Study of Serum Triglyceride in obese and non-obese subject

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Abstract

The global epidemic of overweight and obesity is rapidly becoming a major public health problem in many parts of the world. Rapidly changing diets and lifestyles are fueling the global obesity epidemic**.** It is associated with an increased risk of developing various non-communicable diseases, including hypertension, coronary heart disease, diabetes, stroke and some forms of cancer**.** Obesity has been found to be associated with changes in levels of serum triglycerides and it may differ with age, sex, weight, height, BMI (Body Mass Index) and life style groups. This study aims at measuring and correlating values of serum triglyceride level in obese and non-obese individuals. It has been found that obese individuals having increased BMI and sedentary life style had high triglyceride level as compared to non-obese individuals. They are at high risk for CHD, so early detection of alteration in serum triglyceride level will prevent CHD and non-communicable diseases.

Key Words: Body mass index, Diabetes, Fat, Hypertension, Obesity

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Introduction

According to the World health organization[1], obesity is a condition in which body mass index (BMI) of a person goes beyond 30.

Obesity is a multifactor disorder and its development is due to multiple interactions between genes and environment. The primary cause for being overweight and obese is unhealthy dietary habits, reduced physical activities as well as the genetic predisposition.[2]

Obesity is perhaps the most prevalent form of malnutrition. As a chronic disease, prevalent in both developed and developing countries, and affecting children as well as adults, it is now so common that it is replacing the more traditional public health concerns including under nutrition. It is most significant contributors of ill health.[3]

In 2014, more than 1.9 billion adults, 18 years and older, were overweight. Of these over 600 million were obese. Overall, about 13% of the world's adult population (11% of men and 15% of women) was obese in 2014. In 2014, 39% of adults aged 18 years and over (38% of men and 40% of women) were overweight. The worldwide prevalence of obesity more than doubled between 1980 and 2014.[4]

According to the **NCEP ATP III (National cholesterol education program Adult treatment panel-III)**[5] Triglyceride level less than 150mg/dl is considered as normal while more than 150mg/dl is considered as risk factor for CHD. If it is more than 500mg/dl than it is a very high risk for pancreatitis also.

The present study aims to correlate and test the hypothesis that there are metabolic derangements in obese individuals like altered Serum triglyceride level.

Material and methods

The study was carried out in Physiology department of Smt. N.H.L. Municipal Medical College & V.S. general hospital, Ahmedabad during a time period from June 2008 to November 2010. Total sixty five obese subjects of the age group between 20-70 yrs, coming for health check up at this institute, were selected for the study. Subject with BMI 30 or more than 30 are taken as obese.

Thirty five non-obese volunteers who were non-smokers and non-tobacco chewers with BMI less than 30, age group of 20-70 years were selected for control or comparison of the study.

Subjects taking lipid lowering agents, with hypothyroidism, taking oral contraceptive pills and with any metabolic disorder affecting lipid profile were excluded

The ethical committee of the hospital gave ethical approval for the study. Informed consent prior to study was taken from all the subjects.

Information about Name, Age (years), Sex, Education, Occupation, Weight (kilogram), Height (meter), Address, any history of metabolic diseases (diabetes, hypertension etc.) is obtained from each subjects.

The weight was taken using battery operated body weight scales & height was measured by using a 'drop down' tape measure fixed at about 2metres on a wall, subjects were asked to remove any heavy objects with them like keys, wallet, ornaments, and shoes etc. before taking the readings for weight & height.

BMI calculated for all the subjects using readings of weight in kilograms & height in meter.

BMI = Weight (kg)/Height $(m)^2$

All the subjects were divided according to their life style in active, moderately active & sedentary groups[6]. After an overnight fast venous blood (5 mL) was drawn from each participant and transferred to new plain screw-capped disposable plastic tubes and allowed to stand at room temperature until clotted and the clot retracted (about 2 hours).

After centrifugation, the serum was separated and transferred to plain cryotubes. This was aliquoted and stored at −72°C until analysis was done for serum triglycerides.

Commercial assay kits manufactured by Roche Diagnostics (Basel, Switzerland) were used to determine triglycerides (Triglyceride Kit). All analyses were done using the Hitachi 902 autoanalyzer (Hitachi Ltd, Tokyo, Japan).

