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Study of Serum Cholesterol Level in Adult Obese Population of Karachi, Pakistan

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Abstract

Background: The present study was planned to investigate the level of cholesterol in obese/non-obese (normal) individuals according to their body mass index (BMI) and age in different population residing in Karachi. Aim: Comparison of serum cholesterol values of obese with normal subjects and comparison of BMI of obese and normal individuals. Methods: Selection of obese subjects was according to the WHO (1998) criteria. A total of 40 subjects 18 - 55 years of age participated in the study, among which 30 subjects (Mean Age = 29.47 ± 1.99) were obese (Mean BMI = 35.41 ± 0.878) and 10 were controls with Mean age = 21.00 ± 0.547 and BMI = 19.96 ± 0.432. An overnight fasting blood sample was obtained and serum total Cholesterol (T-CH) level was estimated. Results: Obese persons having Mean T-CH = 202.6 ± 14.3 and controls having Mean T-CH = 173.3 ± 14.0. The data were further divided into males and females. Obese females were 11 with their BMI 31.836 ± 0.21, mean age ranged at 28.73 ± 4.04 and T-CH 191.8 ± 21.8, while that of control females were 6 in number with their BMI ranged at 19.183 ± 0.507, age 21.000 ± 0.894 and Cholester 148.7 ± 16.0 in controls. Total numbers of obese males were 19 with their BMI ranged at 37.49 ± 1.14, age ranged at 29.89 ± 2.19 and cholesterol level ranged at 208.89 ± 19.1. Control males were 4 in number with their BMI ranged at 21.125 ± 0.075, age 21.250 ± 0.479 and their T-CH 128.7 ± 8.72. Conclusion: The results of current study have reflected that BMI and total cholesterol concentration are higher in obese subjects.

Keywords

BMI, Obesity, Serum Cholesterol Levels

1. Introduction

Obesity is right now considered a pandemic, expanding quickly in many developed countries throughout the world. The incidence of being overweight and obese among United State grown-ups has expanded by 45% in

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the course of recent decades, from 44.8% in 1962 to 65.2% in 2002 [1]. Obesity is usually characterized as the presence of excessive body fat, yet the instance of fat distribution is critical regarding Diabetes mellitus (DM) hazard and many other metabolic abnormalities included in the metabolic syndrome. Men are more prone to have abdominal or upper-body obesity called android obesity, initially depicted by Vague in 1956 [2], though females are more inclined to have a gluteofemoral or lower-body pattern of fat dissemination (gynoid obesity). Obesity has been defined as a weight more than 20% above what is considered normal according to standard age, height, and weight tables, or by a complex formula known as the body mass index [3]. Overweight and obesity keep on increasing considerably around the world, influencing all ages, genders and races [4]. Pakistan National Representative Survey demonstrated 25% of the populations to be overweight as indicated by the Asian-particular BMI cutoff values and 10.3% are obese. This information confirms a major health issue in Pakistan [5]. Obese individuals with body mass index (BMI) greater than 30 kg/m^2 have a more serious danger of dying earlier than the non-obese [6]. Because of excess amount of body fat ratio in obesity, BMI, waist circumference (WC) and waist-to-hip ratio (WHR) have been utilized as basic anthropometric indices (AI) for evaluating the sum and appropriation of muscle to fat ratio ratios [7] and are useful indices in foreseeing the risk of type 2 diabetes, hypertension, and cardiovascular diseases (CVDs) in grown-ups [8]. Generally among the over three indices, BMI has been demonstrated to be the most helpful and useful one in characterizing obesity in people. Obesity and abdominal obesity specifically, is definitely connected with an unfavorable dyslipidemic profile and an expanded danger for coronary vein artery disease [9]. Saturated fats and cholesterol in the diet play an important role in the etiology of hypercholesterolemia and act as a danger element for CHD [10]. Grundy in 1987 reported that the high level of plasma cholesterol is because of an increased in the level of low-density lipoprotein cholesterol (LDL-C) [11]. Polyunsaturated fat diet decreases plasma cholesterol level and beta lipoprotein when substituted for saturated fats [12]. Saturated fats and cholesterol in the diet cause elevated serum cholesterol while diet low in saturated fat and cholesterol reduce cholesterol level in people [13]. Polyunsaturated unsaturated fats (PUFA) in diet lower triglyceride (TG), very low-density lipoprotein cholesterol (VLDL-C), low-density lipoprotein cholesterol (LDL-C), and furthermore high-density lipoprotein cholesterol (HDL-C) [14]. Tayyab *et al*., in 1991 watched that saturated fats raised the serum total cholesterol (TC), mono unsaturated fatty acids (MUFA) expanded HDL-C and PUFA diminished both TC and HDL-C. Lifted LDL-C and diminished HDL-C in plasma have been separately recognized to be connected with expanded danger for CHD in men [15].

