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A COMPARATIVE STUDY OF LIPID PROFILE IN OBESE AND NON-OBESE SUBJECTS

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ABSTRACT

Background - this cross-sectional, prospective study was done to observe pattern of lipid profile alteration in non-obese patients, to study the alteration of lipid profile in obese patients and to evaluate the any association between lipid profile and other parameters. **Aims and objective** – to compare the lipid profile between obese and non-obese patients with statistically analysis. **Results** – total 113 (42 obese and 71 non-obese) subjects were analyzed in this study. The mean age in obese group was found to be 41.24±8.64 years and maximum participants (82.00%) were from 40-50 years age group. The mean values of LDL, total cholesterol and triglyceride were high in obese than non-obese subject. **Conclusion** - It is concluded that mean value of triglycerides, LDL, HDL and total cholesterol was found to be significantly higher in obese individuals in comparison to the non-obese patients. We did the comparative study of lipid profile between obese and non-obese person and found significant difference statistically. These results indicate us that obesity is the progenitor of multiple medical and surgical illnesses.

KEYWORDS: BMI, Cholesterol, HDL, Lipid Profile, LDL, Non-obese, Obese.

INTRODUCTION

India is the country that comprising 17% populations of the world and stand over the second step. It contributes 16% deaths in the world.[1] Obesity is the worldwide major health problem. More than 135 million persons of India, having the obesity.[2] On the other hand Malnutrition is also a major health problem. The malnutrition is associated with socio-cultural determinant and lack of knowledge and awareness.[3] Obesity is rapidly increasing in India. Obesity becoming a new health burden for India. Their consequence leads to affect the healthy life. So, better understanding about the load of obesity in Indian population helps in early prevention.[4] Serum cholesterol level, triglycerides and blood sugar level are strongly associated with obesity. The development of hypertension, cardiovascular disorder and diabetes may be consequences of obesity.[5] Obesity itself increases the risk of cardio-vascular accident in Asian Indian population.[6] Pathophysiology of deranged lipid profile in obese population is multifactorial. Over production of VLDL, triglyceride lipolysis decrease, decrease peripheral free fatty acid trapping, increased release of free fatty acid from adipocytes to the liver and other tissues explain the pathophysiology in obese population.[7]

MATERIAL AND METHODS

The present study was conducted in Rukmani Devi Beniprasad Jaipuria Hospital, Jaipur. This study was conducted in the Department of Medicine of a tertiary care hospital, a comprising study of obese and non-obese individual. This study was conducted between August 2019 and July 2020. Detailed clinical history, clinical examination and biochemical test results were noted. A detail Proforma with evaluation of height, weight, level of physical activity co-morbid condition was filled.

Biochemical Measurement was done in the form of Serum cholesterol (mg %), Serum triglyceride (mg %), Serum HDL (mg %), Serum LDL (mg %), Serum VLDL (mg %), LDL/HDL ratio, Serum cholesterol, serum triglyceride and serum HDL. They were estimated by enzymatic method and value of S. LDL, serum VLDL were calculated by the friedewald formula (VLDL = TG/5, LDL=Total cholesterol –HDL-TG/5). The results were expressed as mg/dl.

Study design: - It is comparative, cross-sectional and prospective study.

Study area: - Study was conducted in Rukmani Devi Beni Prasad Jaipuria Hospital, Jaipur.

Sample size: - $Z^2 \times p \times q / e^2$

Z=1.96 (value of 5% confidence level)

p- Prevalence = 92%

q= 1-p

e- Allowable error

Hence,

N= $3.84pq/e^2$= 3.84x92x8\52= 113

So total 113 cases were taken in this study (including obese and non-obese)

AIMS AND OBJECTIVES

Aim

To compare lipid profile in obese and non-obese individuals

Objectives

1) To observe pattern of lipid profile alteration in non-obese patients.
2) To study the alteration of lipid profile in obese patients
3) To evaluate the any association between lipid profile and other parameters.