Results

Following observation were made from the study of lipid profile in 65 obese and 35 non obese subjects.

Table 1: Serum triglyceride in obese & non obese

S. triglyceride (mg/dl)	No. of obese subjects	No. of non obese subjects
0-199	32	32
200-299	14	02
300-399	10	01
>400	09	00
Total	65	35

Table 2: Serum triglyceride in obese and non- obese

		Obese	Non obese	P value
S. triglyceride (mg/dl)	Mean	186.03	126.55	<.0001
	S.D.	108.62	60.94	

Level of serum triglyceride is significant (p value<.0001) in obese individuals as compared to non-obese individuals.

Table 3: Comparing S. triglyceride in obese with different life style

		Life Style			P value
		A	MA	S	
S. triglyceride (mg/dl)	Mean	160.14	185.31	209.30	0.2954
	S.D.	103	103	123	

Level of serum triglyceride does not showing any significance (p value>.05) with life style of individuals.

Table 6: Comparing S. triglyceride in Obese and Non – Obese with Different Age Groups

Sr. no.	Age groups (yrs)	N=Number of subjects in group	Serum Triglyceride (mg/dl)		P value
1	20-40	Obese (N=16)	194.03	107.50	0.0073
		Non-obese (N=20)	139.54	66.63	
2	41-60	Obese (N=45)	214.70	102.26	0.0041
		Non –obese (N=11)	122.40	36.12	
3	61-70	Obese (N=4)	230.45	79.78	0.933
		Non –obese (N=4)	128	64.80	

Above table is showing that in age group of 20 to 40 yrs and 41 to 60 yrs the triglyceride level is significantly higher (p value <.05) in obese individuals as compared to non obese individuals while in age group 61 to 70 yrs it is not showing any significance (p value >.05) this could be due to small sample size in age group of 61 to 70 yrs.

Discussion

According to a Comparative Study of blood lipid profile of obese and non-obese sedentary college men[7], When various parameters of blood lipid profile were compared it was observed that there was significant difference between obese and non-obese subjects in relation to total cholesterol triglycerides and high density lipoprotein. On the average, the more fat, the more likely an individual will be dyslipidemic and to express elements of the metabolic syndrome.

Mechanism contributing to complications of altered lipid profile in obesity is due to excessive fat in visceral adipocytes which release an excess amount of Free Fatty Acids. This further increases synthesis of triglycerides and secretion of VLDL rich in triglycerides into circulation increasing fasting TG blood levels. Through cholesteryl ester transfer protein (CETP), TGs from VLDL are exchanged for cholesterol in HDL. TG-rich LDL and VLDL subsequently undergo hydrolysis by hepatic lipase or lipoprotein lipase leading to formation small, dense LDL particles which are more toxic and atherogenic[8]. This atherogenicity is the root cause for all obesity related complications.

According to a study of Obesity in Spanish Schoolchildren: Relationship with Lipid Profile and Insulin Resistance[9]. When comparing the lipid profile between obese and non-obese children, they observed that, in both sexes, obese children had significantly higher triglyceride levels than non-obese children. The findings of our study are also almost similar in which obese subjects are having higher triglycerides level.

According to a study of blood triglyceride in obese and overweight patient at Cardiology department, University of Lubin, 2003.[10] It was observed that the total triglycerides concentrations is higher in obese. Present study showed statistically significant higher values of Serum Triglycerides in obese individuals. These results are in accordance with a cross sectional study done during 2009-10 by Michael Khoury, Cedric Manlhiot et al which showed statistically significant association between lipid profile and measures of adiposity[11]**.** Another case control study of adolescents done by Gilles Plourde on caucassian adolescents also revealed that overall abnormal glucose and lipid profile were significantly associated with obesity[12.]

Conclusion

In present study the values of harmful lipid like triglycerides levels in obese group was significantly higher, early and immediate interventional measures like increase in physical activity, healthy dietary habits and regular surveillance are required in them to prevent development of irreversible dangerous complications.

Conflict of Interest: None
Source of Support: Nil

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