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**Research Article**

# A Study to Determine a Relationship of Obesity and Serum Biochemistry in Adults of Kashmiri Population

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**Abstract:** The aim of the study was to determine a relationship of obesity and serum biochemistry in adults of Kashmiri population. Multistage and multiphase sampling technique was utilized in this study based on WHO classification of obesity according to BMI of 18-45 years of age. Each household was visited and only the subjects having age of 18-45 years were included in this study and this comprised of 5107 subjects, and then identified obese cases with the help of height and weight techniques. Only those people who had simple obesity were included in the study. People having secondary obesity, drug induced obesity and pregnant ladies were excluded from this study. Investigations for blood cholesterol and serum triglycerides were done. The data was collected and analyzed using statistical software and chi square and proportional statistical test were applied. In study population, overall prevalence of obesity in the screened population was 7.05%, rural prevalence of obesity being 6.61% and urban prevalence for obesity as 8.34%. The relationship of triglycerides with obesity in obese males and females of study population was found, out of 360 obese cases of study population 286(79.4%) were having high triglycerides than normal range and 74(20.6%) were in normal range, which is statistically significant ($p < 0.005$) the relationship of serum cholesterol with obesity in obese males and females of study population. Out of 360 obese cases of study population 202(56.1%) were having high serum cholesterol and 158(43.9%) were in normal range, which is statistically significant ($p < 0.005$). We found a strong association between obesity and level of serum triglycerides, higher triglycerides level in our population could be because of excess truncal fat and increased intra-abdominal fat, also it was observed that 56.1%(202) of obese population were having ≥ 200 mg/dl of serum cholesterol. There was no significant difference between males and females as per serum lipid levels.
**Keywords:** obesity, BMI (body mass index), Triglyceride, Cholesterol

## INTRODUCTION

Obesity is a nutritional disorder that spans all ages and ethnicities and affects both sexes. World health organization (WHO) in 2000 called an international consultation on obesity to review epidemiological data worldwide, which concluded that obesity is a rapidly growing epidemic and at the same time acknowledged its status as disease [1].

Due to obesity, many complications arises like Diabetes Mellitus type 2, Hypertension, Stroke, Hyperlipidaemia, Osteoarthritis, Coronary heart diseases, Cancer (Post menopausal breast carcinoma, endometrial, Ovarian, Gall-bladder and colon), Gall stones, sleep Apnea [2-5].

When a person gains weight, these fat cells first increase in size and later in number. When a person starts losing weight, the cells decrease in size, but the number of fat cells generally stays the same.

Simple Obesity: called as primary obesity (95%), also known as diet-induced obesity, generally caused by the heredity factor, the nutrition surplus and a lack of exercise, and characterized by the even distribution of the whole body fat. Secondary obesity: due to metabolic disorders resulted by endocrine or metabolic diseases. Drug-induced obesity: (2%). The prevalence of obesity is increasing throughout the world's population. But the distribution varies greatly between and within countries.

In Asia, the prevalence of obesity has rapidly increased [6, 7]. Women in all regions are generally more obese than men and the prevalence for those on low income is still increasing. However, the rate of obesity among women with high income is becoming

stable or even declining [8], it is acknowledged that increases in abdominal fatness (particularly, intra-abdominal fat) pose a greater risk to health than increases in fatness around the hips and limbs. The increasing westernization, urbanization and mechanization occurring in most countries around the world are associated with changes in the diet towards one of high fat, high energy-dense foods and a sedentary lifestyle [9, 10]. This shift is also associated with the current rapid changes in childhood and adult obesity. Even in many low income countries, obesity is now rapidly increasing, and often coexists in the same population with chronic under nutrition [10]. A sharp decline in cost of vegetable oils and sugar means that they are now in direct competition with cereals as the cheapest food ingredients in the world [11]. This has caused a reduction in the proportion of the diet that is derived from grain and grain products [10] and has greatly increased world average energy consumption, although this increase is not distributed evenly throughout the world's population [11].

Health consequences of obesity Mortality rates increase with BMI and they are greatly increased above a BMI of 30 kg/m$^2$ [12].