Selection criteria of patients

Inclusion criteria

1) Patients were selected regardless of gender but of age group above 18 years.
2) Patients giving informed consent
3) Patients who have BMI more than 30 are taken as obese
4) Patients who have BMI less than 30 are taken as non-obese
5) Patients who were non obese were non-smoker and non-tobacco chewer

Exclusion criteria

1) Patient not willing to participate in the study.
2) Free from any endocrine condition that could lead to obesity/ dyslipidemia like hypothyroidism
3) Taking any drug that affects lipid profile/ body weight like oral contraceptive drugs
4) Influencing hydration status thereby changing anthropometric measurements
5) Having any metabolic disorders which affect lipid profile.

Technique

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

BMI = Weight (kg)/Height2 (m)

Normal values for BMI

Under weight: 30

Normal weight: 18.5-24.9

Over weight: 25-29.9

Obesity: >30

All the subjects were divided into two groups according to their BMI values.

Group –I Obese

Group –II Non obese

After an overnight fasting, venous blood (5 mL) was taken from each participant and then transfer to new plain screw capped disposable plastic tubes. After collection of blood sample they were centrifuge for the serum separation. Centrifuge was done for 10 minutes at 1000 rpm.

1ml of serum was separated for biochemical parameters ie Total Cholesterol (TC), Triglycerides (TG), low density lipoproteins (LDL) and High density lipoproteins (HDL). Estimation of serum total cholesterol was done by cholesterol oxidase / phenol amino antipyrine method (CHOD-PAP) 76. Estimation of serum HDL cholesterol by immune inhibition method and LDL-cholesterol were calculated according to the Friedewald equations77. Friedewald formula: LDL=TC-(HDL+TG/5) Estimation of serum triglyceride by glycerol phosphate oxidase (GPO) method78.

Statistical analysis

The collected data was tabulated by using MS Excel software. Statistical analysis was done using SPSS version 22 software. Results are expressed as mean ± standard deviation. Statistical significance was defined by $P<0.05$.

RESULTS

This study was performed in 113 subjects, out of them 71 (62.83%) patients were non-obese while 42 (37.17%) patients were obese (table 1).

In the obese and non-obese groups male female ratio were 22:20 and 27:44 respectively (table 2). The mean age in obese group was found to be 41.24 ± 8.64 years and maximum participants (82.00%) were from 40-50 years age group (table 3). The mean age was 40.02 ± 8.29 years among female patients and 42.41 ± 8.89 years among male patients of obese group (table 5). The mean age in non-obese group was found to be 27.78±8.63 years and maximum participants (80.00%) were from 20-30 years age group (table 4). The mean age was 27.68 ± 8.78 years among female patients and 27.83 ± 8.61 years among male patients of non-obese group (table 5).

The mean height of the patients was 1.65 ± 0.06 meter. It was 1.66 ± 0.13 meter in the non-obese group while it was 1.64 ± 0.24 meter in the obese group. No significant difference was there between groups. The mean body weight was 81.75 ± 9.68 kg. It was 97.25 ± 8.21 kg in the obese group while it was 65.27 ± 5.31 kg in the non-obese group. Body weight was significantly higher in the obese group patients. The mean BMI was 30.04 ± 4.56. It was 36.34 ± 3.21 in the obese group while it significantly lowers in the non-obese group 24.67 ± 2.56 (table 6).

The overall mean value of triglycerides was found to be 138.67 ± 35.84 mg/dl. It was 152.54 ± 47.63 mg/dl for the obese patients while it was 123.14 ± 17.06 mg/dl for the non-obese patients. The mean value of LDL was found to be 105.61 ± 15.66 mg/dl. It was 127.37 ± 39.47 mg/dl for the obese patients while it was 87.12 ± 9.35 mg/dl for the non-obese patients. The mean value of HDL was found to be 41.11 ± 6.89 mg/dl. It was 38.61 ± 8.86 mg/dl for the obese patients while it was 43.31 ± 6.11 mg/dl for the non-obese patients. The mean value of TC was found to be 178.62 ± 35.46 mg/dl. It was 222.99 ± 52.88 mg/dl for the obese patients while it was 137.14 ± 20.54 mg/dl for the non-obese patients (table 7).

Table 1: Distribution of patients among groups.

Group	N	Per cent
Obese	42	37.17%
Non-obese	71	62.83%
Total	113	100.00%

Table 2: Gender-wise distribution of patients among groups.

