Serum lipid profile of obese and overweight Sudanese over 60 years

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Abstract

Obesity is a state characterized by a relatively absolute excess fat stored in the adipose tissue; it is associated with changes in lipids and lipoproteins. The objective of this study is to assess the association of lipids and lipoproteins concentration in obese and overweight Sudanese, attending Khartoum Teaching Hospital and Jaber Abo-Al Ez Hospital, in Khartoum- Sudan. The study was done between February to August 2014, which comprised of 110 Sudanese over the age of 60 years, of them 50 were subjects with weight problems, while 60 were age and sex matched controls. The mean (BMI) in obese, overweight and healthy control normal subjects were (32.53±2.13), (27.84±1.31) and (21.46±1.66); respectively. Serum lipid profile was done using automated chemical analyzer. In obese and overweight; the mean serum cholesterol was (220.20±19.62 mg/dl) and (223.86±21.79mg/dl), versus (168.0±26.88mg/dl) in the normal subjects, triglycerides was (145.20±56.07 mg/dl) and (183.96±81.79 mg/dl), versus (89.89±29.58 mg/dl) in the normal subjects, HDL was (45.85±9.22 mg/dl), and (49.46±11.83 mg/dl), versus (48.37±8.90 mg/dl) in their controls, LDL was (143.50±24.41mg/dl), and (139.56±39.70 mg/dl), versus (102.80±26.90 mg/dl) in the normal subjects. The mean cholesterol /HDL ratio was (4.80) in obese group, and (4.52) in overweight, versus (3.47) in the normal subjects. The mean LDL/HDL ratio was (3.12) in obese group, and (2.82) in overweight, versus (2.12) in the normal subjects. Using ANOVA test; total cholesterol, triglycerides and LDL, were significantly elevated in both obese and overweight subjects, increasing the risk of coronary heart diseases. Sudanese overweight and obese subjects, show significant increase in the plasma levels, of total cholesterol, triglycerides and LDL. No significant variations in the lipid profile between Sudanese ethic groups.

Key words: overweight, obese, ethnic groups, lipid profile, Sudan.

INTRODUCTION

In recent decades the prevalence of obesity and overweight has increased steadily in both developed and developing countries [1]. Alterations in body fat distributions are associated with changes in lipids and lipoproteins [2]. Obesity is a risk factor for adult coronary heart disease and is in increasing order among young people and adults[3,4]. Various lipid/lipoprotein abnormalities have been observed in obese individuals, including elevated cholesterol, triglycerides, and lower high-density lipoprotein (HDL) cholesterol levels. Of these indicators, changes in triglyceride and HDL cholesterol levels are most consistent and pronounced [5]. Leptin serum level has a close correlation with adiposity indices and lipid profile and its level increases significantly with increasing grades of obesity [6]. Body mass index is widely used as a marker of adiposity, but it may not be a good measurement of fatness, mainly in

extremes of stature and with advancing age[7]. In addition the strength of the relationship between BMI and body fat percentage (BF %) varies between populations and ethnic groups, implying that a BMI-based classification of weight status would necessarily be population specific [8]. Cardiovascular diseases (CVD), the most leading cause of morbidity and mortality in the western World are now emerging as public health problem in the developing countries[9]. Association between dyslipidemia, obesity and hypertension is well established, it's becoming increasing common in Africa[9]. The present study was designed to measure serum lipid profile as markers for cardiovascular diseases among obese and overweight Sudanese above 60 years of age.

