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Original Research Article

Assessment of Existence Metabolic Risk Factors in Obese Males and Females

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ABSTRACT

Background: Obesity has become a leading global public health problem. It is one of the underlying causes of non-communicable chronic diseases. It is linked with non-communicable disorders including hypertension, type 2 diabetes mellitus, hypercholesterolemia, coronary heart disease & stroke. It has become leading cause of morbidity and mortality in both developed & developing countries.

Aim: To study the effect of obesity on blood pressure, blood glucose and lipid profile in obese male & obese female.

Materials and Methods: 40 obese male subjects with age & sex matched 40 obese female subjects were chosen.

Results and conclusion: Results of present study showed that obese females have high blood lipid levels compared to non-obese. Thereby proving that obese are prone to high blood lipids. This is due to changes in body fat distribution resulting in changes in body metabolism which in turn cause change in lipid levels.

KEY WORDS: Blood Lipids, Blood Glucose Levels, Blood Pressure, Obese Male, Obese Female.

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INTRODUCTION

Obesity is often defined as a condition of abnormal or excessive fat accumulation in adipose tissue, to the extent that health may be impaired [1]. Obese individuals not only differ in the amount of excess fat that they store, but also in the regional distribution of that fat within the body [1]. The accumulation of fat in the abdominal region has been described as the type of obesity that had the greatest risk for the health of the individuals [1]. Overweight and obese individuals are classified as a having body mass index (BMI; weight in kilograms divided by height in meter^{2}between 25-29.9 (kg/m^2) and greater than 30 (kg/m^2), respectively [2,3]. Obesity has become a leading global public health problem. Obesity is one of the underlying causes of non-communicable chronic diseases

including hypertension, insulin resistance, type 2 diabetes mellitus, hyper cholesterolaemia, coronary heart disease, strokes and certain cancers [3]. It has become one of the leading causes of morbidity and mortality in both developed and developing countries [2].

Prevalence of obesity has increased tremendously in Indians subsequent to the wave of industrialization and modernization [4]. It is a potential cause of future health-related problems, including metabolic diseases. In most instances, the harmful impact of obesity was revealed by measuring increased levels of blood lipids, blood glucose and blood pressure [5]. Elevated blood lipids, glucose and blood pressure indicate the increasing risk for developing atherosclerosis, heart disease and Type-II diabetes mellitus**.** Elevated levels of lipids and lipoproteins are well known risk factors for ischemic heart disease by triglyceride, cholesterol and low density lipoprotein are risk factors for atherogenesis [6].

Moreover, blood level of high density lipoprotein-cholesterolin contrast bears an inverse relationship of the risk of atherosclerosis and coronary heart disease, that is higher the level, smaller the risk [7,8]. Different plasma lipids vary significantly in various population groups due to difference in geographical, cultural, economical, social conditions, dietary habits and genetic makeup [5]. Adipose tissue accumulation with triglyceride and free fatty acids, especially visceral and ectopic (intramuscular and hepatic), induces a spectrum of metabolic and hormonal changes, which progressively impair insulin signaling [6]. These changes manifest as increased insulin resistance in the adipose tissue, liver, skeletal muscle and vascular endothelium[5] which may lead to glucose intolerance [7,9]. Obesity individuals are linked with higher rates of hypertension than normal-weight individuals. Waist circumference has been reported as the strongest independent predictor of systolic blood pressure and diastolic blood pressure [10,11]. Furthermore, excess intra-abdominal fat has been found to be associated with hypertension. Based on the physiological novel techniques, blood pressure, blood glucose and lipid profile etc. are determined to find the problem of obesity by clinicians [12,13]. Thus, the present study was designed to determine the prevalence of obesity in adult male and female to assess the existence of metabolic risk factors in obese males and females with following aim and objectives.

MATERIALS AND METHODS

The present study was carried at Department of Physiology in SVIMS. 80 subjects 40-60 years were collected fasting blood samples from 40 Group-1 - obese male and 40 Group-2 - obese female and perform blood glucose and lipid profile analysis.

Inclusion criteria: Obesity BMI > 25 kg/m^2, Age group between 40-60 years

Exclusion criteria: Endocrine disorders like thyroid disorders,Metabolic disorders like diabetes mellitus**,** BMI < 18 kg/m^2, Less than 40 And more than 60 years of age

Height and Weight were measured by measuring tape and weighing machine and they were expressed in cm and Kg respectively. The Body Mass Index was calculated based on a person Height and Weight by using “Quetelets index” [BMI = WEIGHT (kg)/HEIGHT (m^2)]. Body Fat Percentage is measured by using a formula = (1.20 × BMI) + (0.23× Age) – (10.8 × Gender) – 5.4. (Where male gender = 1, Female gender = 0). Measurement of Waist Circumference: The Waist circumference is measured at a level between the lowest rib and the iliac crest by using measuring tape. Measurement of Hip Circumference: It is taken as the largest circumference around the buttocks by using measuring tape.