A high BMI is associated with higher blood pressure and risk of hypertension, higher total cholesterol, LDL cholesterol and triglyceride levels and lower HDL cholesterol levels. The overall risk of coronary heart disease and stroke, therefore, increases substantially with weight gain and obesity [12]. Gall bladder disease and the incidence of clinically symptomatic gallstones are positively related to BMI [12].

The relationships between these dietary patterns and weight gain or obesity is complex with both cause and effect relationships likely.

Obesity has reached epidemic proportions in India in the 21st century; affecting 5% of the country's population [13]. India is following a trend of other developing countries that are steadily becoming more obese. Morbid obesity has acquired epidemic proportions in the country. This is only the tip of an ice berg and the incidence is growing, according to medical experts [13]. Unhealthy, processed food has become much more accessible following India's continued integration in global food markets.

**Assessment of obesity**

There are many methods to assess ones built or structure, which should not usually change during one's life. One of the most commonly applied methods is calculating body mass index (BMI) for which we need to check weight and height recordings [14]. Both the measurements i.e. height and weight are necessary to record.

Ideally BMI must be in normal range, that's between 18.5 to 24.9 kg/m$^2$ [15]. If BMI is less than 18.5 kg/m$^2$, there is no risk of obesity, but definitely the person is under-nourished (malnourished) and susceptible to various diseases due to deficiency of various nutrients. But if BMI is above 25 kg/m$^2$, then the person has risk of getting other diseases and proportionately more, with increasing BMI.

**WHO Classification of adults according to BMI [16, 17]**

| Classification | BMI (kg/m$^2$) | Risk of co- morbidities |
|---|---|---|
| Underweight | <18.5 | Low (but risk of other clinical problems increased) |
| Normal range | 18.5--24.9 | Average |
| Overweight | ≥25.0 | |
| Pre-obese | 25.0--29.9 | Increased |
| – Obese class I | 30.0--34.9 | Moderate |
| – Obese class II | 35.0--39.9 | Severe |
| – Obese class III | ≥40.0 | Very severe |

The appropriateness of using BMI > 25 for defining overweight and BMI > 30 for obesity for the Asian population has been questioned by certain quarters in recent years.

## MATERIAL AND METHODS

This is a population based cross sectional study conducted over a period of one year from Feb 2009 to Mar 2010; the study was conducted in selected villages and one town of district Anantnag of Kashmir valley.

Multistage and multiphasic sampling technique was utilized in this study to screen the obese subjects and in which first of all people in the selected sample had been assessed for obesity, based on WHO classification of obesity according to BMI.

In the second phase only those subjects found to be obese had been assessed for their dietary intake and investigations for blood cholesterol and serum triglycerides was done.

First of all the sampling frame of 449 villages was prepared where from a sample of 13 villages (comprising total population of 15664 and the population in the age group of 18-45 years were 3800) , with the help of three digit random sample technique

was taken. As regards to urban areas are concerned, with the total urban population of 4765 and the population in the age group 18-45 years was 1307. All the households falling in the selected rural and urban areas, which were 4020 in number were completely enumerated and after line listing the households, each household was visited and only the subjects having age of 18-45 years were included in this study and this comprised of 5107 subjects, then identified obese cases with the help of height and weight techniques.

Only those people who had simple obesity were included in the study. People having secondary obesity, drug induced obesity and pregnant ladies were excluded from this study.

**Survey Data**

**Anthropometric Data**

Standard techniques were adopted for obtaining anthropometric measurements. Weight was measured with light clothing but without shoes to the nearest 0.1 Kg. using a portable standard weight scale. Height had been measured using a portable height scale. The subjects were instructed to stand bare feet with their head in an upright position. The reading was noted to the nearest 0.1 cm. From the ratio of weight to height square, the Body Mass Index (BMI) will be determined where BMI = Weight (kg) /Height$^2$ (m). The scales were checked for accuracy before starting the survey and after and then rechecked periodically.

Blood samples were been taken from those who were found to be obese and there total cholesterol and triglycerides levels were checked and noted as per the classification of National Cholesterol Education Programme Adult Treatment Panel 3$^{rd}$ Approach to Dyslipidemias [18].