MATERIALS AND METHODS
The study was done between February to August 2014, which comprised of 110 Sudanese over the age of 60 years. Fifty of them were subjects with weight problems attending Khartoum Teaching Hospital and Jaber Abo-Al Ez Hospital, Khartoum -Sudan. These subjects were sub-grouped into 30 overweight (BMI >25), and 20 obese (BMI >30), beside 60 age matched, (normal weight) healthy persons as control group. Ethical clearance was taken from the authorities, while written consent was taken from all subjects. On the other hand; all study subjects were classified into three ethnic groups; Afroasian, Nilosaharan and Cogoniger. The important confounding variables such as smoking, alcohol intake were excluded. Two ml blood was put in fluoride oxalate container for glucose measurement, and measured immediately using automated chemical analyzer. Obese, overweight and normal weight healthy controls were given oral instructions to fast overnight for 12-14 hours before collecting the venous blood samples. Five ml blood was put in a plain container. Serum was separated after centrifugation at 3,000 RPM for 10 minutes, and then stored at -20 , till the time of biochemical analysis using automated chemical analyzer (TOSOH AIA - 360). Total cholesterol, triglycerides, low density lipoprotein (LDL) and high density lipoprotein (HDL) were measured parallel with control samples from Biosystem Company (Spain). Cholesterol/HDL and LDL/HDL ratios were calculated by subdividing total cholesterol and LDL respectively by HDL. Statistical analysis was conducted using IBM SPSS Statistics 20 and one way ANOVA (p<0.05). Simple descriptive statistics (mean and Standard Deviation; SD), were used to describe the observed variation in lipid profile between the groups under the study.

RESULTS
The study revealed that: the number of females in the study group was 25(50%), while in control group was 29 (48.3%), the rest were males in the two groups (Table.1). The results also showed that; all the obese and overweight subjects were hypertensive with gouty arthritis and type 2 diabetes millitus. For the females in overweight sub-group; 16 (94.1%) of them were housewives, while in the obese sub-group housewives were 7(87.5%). The mean (BMI) was (32.53±2.13) in obese group, and (27.84±1.31) in the overweight group, versus (21.46±1.66) in the control group. The mean age was (68.76±11.3 years) in obese group, and (68.36±11.06 years) in overweight, versus (66.35±9.51years) in the normal subjects. The mean serum cholesterol was (220.20±19.62 mg/dl) in obese group, and (223.86±21.79mg/dl) in overweight, versus (168.0±26.88mg/dl) in the normal subjects. The mean serum triglycerides was (145.20±56.07 mg/dl) in obese group, and (183.96±81.79mg/dl) in overweight, versus (89.89±29.58mg/dl) in the normal subjects. The mean serum HDL was (45.85±9.22mg/dl) in obese group, and (49.46±11.83mg/dl) in overweight, versus (48.37±8.90 mg/dl) in the normal subjects. The mean serum LDL was (143.50±24.41mg/dl) in obese group, and (139.56±39.70 mg/dl) in overweight, versus (102.80±26.90 mg/dl) in the normal subjects. The mean fasting plasma glucose was (201.35±24.14mg/dl) in obese group, and (197.76±23.97mg/dl) in overweight, versus (79.80±6.51mg/dl) in the normal subjects. The mean weight was (111.65±8.18kg) in obese group, and (114.36±8.83kg) in overweight, versus (63.14±10.51kg) in the normal subjects. The mean height was (182±0.15cm) in obese group, and (202 ±0.09cm) in overweight, versus (169.45±6.44cm) in the normal subjects. The mean cholesterol /HDL ratio was (4.80) in obese group, and (4.52) in overweight, versus (3.47) in the normal subjects. The mean LDL/HDL ratio was (3.12) in obese group, and (2.82) in overweight, versus (2.12) in the normal subjects Table (2). Using One-way ANOVA testing, and based on BMI; total cholesterol, triglycerides and LDL, were significantly elevated (p value=0.000), in both obese and overweight subjects, compared to normal persons, while HDL showed no significant difference between the normal, obese and overweight subjects; Tables (3, 4, and 5).

DISCUSSION
The high total cholesterol, high triglycerides and LDL levels; are the main alterations in blood lipids of overweight and obese elder Sudanese subjects. These

findings reveal in this study are consistent with that reported by Chadha and group[5], WHO [2] and Mojganet al[10], while in contrary to the results of Cameroonian Obese patients as written by Julius and colleagues [4], and a Sudanese study written by Ahmed et al [11]. High density lipoprotein (HDL) values do not significantly change between the three groups of the study, which are consistent with the finding of Julius and colleagues[4]. The present research also reveals increased serum astherogenic index or (LDL/HDL) ratio in the overweight and obese group, when compared to normal subjects; all these factors indicate increasing the risk factors of cardiovascular diseases among overweight and obese Sudanese patients. As Sudan is composed of different tribes and ethnic groups including; Afro-asian, Nilo-saharan and Congo-niger, with nearly similar dietary habits; no significant variations in lipid profile between these ethnic groups in this study, which are in agreement with that reported by Ahmed et al[11], from Khartoum- Sudan; while in disagreement with that implied by Deurenberg and colleagues[8].

