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# Biochemical Evaluation of Lipids in Obesity Patients

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**ABSTRACT**

Background: In the present day we have analyzed changes in the prevalence of obesity among adults. The relationships between weight status and prevalence of health condition by severity of overweight. The role of fiber consumption and its association with insulin levels, weight gain and other risk factor compared with other major dietary components.
Methods: The serum biomolecules were estimation of cholesterol, triglycerides, phospholipids, HDL, LDL, VLDL, blood glucose and protein levels were in obese and normal weight persons.
Results: Cholesterol, phospholipids and triglycerides were also found to be significantly elevated whereas HDL cholesterol level were found to be significantly decreased in obese subject as compared to normal subjects. The decreased in plasma HDL may be contributed to increased plasma triglyceride, cholesterol and phospholipids.
Conclusion: Hence in the present study we have demonstrated profound bio chemical alterations in the plasma of obese subjects. The obese persons are generally advice to maintain "ideal body weight". To take diet containing low fat especially saturated fat and cholesterol. To do physical exercise regularly.

**Keywords:**
cholesterol, obesity, triglycerides, depression, glucose and hypothyroidism.

## 1.Introduction

Obesity is the most common nutritional disorder. It is defined as a condition in which there is excessive accumulation of fat in the subcutaneous tissue and other parts of the body. The form obesity is used when the weight exceeds more than 25kg/m$^2$. Obesity results when too much fat accumulates in the body. A person is normally considered obese when his or her weight is 20% over the normal body weight for height and age and the body mass index (BMI) measures 30 or more, now recognized as a serious medical problem, obesity affects about 30% of adults and about 14% of children and adolescent in the united states (1). Over eating couple with lack of physical exercise contribute to obesity (2). In practical settings, obesity is typically evaluated in absolute terms by measuring BMI, but also in term of its distribution through waist circumference (or) waist hip circumference ratio measurement (3).

**Table 1:** Weight Classification by BMI

| NLHBI | BMI Kg/m$^2$Range | WHO Classification |
|---|---|---|
| Under weight | <18.5 | Under weight |
| Normal weight | 18.5-24.9 | Normal weight |
| Over weight | 25-29.9 | Pre obese |
| Obesity class-1 | 30-34.9 | Obese class-1 |
| Obesity class-2 | 35-39.9 | Obesity class-2 |
| Obesity class-3 | ≥ 40 | Obesity class-3 |

**NHLBI-** National Heart, lung and blood institute

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Psychological factors emotional disturbances, depression, anxiety, frustration and lowliness affect endocrine systems which will result in obesity (4). If a person takes in more calories than his or her body burns up, the extra calories are stored in the form of fat (5). Single locus mutations have been found in only about 5% of obese individuals. While it is though that a large proportion of the causative are still to be identified viz hypothyroidism and hypogonadism. Much obesity is likely the result of interaction between multiple genes and non-genetic factors are likely also important (6). The many peptides implicated in the control of appetite are neuropeptide, proopiomelanocortin, melanocyte stimulating hormone and the endorpluns and enkephalins. (7) The presence of risk factors and disease associated with obesity are also used to establish a clinical diagnosis such as coronary heart disease, type 2 diabetes, sleep apnea. These are possible life threating risk factors that would indicate clinical treatment of obesity. Smoking, hypertension, age and family history are other risk factor that may indicate treatment. (3)

Diagnosis of obesity is made by comparing the patients weight with ideal weight charts. A direct measure of body fat can also be made with an instrument know as calipers. Calipers are a scissor shaped device used to measure the thickness of a person's flesh at the back of upper arm. This measurement can be used to tell whether a person has an excess fatty tissue. Women whose body weight consists of more than 30 percent fatty tissue are regarded as obese. Men with 25 percent fatty tissue in their body weight are considered to be obese. Doctors may also note the way in a person's body fat is distributed. Some patterns of distribution are association with certain complications of obesity. For example, a person who is "apple shaped" has a higher risk of cancer, heart disease and diabetes than someone who is "pear shaped". An "apple shaped" person is one whose weight is concentrated around the waist and abdomen. A "pear shaped" person is one whose extra weight tends to be around the hips and thighs. (5)

This can arise in different ways and obesity is a clinical with several possible causes. Obesity also leads to cardiovascular disorders hyperlipidemia, hyper uricaemia and gout which are all more common among the obese than in the general population.Whatever the ultimate of obesity in the individual is immediate cause is energy imbalance and weight reduction can be achieved only by reducing energy intake or by increasing output or by a combination of the two thus treatment is difficult and the patient needs motivations. It is an important that obese patients should be personal advice as to how they should reorganize their dietary and exercise habits, an agreed target weight to aim for an indication of the rate of weight loss expected (15).

## 2. Methods

### Patients and blood sample

Fifteen obese person were obtained from Kanchipuram and walajapet and equal number of subjects serves as control, were chosen for the study. Both controls and patients were ranging in the age from 20 to 40years.

