDL and HDLof study groups, and table 1 documented that. Table 2 explain the level of TC (mg/dl) in different age groups of study group stratified by gender, and the number of gender in each age group, in which there were no significant different in

ISSN: 0975-8585

all age groups between males and females except in age group range from 50-59 year, which was high in females than males (p<0.01). The mean level of TC according to BMI categories [normal weight (18.5-24.9 kg/m2), overweight (25–29.9 kg/m2), and obese (≥30.0 kg/m2)], shows higher in overweight subjects compared to normal weight subjects (p<0.05); and higher in obese subjects compared to both, overweight subjects and normal weight subjects (p<0.01). Although TC level were increased proportionally with BMI, but there were no significant different in both gender males and females (figure 1). Figure 2 explained that the mean level of TC according to BMI categoriesstratified by different age groups. TC mean level in overweight subjects were sig. when compared with normal weight (p<0.01) in all age groups, and the level in obese when compared with overweight and normal weight were significant (p<0.01) in all age groups.

Table 1: mean of age, BMI and serum TC of study group

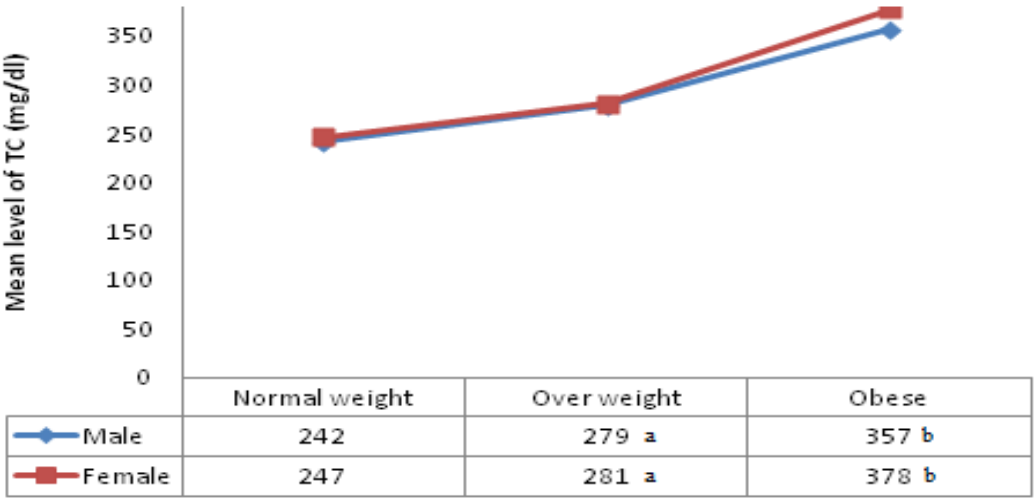
Character	Male	Female	Sig.	95% CI
Age	45.3±14.7	45.9±15.2	0.834	-3.86 – 2.86
BMI	27.7±3.5	28.1±2.2	0.527	-4.87 – 3.81
TC	248.2±31.7	251.9±30.7	0.692	-14.48 – 6.99
LDL	201.7±22.2	206.6±28.3	0.177	-1.52 – 3.18
HDL	41.5±13.7	40.6±11.8	0.411	-3.52 – 1.99

The table shows data as mean±standard deviation. CI: Confidence Intervals.

Table 2: mean of TC level stratified by different age groups and gender

Age groups (n=200)	Number (Male, female)	TC level (mg/dl)		95% CI
		Male	Female	
20-29 (n=33)	(18, 15)	241.7±18.5	230.8±59.6	-32.09 – 53.93
30-39 (n=39)	(16, 23)	256.2±25.0	244.5±15.1	-28.39 – 51.72
40-49 (n=41)	(23, 17)	243.0±10.1	247.3±15.1	-43.12 – 45.10
50-59 (n=45)	(19, 26)	248.2±11.7	271.9±14.9**	5.00 – 13.38
> 60 (n=42)	(21, 22)	245.4±54.8	254.3±20.9	-46.38 – 28.69