Overweight and obesity in Sudan are associated with other diseases; this is observed in this study, that all the overweight and obese subjects enrolled in the study suffer from hypertension, diabetes and with gouty arthritis, with elevated serum astheroginic index, hence; increasing the risk of coronary heart diseases among this group of Sudanese population. As reported by Colosia and colleagues[12], obesity when associated with hypertension and type two diabetes mellitus, these factors are considered the common cause of death around the World. In Sudanese condition gouty arthritis is added to these killing factors. It is well established that in type 2 diabetes; the excessive release of glucose, in the fasting state into the circulation is a major factor responsible for fasting hyperglycemia, as reported by Asimina[13], increasing fasting plasma glucose in both overweight and obese Sudanese reveals in this study; is in consistent with the Cameroonian study of Julius et al[4].

Table 1
Descriptive table of the gender of the obese, overweight and their control

Subjects	Males	Females	Total
Obese (BMI >30)	12(*60%*)	8(*40%*)	20
Overweight (BMI >25)	13(43.3%)	17(56.7%)	30
Control	31(*51.7%*)	29(*48.3%*)	60
Total	56	54	110

Table 2
Descriptive study of mean age, serum cholesterol, triglycerides, HDL, LDL, fasting plasma glucose, weight, height, BMI and cholesterol/HDL, LDL/HDL ratios in obese, overweight and their control.

Items	Obese (n=20) (mean±std)	Overweight (n=30) (mean±std)	Controls (n=60) (mean±std)
Age (years)	68.76±11.3	68.36±11.06	66.35±9.51
Cholesterol (mg/dl)	220.20±19.62	223.86±21.79	168.0±26.88
Triglycerides (mg/dl)	145.20±56.07	183.96±81.79	89.89±29.58
HDL (mg/dl)	45.85±9.22	49.46±11.83	48.37±8.90
LDL (mg/dl)	143.50±24.41	139.56±39.70	102.80±26.90
Cholesterol/HDL	4.80	4.52	3.47
LDL/HDL	3.12	2.82	2.12
Fasting glucose plasma (mg/dl)	201.35±24.14	197.76±23.97	79.80±6.51
Weight (kg)	111.65±8.18	114.36±8.83	63.14±10.51
Height (cm)	182±0.15	202 ±0.09	169.45±6.44
BMI	32.53±2.13	27.84±1.31	21.46±1.66

Table 3
ANOVA test for comparison of serum cholesterol levels among study groups

(I) BMI	(J) BMI	Mean Difference (I-J)	Sig.
Obese	Overweight	-3.667	0.618
	Normal	52.000*	0.000
Overweight			
	Normal	55.667*	0.000

*. The mean difference is significant at the 0.05 level.

Table 4
ANOVA test for comparison of serum triglycerides levels among study groups

(I) BMI	(J) BMI	Mean Difference (I-J)	Sig.
Obese	Overweight	-38.767*	0.014
	Normal	55.067*	0.000
Overweight			
	Normal	93.833*	0.000

*. The mean difference is significant at the 0.05 level.

Table 5
ANOVA test for comparison of serum LDL levels among study groups

(I) BMI	(J) BMI	Mean Difference (I-J)	Sig.
Obese	Overweight	3.933	0.665
	Normal	39.250*	0.000
	Normal	35.317*	0.000

*. The mean difference is significant at the 0.05 level.

CONCLUSION
Sudanese overweight and obese subjects, show significant increase in the serum levels, of total cholesterol, triglycerides and LDL, with high astherogenic index. No significant variations in the lipid profile between Sudanese ethic groups.

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