Recording of Blood Pressure: It is done by “Auscultatory method”, introduced by Qussian physician, Korotkoff. Ask the subject to take rest for 5or 10 minutes in lying down posture. The uninflated cuff of Sphygmomanometer is wrapped firmly around the upper arm 2.5-3 cm above the elbow joint at heart level and tying the cuff. Place the chest piece of stethoscope over the arm medial to tendon of biceps where pulsations of brachial artery are felt. Under ordinary circumstances, if a Stethoscope is placed over an artery, no sound can be heard, as streamline flow of blood vessel produces no sounds. Inflate the cuff until the pressure in it is well

above the 120mm of Hg. The brachial artery gets occluded by the cuff and no sound can be heard with Stethoscope. Now gradually lower the cuff pressure by opening the valve till a clear sharp tapping sound is heard. The cuff pressure at which the sound is heard first, gives a measure of 'SBP'. The pressure in cuff is further progressively lowered, while listening for the appearance of sound of Korotkoff's .The sound undergoes a series of changes in quality and becomes dull and muffled, to finally disappear. The cuff pressure at which the sound becomes muffled or disappears is the 'DBP'. Express the BP as SBP/DBP mm of Hg. Take 3 readings in lying down posture and the average is noted. Ask the subject to stand up and immediately take the reading once.

Sample collection: The subjects were instructed to attend the outpatient department at SVIMS, Tirupathi, India during the morning hours after 12hrs fasting. Venous blood samples were collected randomly from the Obese and non-Obese subjects and allowed to clot for half an hour, following which the sample was centrifuged for 15 min and serum was separated and stored immediately at 5^0C until analysis.The serum sample was analysed for FBS, Total Cholesterol, Triglycerides, HDL, LDL and VLDL.

Estimation of glucose by the method of glucose oxidase and peroxidase, Cholesterol by cholesterol oxidase and peroxidase, Triglyceride by glycerol phosphate oxidase and peroxidase. HDL cholesterol by the method of cholesterol oxidase and peroxidase ,VLDL and LDL cholesterol by the friedewald formula.

Statistical analysis: SPSS version 11.5 was used for all statistical analysis. Groups with discrete variable were compared with chi square test. P-value <0.05 was taken as statistically significant.

RESULTS

In the Group-I and Group II subjects height, weight, body mass index, waist circumference, hip circumference, waist-hip ratio, body fat percentage, blood pressure, fasting blood sugar and lipid profile were measured. The statistically analysed data was suitably arranged in tables. All these characteristics was compared between Group-I and Group II.

Table 1: Comparison of age, weight, height, BMI, WC, HC, WHR and body fat percentage in between the obese male and obese female.

S NO	Characteristics	Obese male n=40 Mean ± SD	Obese female n=40 Mean ± SD	p value
1	Age	47.47±7.19	47.35 ±6.57	0.956
2	Weight	87.1±24.1	70.9±9.96	0.008*
3	Height	165.65±6.32	151.9 ±5.73	0.0001*
4	BMI (kg/m2)	31.54±7.42	30.74±3.73	0.669
5	WC (cm)	108.05±18.38	100.6±7.62	0.102
6	HC (cm)	101.95±26.9	105.3 ±9.64	0.603
7	WHR	1.01±0.044	0.93±0.114	0.005*
8	Body fat percentage	32.15±8.3	41.95±5.14	0.0001*

BMI: Body mass index, WC: Waist circumference, HC: Hip circumference, WHR: Waist hip ratio *= significance p value. This master chart showing the comparison of age, Weight, Height, BMI, WC, HC, WHR and body fat percentage in between the Group I (obese male) and GroupII (obese female). There were significant results seen in the weight, height WHR and body fat percentage.

Table 2: Statistical analysis of SBP, DBP, FBS, cholesterol, triglycerides, HDL, LDL, VLDL and LDL-HDL ratio in between obese male and obese female.

