A COMPARATIVE STUDY OF LIPID PARAMETERS IN OBESE AND NONOBESE FEMALES

Nagashree. V*, Nausheen Rumana, Revathi Devi. M.L

Department of Physiology, Mysore Medical College and Research Institute, Irwin road, Mysore- 570001, Karnataka, India

***Corresponding author:**
E-mail: nagashreev86@gmail.com

ABSTRACT

Obesity, a chronic non communicable disorder is associated with abnormal, excessive body fat accumulation. Obesity has reached epidemic levels worldwide. It is a key risk factor in development of various dangerous complications like dyslipidaemia, diabetes mellitus, hypertension, cardiovascular diseases, infertility etc. This study aims at measuring and correlating values of blood lipid parameters in obese and non-obese individuals. It has been found that obese females having increased waist circumference, BMI and body fat percentage had altered lipid profile. They are at higher risk of developing obesity related complications. Thus, early detection of metabolic impairments will help in pursuing the preventive measure and to halt its progression into irreversible hazardous complications.

Key Words: *Obesity, body fat percentage, BMI, lipid profile, dyslipidaemia.*

INTRODUCTION

Obesity or overweight is defined as a condition of abnormal, excessive fat accumulation that may impair health. The words 'obese'/'obesity' have their origin in French and Latin, where 'obedere' means 'over eat' and 'obesitas' means being very fat[1]. It is estimated that there are more than 500 million clinically obese people world-wide. The overall average prevalence of obesity in adults for the year 2008 was 12% of the global population[2].Obesity has reached epidemic proportions in India in the 21st century, with morbid obesity affecting 5% of the country's population. Obesity is a major contributor to the global burden of chronic disease and disability, affecting all age groups and socioeconomic groups. According to WHO 2008, in all parts of the world, women are more likely to be obese than men, and thus at greater risk of diabetes, cardiovascular disease, hypertension and cancers3.

The etiology of obesity is complex and multi-factorial, that includes environmental, social and genetic factors. Sedentary lifestyle and consumption of high calorie foods of low nutritional value contributes for alarming outburst of overweight and obesity. An important aspect of obesity is the regional distribution of excess body fat as the mortality and morbidity vary with the distribution of body fat, with the highest risk linked to excessive abdominal fat (central obesity)[4]. As the incidence of obesity is increasing rapidly, several research efforts for effective treatment strategies focus on diet and exercise programmes. The foremost objective of these trials has been the reduction in body fat leading to a decrease in risk factors for development of metabolic syndrome.

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

MATERIALS AND METHODS

In present study a total number of 140 female subjects were considered and grouped into 2 groups containing 70 obese and 70 non obese medical and paramedical students of Mysore Medical College and Research Institute belonging to age group of 18-25 years. Females with BMI more than 25 are grouped as obese (Classification of weight by BMI in Asian and Euripides adults by WHO) and also with Body fat percentage more than 39% are considered as obese[5].

Subjects with history of diabetes mellitus, hypertension, cardiovascular

diseases, drug intake, active sports training, yoga, aerobic exercise, other metabolic disorders were excluded from the study. Study was conducted after obtaining Ethical clearance from the ethical committee of MMC&RI. Informed consent was taken from all the participating subjects

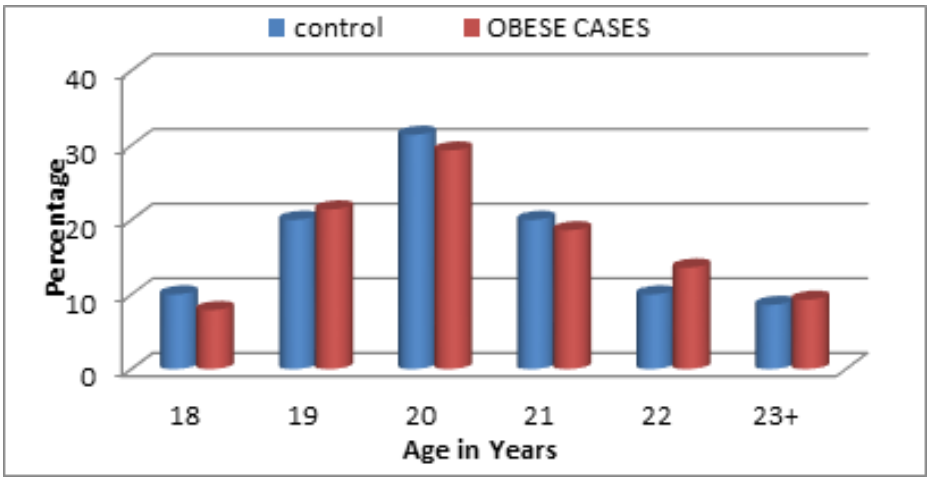
Anthropometric measurements such as Height in meters, Weight in kilograms, Waist circumference in centimetres, Body Mass Index were recorded. Body fat percentage was recorded using bioelectric impedence body fat analyser Omron Model HBF 306.