### Estimations

The serum cholesterol levels were estimated by zlatkis, zak and Boyle method (8),

The level of triglycerides was estimated by Randrup A and Van Handel E (9,10). Phospholipids were estimated using fiske and subbarow method (11). The HDL cholesterol was estimated by the heparin manganese chloride precipitation method. Blood glucose was estimated by the method of fingsetal (12). The protein content in plasma was estimated by the method of Lowery et al (13).

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Estimation of VLDL cholesterol = triglycerides /5. Estimation of LDL cholesterol = total cholesterol – (HDL cholesterol + VLDL cholesterol).

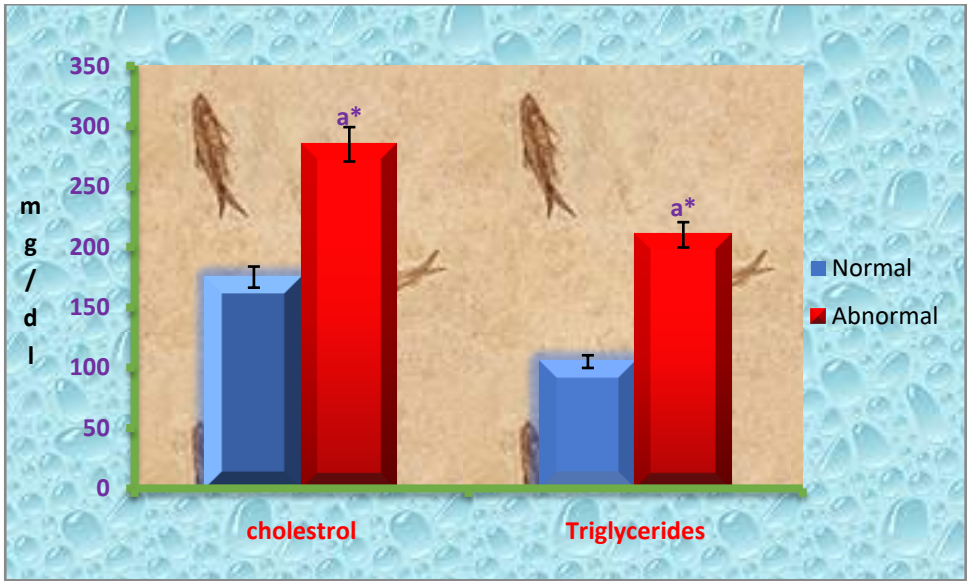
## 3. Results and Discussion

Table II: shows the case history of obese and normal individual subjects investigation. All these subjects are age and sex matched.

| General Characters | Normal | Obesity |
|---|---|---|
| Total no. of persons | 15 | 15 |
| Sex | Male and female | Male and female |
| Age | 20 - 40 | 20 - 40 |
| Food habits | Vegetarians | Vegetarian and non-vegetarian |
| Clinical status | - | obesity |

The modified students 't' test was used to compare the mean of these groups. The present study deals with the influence of obesity the metabolic rate of dietary lipids. We showed that the defect in the oxidation of exogenous long chian triglycerol, a defect that was proportion to fat mass (14). In the study, the appearance of label in fatty acid was due to the hydrolysis of chylomicron, triglycerol by lipoprotein lipase. The lack of obese subjects could have been related to defect in chylomicron, triglycerol clearance (15).
In the present study we analyzed the levels of lipid profile status in obese person. The result obtained was compared with normal and obese subjects.

**Figure 1.** Level of cholesterol and triglycerides in normal and obese subjects




Values are expressed as mean ± S.D from 15 subjects in each group.
*Significantly different from normal ($P < 0.05$)

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Figure 1shows the level of plasma lipid profile in normal and obese subjects. The level of cholesterol and triglycerides were significantly increased in obese subjects when compared to normal subjects (16). In obese person insulin affects many site of mammalian lipid metabolism. It stimulates the synthesis of fatty acids in liver adipose tissue and in the intestine. Insulin has also been reported to increase the cholesterol synthesis. High concentration of cholesterol in obese person may be due to decrease muscular exercise or inhibitor of cholesterol catabolism (17). Increased synthesis of cholesterol in the body, due to the very high amount of sugar and fat consumed. Because increased blood cholesterol, there is tendency of atherosclerosis which is a condition of thickening and narrowing of blood vessels like aorta, lungs, arteries etc. the thickening is due to the deposition of cholesterol of and other lipids in inner wall of arteries. Increase triglyceride level may be risk factor for vascular diseases. Hyper triglyceridemia has been associated with obesity. Hyper triglyceridemia may be related to the insulin resistance and consequence hyper insulinemia of obesity. Catecholamines activate lipolysisin adipose tissue and increase free fatty acid flow to the liver where increased triglyceride synthesis and secretion occur (18).