S NO	Characteristics	Obese male n=40 Mean ± SD	Obese female n=40 Mean ± SD	p Value
1	SBP (mm hg)	127±15.6	129±13.72	0.669
2	DBP (mm hg)	83.5±8.75	90.52 ±4.47	0.002*
3	FBS (mg/dl)	152.4 ±52.79	143.85±52.07	0.608
4	Cholesterol (mg/dl)	152.0±65.58	175.85±47.67	<0.0001*
5	Triglycerides (mg/dl)	171.15±94.40	175.5± 99.51	0.888
6	HDL (mg/dl)	39.65±7.11	37.1 ± 3.33	0.154
7	LDL (mg/dl)	97.6±35.98	105.15 ±43.87	0.555
8	VLDL (mg/dl)	34.15±18.85	32.65 ± 18.23	0.799
9	LDL/HDL Ratio	2.98±1.032	3.11± 1.4	0.74

SBP: Systolic blood pressure, DBP: Diastolic blood pressure, FBS: Fasting blood sugar, HDL: High density lipoprotein, LDL: Low density lipoprotein, VLDL: Very low density lipoprotein. *= significance p value. This master chart showing the comparison of SBP, DBP, FBS, cholesterol, triglycerides, HDL, LDL, VLDL, LDL-HDL ratio in between Group I (obese male) and Group II (obese female). There were significant results seen in the DBP and Cholesterol.

Fig. 1: Bar diagram shows the comparison of blood pressure in between the Group I (obese male) and Group II (obese female).

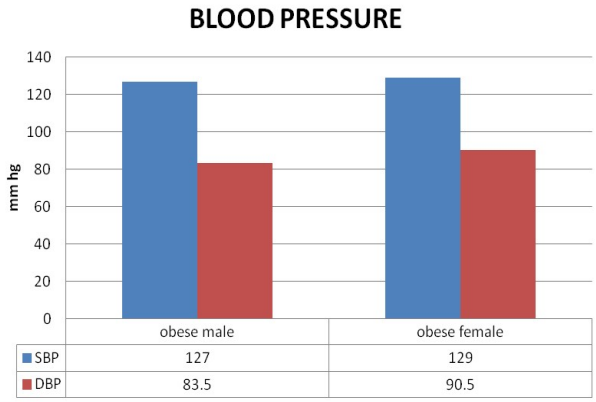
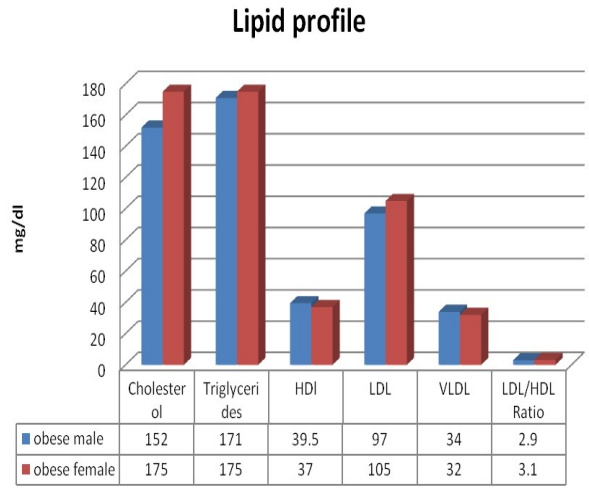


Fig 2: Bar diagram shows the comparison of lipid profile in between Group Ia (obese male) and Group I b (obese female).



DISCUSSION

The current study was carried out to evaluate the parameters such as blood pressure, blood glucose and lipid profile that influenced by the obesity in males & females. According to Table 1, 2 and Fig 1, 2 the body fat percentage, WHR, DBP and total cholesterol shows significantly higher levels in obese female compared with obese male. There is no significant difference in SBP, FBS, triglycerides, LDL, HDL, and VLDL. Faheem et al. (2010) [14] showed that cholesterol and DBP were significantly higher in females when compared to male. The present study result is supported by Faheem. These results shows that females have significant high levels in DBP and total cholesterol than males, this higher prevalence of cholesterol in females may be due to estrogen deficiency in age group of 45-55 years (the mean age of this present study is 47 years). The mechanisms by which estrogen deficiency affects the cholesterol level seem to be mediated through alterations in the lipid–lipoprotein profile and changes in the distribution of fat mass towards a more android distribution.

CONCLUSION

In the present study, highly significant levels in height, weight, waist hip ratio, body fat percentage, DBP & cholesterol were seen in obese female (Abdominal obesity was more closely related with metabolic dysfunctions connected with cardiovascular disease than was general obesity).Thus, changes in body fat distribution results in changes in body metabolisms which in turn cause the changes in blood pressure, blood glucose and lipid profile. An increased significant level of blood pressure, blood glucose and lipid profile may lead to various risk factors like diabetes, cancer, cardiovascular disease, non-alcoholic fatty liver disease. These cardiovascular risk factors are more in obese females (as of additional increasing DBP and total cholesterol) than obese male. Thus, the obesity is positively correlated with blood pressure, blood glucose and lipid profile& that to its affect is more on obese female. Diagnosis of obesity and the evaluation of the present study parameters will be highly useful to the clinicians the institute remedial measures at an early stage.

Policies and programs can be formulated that focus on population-level intervention with regard to obesity prevention, such as those that promote public awareness about obesity and its causes, effects, complications and management.

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