Blood sampling was done after ten hours of overnight fasting.The venepuncture was done in the cubital fossa and serum was separated by centrifugation at 5000 rpm for 10 minutes, the supernatant clean serum was then pipetted out and the samples were analysed in Erba Mannheim Model XL 600 automated analyser.

Fasting lipid profile is done to measure total cholesterol[6] by cholesterol oxidase method, LDL[7,8,9] and HDL cholesterol[10] by direct kit method using liquid stable reagent – poly venyl sulfonic acid & poly ethyl glycol, methyl ether coupled classic precipitation method) and Triglycerides by kit method [11,12] .

RESULTS

This is a comparative study done by random sampling with power > 80% and Level of significance being 5%. Statistical analysis is done using SPSS software.

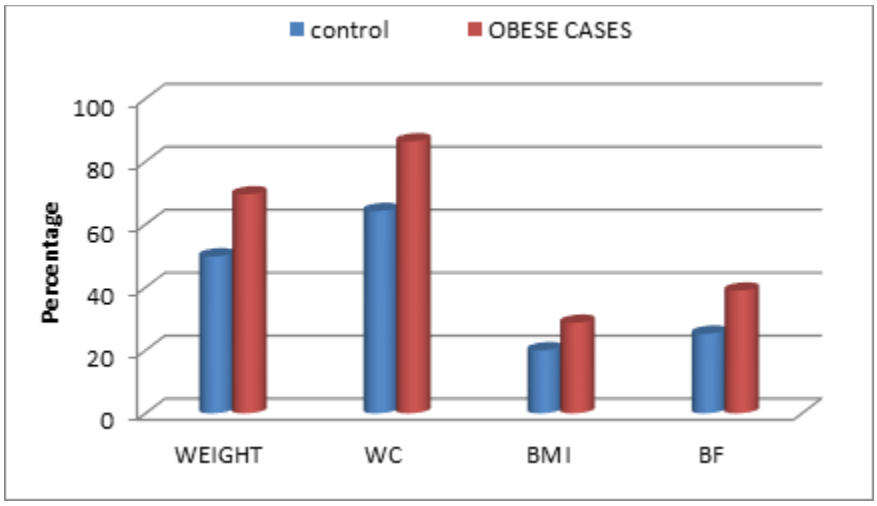


Graph 1: Age wise distribution of controls and obese cases.

The distribution of age is not showing any statistically significant values between case and control. Maximum number of subjects belonged age group of 20 years (27.1% obese and 34.7% non-obese)

Table 1: Anthropometric measurements

Variables	Mean ± SD of Case	Mean ± SD of Control	P- Value
Height in cms	155.78 ± 5.38	157.41 ± 6.60	0. 112
Weight in kg	69.58 ± 6.17	49.88± 6.08	0.000
Waist circumference in cms	86.41 ± 9.47	64.28± 4.05	0.000
BMI	29.77 ± 2.27	20.05± 1.62	0.000
Body Fat%	38.99± 2.66	25.29± 2.74	0.000

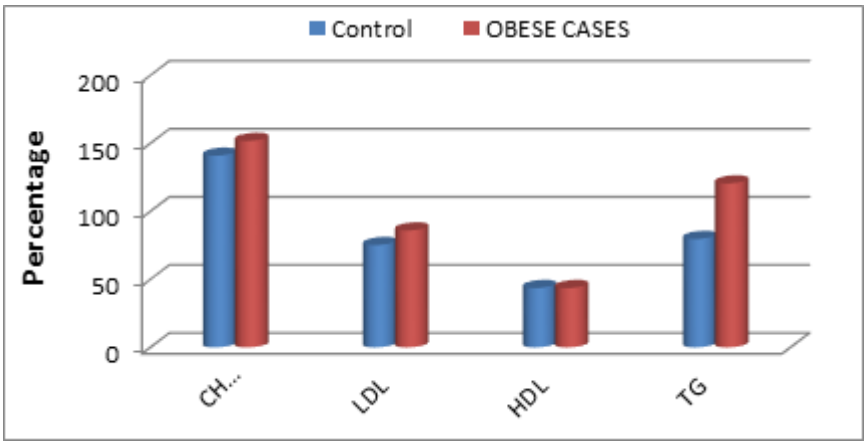


Graph 2: Anthropometric measurements

The above table and graph shows statistically significant higher values of weight, waist circumference, BMI, Body fat % in obese (p- value = 0.000). Height is not showing any significant variation (p-value = 0.115).