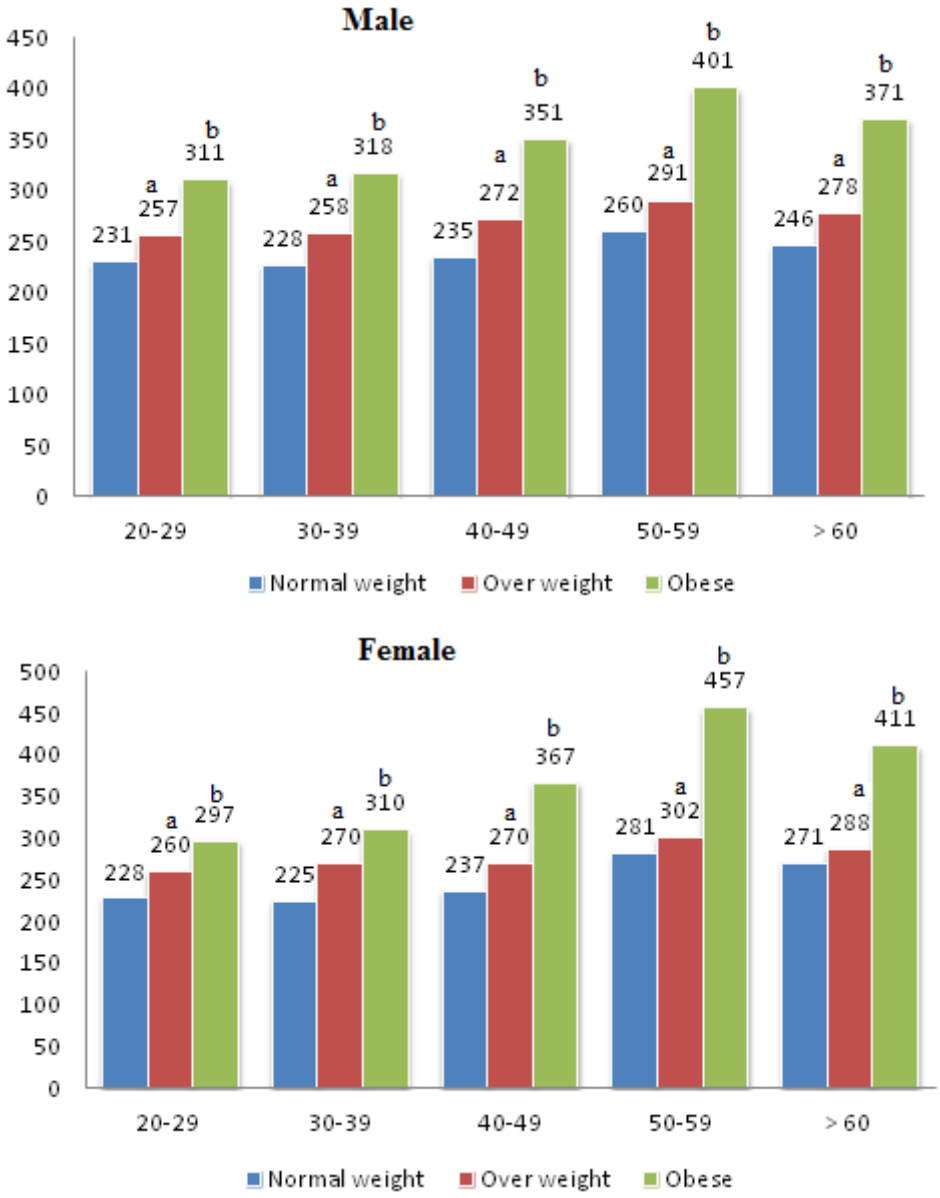
The table shows data as mean±standard deviation. CI: Confidence Intervals. **: significant at P<0.01.



a: sig. when compared with normal weight (p<0.01),
b: sig. when compared with overweight and normal weight (p<0.01)

Figure 1: TC level in males and females according to BMI

ISSN: 0975-8585



a: sig. when compared with normal weight ($p<0.01$)
b: sig. when compared with overweight and normal weight ($p<0.01$)

Figure 2: TC level in male and female according to BMI stratified by age groups

DISCUSSION

Consistent with the results from the present study, there has been much evidence on whether the age-related cholesterol increased is the result of a natural process of intrinsic ageing (greater susceptibility of older people to the effect of dietary cholesterol) or whether it is due to age-associated anthropometrics and/or lifestyle changes diet and dietary).This finding agrees with many studies[7-9]. In our study the data analysis shows that females have statistically significantly higher TC thanmales in the group range between 50 – 59 years.

In the result of the present study, stratified by age, we have found that males and femalesTC level increased by age substantially, on the other hand, the age related analysis stratified by BMI categorize we have found that in overweight or obese males and females TC level increased inall age groups, but the higher frequency in the age group 50 – 59 year specially in females. The suggestion of increased the level of TC in this age group in female was sedentary life style and oestrogen deficiency in postmenopausal women, which described that menopause is highly associated with an unfavorable hyperlipidemia[10]. Tremollieres*et al*[11] found that about 30% of postmenopausal women had serum total cholesterol levels above 250 mg/dl associated with LDL cholesterol above 160 mg/dl.The impact of BMI on the risk of having Hypercholesterolemia positively correlated with blood TC level, and it associated with increased risk of mortality from CHD, this finding agree with Tyrovolas *etal*[5].Physician at all health care should be motivated to identify the problem and implement necessary remedial and preventive measures focusing on weight control (oriented toward the risks of obesity), increased physical exercisefor controlling of dyslipidemia.

CONCLUSION

Hypercholesterolemia significant higher in the obese and overweight subjects than normal weight, the strongest effect of obesity on the risk of hypercholesterolemia has been found in female subjects aged 50–59 years.

REFERENCES

[1] Tanabe N, Iso H, Okada K, Nakamura Y, Harada A, Ohashi Y, Ando T, UeshimaH. The JALS-ECC. Circ J 2010;74:1346-56.

[2] National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III): Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III) final report. Circulation 2002;106:3143-421.

[3] Wilson PWF, Abbott RD, Castelli WP. Arteriosclerosis 1988, 8:737-741.

[4] Stamler J, Daviglus M, Garside D, Dyer A, Greenland P, Neaton J. J Am Med Assoc 2000;284:311-318.

[5] Tyrovolas S, Lionis C, Zeimbekis A, Bountziouka V, Micheli M, Katsarou A, Papairakleous N, Metallinos G, Makri K, Polychronopoulos E, Panagiotakos DB. Lipids in Health and Disease 2009;8:10.

[6] Molarius A, Kuulasmaa K, Sans S, Virman-Ojanen T, for the WHO MONICA Project. Quality assessment of weight and height measurements in the WHO MONICA Project, 1997.

[7] Gostynski M, Gutzwiller F, Kuulasmaa F, Do¨ring A, Ferrario M, Grafnetter D, Pajak A. International Journal of Obesity 2004;28:1082–1090.

[8] Circulation 1979; 60: 427–439.

[9] Wietlisbach V, Paccaud F, Rickenbach M, Gutzwiller F. Prev Med 1997; 26: 523–533.

[10] The Writing Group for the PEPI Trial. JAMA 1995; 273: 199–208.

[11] Tremollieres F, Pouilles J, Cauneille C, Ribot C. Atherosclerosis 1999; 142: 415–423.