Table III.shows the level of plasma lipid profile in normal and obese subjects. The level of LDL and VLDL were significantly increased in obese subject when compared to normal subject. In obese condition insulin increase the number of LDL receptor, insulin deficiency appears, it diminishes the level of LDL receptor.

**Table III.** level of LDL and VLDL in normal and obese subjects

| S.No | Parameter | Normal | Abnormal |
|---|---|---|---|
| 1. | LDL (mg/dl) | 105 ± 10.95 | 177.13 ± 2.26 * |
| 2. | VLDL (mg/dl) | 21.56 ± 2.66 | 41.82 ± 1.59 * |

Values are expressed as mean ± S.D from 15 subjects in each group.
*Significantly different from normal (P<0.05)

This causes LDL particle and result in increased LDL cholesterol. The VLDL production rates may be greater in obese than in normal. Accumulation of partially metabolized triglycerides rich lipoprotein causes storage of VLDL in blood due to apo B defect have been linked to pathogenic process. Alteration in VLDL metabolism are involved in the pathogenesis of coronary heart disease (19,20).

**TABLE IV**: level of HDL and phospholipid in normal and obese subject

| S. No | Parameter | Normal | Obese |
|---|---|---|---|
| 1. | HDL (mg/dl) | 44.73 ± 3.56 | 30.80 ± 1.01 * |
| 2. | Phospholipid (mg/dl) | 172.38 ± 1.76 | 196.34 ± 1.15 * |

Values are expressed as mean ± S.D from 15 subjects in each group.
*Significantly different from normal (P<0.05)

Table IV shows the level of HDL and phospholipid in normal and obese subject. The levels of HDL were slightly decreased in obese subject when compared to normal subject. HDL which transport endogenous cholesterol from the tissue to the liver that is it removes cholesterol from

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the tissue. HDL therefore function as cholesterol scavenger. Decreased HDL may be due to increased triglyceride and cholesterol. HDL cholesterol tend to be lower in obese people. Low HDL cholesterol are often associated with raised plasma triglycerides. The level of phospholipids was increased in obese subject when compared to normal subject. Increased phospholipids level is seen in obese subject may be due to increased plasma cholesterol level. Phospholipids increased with increase in cholesterol, the rise in smaller implies, to liver and biliary tract diseases, diabetes mellitus and obesity.

**Table V.** Level of glucose and protein in normal person and obese subject

| S. No | Parameter | Normal | Obese |
|---|---|---|---|
| 1. | Glucose (mg/dl) | 112.46 ± 4.83 | 132.06 ± 5.52 * |
| 2. | Protein (g/dl) | 6.84 ± 0.53 | 4.79 ± 0.82 * |

Values are expressed as mean ± S.D from 15 subjects in each group.
*Significantly different from normal ($P<0.05$)

Table V shows the level of glucose and protein in normal and obese subject. The level of glucose was increased in obese person when compared to normal weight. If too much cane sugar is consumed, it is good as consuming too much of glucose (or) starch and hence insulin has a direct effect in depositing atheromatous plaques in the arteries as well as fat in the adipose tissue leading to obesity. A strong association exists between obesity and diabetes mellitus(21). Diabetes mellitus is a disease in which there is an inefficient utilization of dietary starch and sugars in the body for want of insulin. Patients with this disease have a high level of sugar in their blood and urine. Obese person has been found to be more prone to bee diabetic as compared to those with normal weight (22). The level of protein is reduced in obese subject when compared to normal subjects. Plasma protein concentration are also moderately reduced in the metabolic response to severe injury or infection as well liver cirrhosis and nephritic syndrome (23).

Cholesterol, phospholipids and triglycerides were also found to be significantly elevated where as HDL cholesterol levels were found to be significantly decreased in obese subject as compared to normal subjects. The decreased in plasma HDL may be contributed to increased plasma triglyceride, cholesterol and phospholipids. Obesity refers to an excess of body fat. It is due to energy make that Ingrate than energy expenditure. In the obesity, there is an increased prevalence of cardiovascular disease, hypertension, diabetes, pulmonary disorders and gall stones. Insulin resistance and hyper insulinemia are characteristics feature of human obesity one possible mediator of insulin resistance in obesity is increased levels of free fatty acids. The lipid abnormalities of obese are those expected to athrogenic. (i) Increased low density lipoprotein (LDL) and cholesterol. (ii) Increased very low density lipoprotein (VLDL) and triglycerides. (iii) Decreased high density lipoprotein. Obesity is associated with hypertension which improves (or) reverse with weight reduction. Gall stone are more common in obese than normal individual. The reason for this formation is that the bile of obese individuals is supersaturated because of enhancebillary secretion of cholesterol.

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## 4. Conclusion

Hence in the present study we have demonstrated profound bio chemical alterations in the plasma of obese subjects. The obese persons are generally advice to maintain "ideal body weight". To take diet containing low fat especially saturated fat and cholesterol. To do physical exercise regularly.

## 5. Conflict of Interest

The authors declare no conflict of interest.

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