The vital basic constituent in the cell layer of numerous vertebrates is cholesterol [16].

BMI is calculated by the following formula:

$$\mathrm{BMI}\left(\mathrm{kg}/\mathrm{m}^2\right)=\mathrm{Weight}/\mathrm{Height}^2$$

An attractive BMI as indicated by the WHO (1998), prescribed cut-offs for Asians is considered to be between 18.5 and 22.9 kg/m^2. A BMI of 23 - 24.9 kg/m^2 is defined as “overweight” and BMI > 25 kg/m^2 as “obese” [17]-[18].

Other than all the preventive measures that are screening for indices of obesity and dyslipidemia, the prevalence of the obesity and its inconveniences is expanding worldwide and is one of the major public health issues. The reason for this study was to focus on the relationship of lipid profile in obese versus non-obese patients and to focus on the frequency of dyslipidemia in these two gatherings.

2. Materials and Methods

The present study was conducted at Federal Urdu University of Arts, Science and Technology (FUUAST) Gulshan e Iqbal Campus Karachi; all volunteers were students, and faculty members of the university.

Total of 40 subjects including 30 obese male and females and 10 controls (non-obese) male and female with aged 18 - 50 were randomly selected for the study. All subjects were from different socio-economic groups. To remove bias, subjects with known hypertension, diabetes, alcoholics etc. were excluded from the study. The duration of the study was seven months. A written informed consent was obtained from each subject and the procedure pertaining to study was explained to each subject. All procedures for the study were approved by the ethical committee of University. A desirable BMI according to the WHO (1998) [19] recommended cut-offs for Asians is considered to be between 18.5 and 22.9 kg/m^2. A BMI of 23 - 24.9 kg/m^2 is defined as “overweight” and BMI > 25 kg/m^2 as “obese” [20].

Serum samples were collected after 12 hours of fasting. Cholesterol levels were determined by using commercially available kit (LINEAR CHEMICALS S.L. Joquim Costa 18 2[a] planta. Montgat, Barcelona, SPAIN website http://www.linear.es).

3. Results

The study has been focused to investigate the comparison of age; body mass index and total cholesterol, in obese and non-obese groups in the sera were pertinently assessed separately in both groups.

3.1. Total Obese Versus Total Control

3.1.1. Age

The **Table 1** presents pattern of age in control and obese groups. The age of obese subjects ranged at 29.47 ± 1.99 in subjects of both gender and 21.10 ± 0.547 in non-obese subjects of both gender. The results are statistically significant ($P < 0.001$). The subjects were in close range and well suited for the comparisons.

3.1.2. Body Mass Index (BMI)

The **Table 2** presents pattern of Body Mass Index (BMI) in control and obese groups. Body mass index averaged at 19.96 ± 0.432 kg/m² and 35.41 ± 0.878 kg/m² in the control and obese subjects respectively. Results are highly significant ($P < 0.001$). Body mass index of control subjects was lower as compare to obese.

3.1.3. Total Cholesterol (T-CH)

The **Table 3** presents pattern of total cholesterol in control and obese groups. A concentration of total cholesterol was 173.3 ± 14.0 mg/dl in and 202.6 ± 14.3 mg/dl in the control and obese subjects correspondingly ($P > 0.05$). An elevated level of cholesterol concentration was experienced in obese subjects, as compared to control. In summary from the above results of this fraction in both groups it is quite obvious that obesity may effect on cholesterol concentration.

3.2. Obese Females versus Control Females

The data of obese and non obese subjects were categories according to gender that is into males and female for further study.

Table 1. Age of obese and control persons.

Age	Total Obese (n = 30)	Total Control (n = 10)	P Values
Mean	29.47 ± 1.99 years	21.10 ± 0.547 years	
SE Mean	1.99	0.54	P < 0.001
Median	24.50	21.00	

Table 2. BMI of obese and control persons.

BMI	Total Obese (n = 30)	Total Control (n = 10)	P Value
Mean	35.41 ± 0.878 kg/m²	19.96 ± 0.432 kg/m²	
SE Mean	0.87	0.43	P < 0.001
Median	33.40	20.65	

Table 3. Cholesterol level of obese and control person.

Cholesterol	Total Obese (n = 30)	Total Control (n = 10)	P Values
Mean	202.6 ± 14.3 mg/dl	173.3 ± 14.0 mg/dl	
SE Mean	14.3	14.0	P > 0.05
Median	187.0	174.5	

Table 4 presents the comparative analysis of obese and non obese females.