Group		N	Per cent
Obese	Male	22	52.38%
	Female	20	47.62%
Total		42	100.00%
Non-obese	Male	27	38.00%
	Female	44	62.00%
Total		71	100.00%

Table 3: Gender-wise and age group-wise distribution of Obese patients.

Age Group (years)	Obese		
	Gender		Total
	Female	Male	
20-30	1	1	2
30-40	5	8	13
40-50	12	11	23
>50	2	2	4
Total	20	22	42

Table 4: Gender-wise and age group-wise distribution of Non-obese patients.

Age Group	Non-obese		
	Gender		Total
	F	M	
20-30	14	31	45
30-40	3	4	7
40-50	2	3	5
>50	1	3	4
Total	20	41	71

Table 5: Mean age of obese and non-obese patients.

Patients	Female (mean ± SD) age in years	Male (mean ± SD) age in years	Total (mean ± SD) age in years
Obese patients	40.02±8.29	42.41±8.89	41.24±8.64
Non-obese patients	27.68±8.78	27.83±8.61	27.78±8.63

Table 6: Mean height, Mean body weight, Mean BMI of patients across groups.

	Obese	Non-obese	Total	Significance
Mean height mean ± SD (meter)	1.64±0.24	1.66±0.13	1.65±0.06	0.12 (NS)
Mean body weight (kg.)	97.25±8.21	65.27±5.31	81.75±9.68	0.002 (S)
Mean BMI	36.34±3.21	24.67±2.56	30.04±4.56	0.0068 (S)

NS – not significant, S – significant

Table 7: Mean value of lipid profile of patients across groups.

	Obese	Non-obese	Total	Significance
Mean value of TG (mg/dl)	152.54±47.63	123.14±17.06	138.67±35.84	0.0002 (S)
Mean value of LDL (mg/dl)	127.37±39.47	87.12±9.35	105.61±15.66	0.000 (S)
Mean value of HDL (mg/dl)	38.61±8.86	43.31±6.11	41.11±6.89	0.012 (S)
Mean value of TC (mg/dl)	222.99±52.88	137.14±20.54	178.62±35.46	0.002 (S)

NS – not significant, S - significant

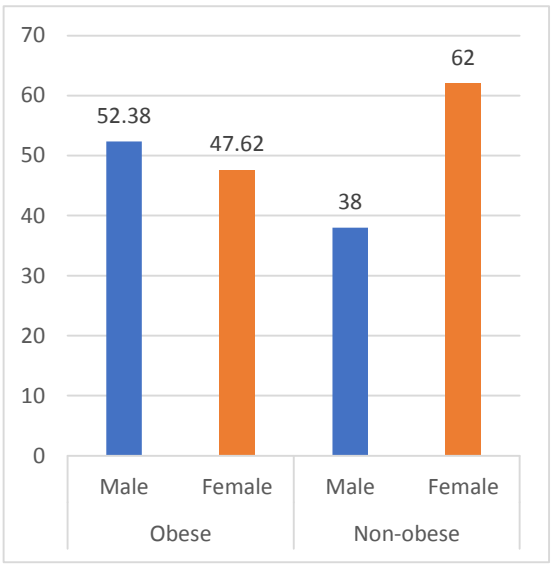

Figure 1: Gender-wise distribution of patients among groups.

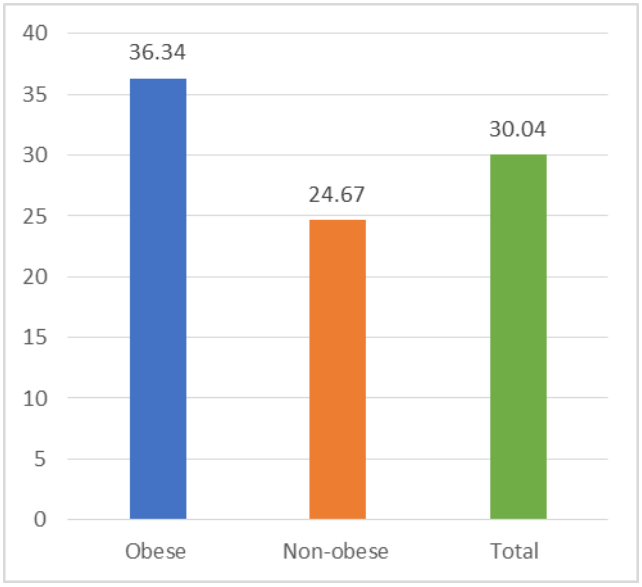

Figure 2: Mean BMI of patients across groups.