Table 2: Lipid parameters

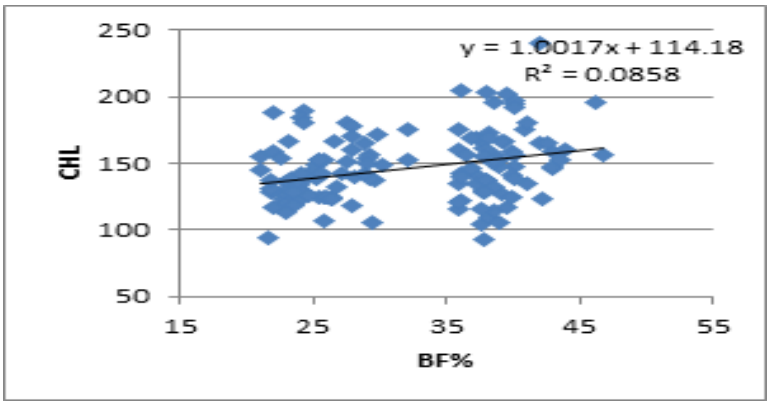
Variables in (mg/dl)	Mean ± SD of case	Mean ± SD of control	p- value
Total Cholesterol	151.81 ± 27.73	140.94 ± 21.29	0.010
LDL	85.94 ± 22.80	75.22± 16.74	0.002
HDL	43.64 ± 7.015	43. 70 ± 6.33	0.960
TG	120. 55 ± 28.01	79.71± 18.20	0.000



Graph 3: Lipid parameters

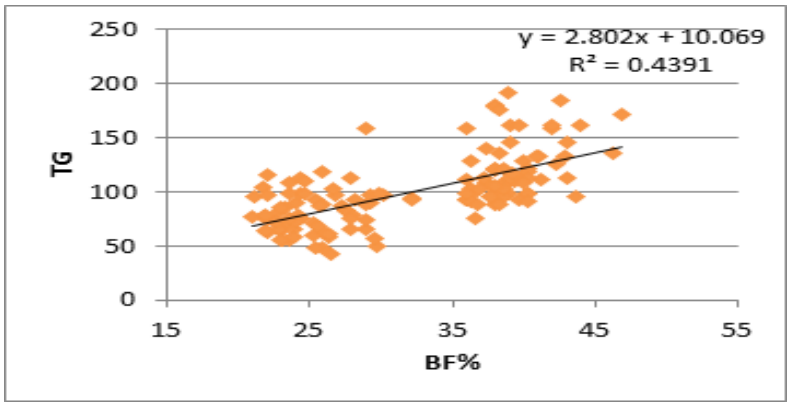
The above table and graph shows statistically significant higher values of total cholesterol(p-value = 0.010)., LDL (p-value = 0.002) and Triglycerides (p-value = 0.000) in obese females. HDL values is not showing any significant variation (p-value = 0.960).

Correlations:



Graph 4: Body fat % with cholesterol

The above graph shows linear positive correlation between body fat percent and blood cholesterol levels.



Graph 5: Body fat % with Triglycerides

The above graph shows linear positive correlation between body fat percent and triglyceride levels.

DISCUSSION

According to Several studies done during 1980s, obesity increases with age and was highly distributed among middle aged men and women attributing to their increased sedentary lifestyles and decreased physical activities. Recent studies have shown changing trends with almost doubled incidence of obesity among children, adolescents and young adults above 20 years of age[13,14,15]. Various studies conducted in different parts of the world have shown high prevalence of obesity in females. Hence females were selected for this study. Studies have shown that during puberty in girls, the amount of body fat tends to increase by approximately 40%. Girls with early menarche (age ≤ 11 years) are twice as likely to become obese adults as are late ones (age≥14 years) [16]. The probable reasons for higher incidence of obesity in females might be due to hormonal influences and intensity of physical activities. Testosterone and other androgens in males have protein anabolic action which leads to 50% increase in muscle mass in men after puberty and these hormones have very few effects on fat distribution in them. Secondly males tend to be physically more active than females. But in females, estrogen causes increased deposition of fat in the subcutaneous tissues. This leads to particular pattern of fat distribution resulting in increased fat mass in them compared to males[17].

Present study showed a statistically significant higher values of various lipid parameters like Total Cholesterol (TC),

Triglycerides (TG) and LDL in obese females. 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 [18]. 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[19].

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 undergoes hydrolysis by hepatic lipase or lipoprotein lipase leading to formation small, dense LDL particles which are more toxic and atherogenic[20]. This atherogenicity is the root cause for all obesity related complications.

CONCLUSION

In present study the values of harmful lipids like triglycerides, total cholesterol and LDL levels in obese group was significantly higher and are positively correlating with their anthropometric measures, 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.

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