In this group total number of obese females were 11 and those of controls were 6 in number with their BMI ranged at 31.836 ± 0.211 (obese female) and 19.183 ± 0.507 in control/non-obese females. The results were statistically highly significant ($P < 0.001$). In this group obese and control female were with their mean age ranged at 28.73 ± 4.04 and 21.000 ± 0.894 respectively. The values were not statistically significant ($P > 0.05$). Similarly obese females with their cholesterol values were 191.8 ± 21.8 and 148.7 ± 16.0 in controls. The values were not statistically significant ($P > 0.05$).

3.3. Obese Males versus Control Males

Table 5 presents the comparative analysis of age, BMI and total Cholesterol of obese and non-obese males. In this group total number of obese males were 19 and that of control males were 4 in number with their BMI ranged at 37.49 ± 1.14 (obese male) and BMI ranged at 21.125 ± 0.075 (control males).The values were statistically highly significant ($P < 0.001$). In this group obese males with their age ranged at 29.89 ± 2.19 and control males with their age averaged at 21.250 ± 0.479. The values were statistically significant ($P < 0.01$). Similarly obese males and control with their cholesterol level ranged at 208.89 ± 19.1 and 128.7 ± 8.72 respectively. The values were not statistically significant ($P > 0.05$).

4. Discussion

Obesity increases the predominance of nearly every anomalous lipid profile. Being overweight seems as significant risk factor for chronic diseases, for example, arteriosclerosis, ischemic coronary illness and diabetes, all of which are significant reason for morbidity and mortality [9]. It is an important issue around the world, and its frequency is increasing in both developed and developing countries with changes in dietary habits and activity level [21]. Being overweight and obesity lead to genuine wellbeing results, with the danger expanding logically with body mass record (BMI) and hence danger of cardiovascular sickness, type 2 diabetes and a few diseases includes endometrial, breast and colon cancer [22].

Overweight and obesity prompts numerous complexities, including BMI, diabetes, dyslipidemia and hypertension. A large portion of the historic point considers on these cardiovascular danger components have been carried out on western population. It is normal that as the BMI builds, the recurrence of these complications will additionally build. In our study contrast between BMI groups (normal, obese) were discovered just for serum cholesterol level. These results are in accordance with the results of other studies, which demonstrated that obesity is steady parameters related dyslipidemia and cardiovascular hazard in most population [19] [20]. In our study mean cholesterol and BMI showed a positive correlation. These findings are in accordance with the results from other western studies [23]-[24].

A few studies on Asian population additionally demonstrated the same discoveries [25]. Our study correlation of mean cholesterol with BMI was strong. Mean age in our study was 29.47 ± 1.99 years, which is the best representative of adult population. Mean BMI in our study was in the obese range *i.e.* 35.41 ± 0.878 Kg/m^2. Hus-

Table 4. Age, BMI and cholesterol of obese and control females.

Parameters	Obese Females (n = 11)	Control Females (n = 6)	P Values
Age Mean	28.73 ± 4.04	21.000 ± 0.894	P > 0.05
BMI Mean	31.836 ± 0.211	19.183 ± 0.507	P < 0.001
Cholesterol Mean	191.8 ± 21.8	128.7 ± 8.72	P > 0.05

Table 5. Age, BMI and cholesterol of obese and control males.

Parameters	Obese Males (n = 19)	Control Males (n = 4)	P Values
Age Mean	29.89 ± 2.19	21.250 ± 0.479	P < 0.01
BMI Mean	37.49 ± 1.14	21.125 ± 0.075	P < 0.001
Cholesterol Mean	208.89 ± 19.1	128.7 ± 8.72	P > 0.05

sain *et al.*, 2009 reported a mean BMI of more than 28 in diabetics as well as in non-diabetics [26]. Different studies done in our neighboring nations additionally demonstrated high BMI and huge commonness of obesity [27].

In a region where most of the population has poor access to good nourishment sustenance, discovering BMI in the overweight reach is disturbing. It demonstrates that notwithstanding sustenance, obesity is connected with other variables like hereditary qualities and lack of activity. Our studies additionally demonstrated that the majority of the people were not performing any exercise. The relationship of BMI and cholesterol in our study is firm modification for age, gender and exercise have likewise demonstrated that in both men and ladies, BMI was connected with cardiovascular danger figures yet the affiliation was no longer significant after age alteration. Like western countries our population is likewise at danger of obesity. BMI ought to be routinely weighed in clinical practice and epidemiological reviews. Our people need formal direction about healthy life style particularly about diet and exercise [28].

Rapidly increasing obesity prevalence rates necessitate weight management to be a priority for the prevention and treatment of chronic diseases.

5. Conclusion

In the present, study we compared the BMI and total cholesterol of non-obese and obese population of Karachi. The results of current study have reflected that BMI and total cholesterol concentration are higher in obese subjects. The increasing trend of obesity in the developing country like Pakistan specifically in females because these are socially subjected to sedentary life pattern is concerning. Thus public health authorities are strongly suggested to focus on this issue seriously.

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