DISCUSSION

WHO Definition of Obesity is 'the abnormal or excessive collection of the fat in the body to the extent that the health is impaired'.[8] Obesity is becoming the major health problem and its comorbities becoming expensive or lethal to person. It causes cardiovascular pathology. Familial tendency of cardiovascular also will be seen in obese family.[9]

Excessive fat deposition causes adipose tissue dysfunction. This leads to positive caloric balance and sedentary lifestyle. This is known as "Adiposopathy". Adiposopathy causes deranged lipid profile. Such changes cause high blood pressure, cardiovascular disease and type 2 diabetes mellitus due to insulin resistance.[10]

A similar study reported by Babu SV et al in 2017. This study resulted that the mean values of total cholesterol in the normal and increased BMI groups were found to be a statistically significant difference with a p-value of 0.040. The mean LDL cholesterol value in normal BMI group was 111 ± 27 and increased BMI group was 128 ± 30. There was a statistically highly significant difference in the mean LDL cholesterol values with a p-value of 0.010.[11] Our study also showed statistically difference in values of total cholesterol and LDL with P value of 0.002 and 0.000 respectively. Mean triglycerides and mean HDL values were not statistically different in their study, but our study showed statistically significant difference with P values of 0.0002 and 0.012 respectively (table 7). An another study from Karbala, Iraq showed significant increase in levels of serum cholesterol and serum LDL –C and a significant decrease HDL-C in obese people.[12] Our study results also compatible with this study.

Low HDL-C, high LDL-C and high TG level are highly associated with an increase in BMI.[13] A similar study of Khan MN et al, 2016 was done at University of Aljouf, Kingdom of Saudi Arabia. Results of their study are as following, the total cholesterol was significantly higher (198.0mg/dl) in obese in comparison with the non-obese (165.6 mg/dl), $p<0.05$. Triglycerides were also significantly higher (146.6 mg/dl) in obese compared to the non-obese (102.8 mg/dl), $p<0.05$. LDL-C was found to be significantly higher (117.4mg/dl) in obese compared to the non-obese (105.5mg/dl), $p<0.05$. But a significantly lower value (34.8mg/dl) was obtained in obese compared to the non-obese (40.4mg/dl), $p<0.05$ for HDL-C.[14] Similar pattern found in our study. Our study showed that obese people have raised BMI. These peoples blood lipid profile showed low HDL, high LDL and high TG level.

Generally physically active person rarely face the obesity or deranged lipid profile. Sedentary life style more prone for obesity and deranged lipid profile.[15] A High intensity intermittent exercise for 15 to 20 min for 3 to 4 days in a week can cause significant change in the LDL and improvement in diastolic blood pressure. BMI can be reduced by moderate intensity exercise. Cardio metabolic profile can be improved by High or moderate intensity exercise.[16]

CONCLUSION

Our study showed that there were significantly differences in mean values of triglycerides, total cholesterol, LDL, and HDL between obese and non-obese. Finally it is concluded that mean value of triglycerides, LDL, HDL and total cholesterol was found to be significantly higher in obese individuals in comparison to the non-obese patients. It indicates that obese individuals have deranged lipid profile. These individual needs change their life style, feeding habits, and routine for health. Otherwise it will increase the morbidity and further more.

Malnutrition and obesity both are standing at two poles of health sector in the world which are the challenge for health policies. Obesity is neglected sector till now. It needs to be general awareness and implementation in life to keep away the obesity.

Abbreviations

LDL – low density lipoprotein

HDL – high density lipoprotein

TC – total cholesterol

TG – triglycerides

BMI – body mass index

Source(s) of support: Nil

Conflict of Interest/Disclosure of relationships and activities: None

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