**Statistical Analysis**

Entire data was subjected to suitable standard statistical technique. Univariate analysis was done applying specific tests, wherever applicable.

**Table 1: Prevalence of obesity**

| Residence | Population in the age-group 18-45 | Obese population | Prevalence |
|---|---|---|---|
| Rural | 3800 | 251 | 6.61% |
| Urban | 1307 | 109 | 8.34% |
| Total | 5107 | 360 | 7.05% |
| $\chi^2 = 4.47$ | $d.f. = 1$ | $p - value = 0.035$ | |

The table 1 reflects the overall prevalence of obesity in the screened population as 7.05%, rural prevalence of obesity being 6.61% and urban prevalence for obesity as 8.34%.

**Table 2: Relationship of triglycerides with obesity among obese males and obese females**

| Triglycerides (mg/dl) | | Obese | | Total |
|---|---|---|---|---|
| | | Males | Females | |
| ≥150 | No | 131 | 155 | 286 |
| | % | 77.1% | 81.6% | 79.4% |
| <150 | No. | 39 | 35 | 74 |
| | % | 22.9% | 18.4% | 20.6% |
| Total | No. | 170 | 190 | 360 |
| | % | 100% | 100% | 100% |

Table 2 shows the relationship of triglycerides with obesity in obese males and females of study population. Out of 360 obese cases of study population 286 (79.4%) were having high triglycerides than normal range and 74(20.6%) were in normal range, which is statistically significant ($p < 0.005$).

**Table 3: Relationship of serum cholesterol with obesity among obese males and obese females**

| Serum Cholesterol (mg/dl) | | Obese | | Total |
|---|---|---|---|---|
| | | Males | Females | |
| ≥200 | No | 94 | 108 | 202 |
| | % | 55.3% | 56.8% | 56.1% |
| <200 | No. | 76 | 82 | 158 |
| | % | 44.7% | 43.2% | 43.9% |
| Total | No. | 170 | 190 | 360 |
| | % | 100% | 100% | 100% |

Table 3 shows the relationship of serum cholesterol with obesity in obese males and females of study population. Out of 360 obese cases of study population 202(56.1%) were having high serum cholesterol and 158(43.9%) were in normal range, which is statistically significant ($p < 0.005$).

## DISCUSSION

The present study is a cross sectional study conducted in Kashmir province, where in 5107 people in the age group 18-45 were included out of 20429 people screened in a multiphasic sampling. Out of 5107 people selected, 2652(51.92%) were males and 2455(48.08%) were females Habibullah *et al*. [19] in 2009 reported similar trends in their study.

The overall prevalence of obesity was 7.05% in our study which include 5107 people, in which 360 came out to be obese .similar trends were found by Khan *et al*. (8%) [20], Laurier D *et al*. [21] (7%) and Pragati Chabra *et al*. (6.1%) [22].

Leo E. Hollister *et al*. [23] conducted a study and found that abnormalities in serum cholesterol levels were most frequent, occurring in over half the sample. The only laboratory abnormality conspicuously associated with serum cholesterol elevation was a concomitant elevation of serum triglycerides, the latter being almost as frequent as the isolated abnormality. Serum triglycerides were the next most commonly elevated value, but rarely occurred alone, most commonly being associated with an elevation of serum cholesterol.

We found a strong association between obesity and level of serum triglycerides. in our study overall 79.4% (77.1% males, 81.6% females) obese people had serum triglycerides ≥ 150 mg/dl as compared to 20.6% (22.9% males, 18.4% females) obese people with serum triglycerides < 150 mg/dl. Gopinath N *et al*. [24] also found that hypertriglyceridemia was more common in obese subjects than non obese. C. Kiss *et al*. [25] in their study observed that obese had a higher level of serum triglycerides. Higher triglycerides level in our population could be because of excess truncal fat and increased intra-abdominal fat accumulation also observed by Misra *et al*. [26] also it was observed that 56.1% (202) of obese population were having ≥ 200 mg/dl of serum cholesterol. There was no significant difference between males and females as per serum lipid levels.our observation were shown in various other studies [19, 27-29].

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