

A Study on Comparison of Methods for Predicting Obesity and Dyslipidemia

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Selaiyur, Chennai, Tamil Nadu 600 073**ABSTRACTS**

The 100 subjects of different socio economic group, age and cultural background were selected from Bangalore city of Karnataka district .Anthropometric assessment of the selected subjects was carried out using fat composition analyzer and through measurement of height, weight, waist circumference, waist hip ratio, BMI, REE. Lipid profile for all subjects was carried out and interpreted between anthropometric measurements. The subjects of age group between 21-30 years of both sexes have higher BMI compared to other age groups.64% subjects REE was between 1200kcal-1400kcal of both sexes.35% of female and 48% of male subjects had high body fat percentage. Visceral fat was found to be higher in 64 subjects. Majority of subjects were non vegetarian. Waist circumference was more in 32 male subjects and 29 female subjects. Waist hip ratio was more in 31 female subjects and 33 male subjects respectively. Total cholesterol, triglycerides, LDL Cholesterol was on higher side in 60 subjects respectively.HDL was less in 52 subjects. Subjects with normal BMI had lipid profile on higher side. BMI,Waist circumference, waist hip ratio, Body fat percentage, visceral fat, was compared with lipid profile of same subjects. It was found that subjects with more visceral fat had elevated total cholesterol, LDL and triglycerides with HDL on lower side. Nutritional assessment through body fat analyzer was found to be quick cost effective method to predict nutritional status and lipid deposition in subjects irrespective of different socio economic and cultural background

1. INTRODUCTION

India is in the midst of rapid socio economic, demographic, nutrition and health transition .It is increasingly facing problems related to affluence due to industrialization, urbanization and economic betterment. Over the last two decades, over nutrition and obesity have emerged as public health problems often associated with abdominal obesity. There is evidence that risk of chronic disease in population increases progressively from a BMI of 21.

High prevalence of malnutrition in people belonging to low socio economic strata led to the assumption that obesity and diabetes will not be a crucial problem in them whereas a rural population usually has low risk of development of diabetes and obesity in India, their migration to metropolitan city exposes them to several adverse lifestyle and environmental influences. In cities they usually settle down in urban slums and take to daily wage jobs. Several lifestyle alterations results from this transition- Changes from their traditional penurious eating habits, exposure to severe stress, decreased physical activity and increase in smoking, tobacco chewing and alcohol intake. The fundamental cause of obesity and overweight is an energy imbalance between calories consumed on one hand and calories expended on the other hand.

WHO's latest projections indicate that globally in 2005 approximately 1.6 billion adults (age 15+) were overweight, at least 400 million adults were obese. WHO further projects that by 2015, approximately 2.3 billion adults will be overweight and more than 700 million will be obese. The common consequences of overweight and obesity were CVD (mainly heart disease and stroke) the world's no one cause of death killing 17 million people each year. Diabetes has rapidly become a global epidemic WHO projects that diabetes deaths will increase by more than 50% worldwide in the next 10years.

The metabolic abnormalities significantly associated with insulin resistance in Asian Indians include dyslipidemia, (hyper triglyceridemia, low levels of HDL and high levels of small dense LDL), pro coagulant tendency, increased pro inflammatory cytokines and endothelial dysfunction. Interestingly such a phenotype and metabolic perturbations are particularly seen in immigrant Asian Indians and also in intra country migrants from rural areas settled in urban slums. Clinically insulin resistance should be suspected in the presence of abdominal obesity ,HTN, dyslipidemia, family history of type 2 diabetes and in individuals of certain ethnic groups(Hispanics, Asian Indians) particularly if they are obese.

Mathur and Sharma (1968) stated that Indians have abdominal obesity and higher body fat for the same BMI as compared to the caucasians and are associated with increased risk of HTN, Diabetes and CVD Many low and middle income countries are now facing a "double burden" of disease: This double burden is caused by inadequate pre-natal, infant and young child nutrition followed by exposure to high-fat, energy-dense, micronutrient-poor foods and lack of physical activity. The present study was planned to predict obesity, dyslipidemia through quick cost effective method.

2. MATERIALS AND METHODS

50 males and 50 females were selected in the age group between 20 to 70 years from **BGS Global Hospitals, Bangalore District, Karnataka**. Random sampling was used in the selection of subjects. According to Gupta(1991) in a random sample, every individual in a population has an equal chance of being selected. Each subject was personally interviewed and filled the collected details in questionnaire. Anthropometric measurements of the subjects recorded for all the selected samples were height, weight, Body mass Index(BMI),waist circumference, waist hip ratio, Body fat %,REE, Visceral fat. Height: The Height of an individual is principally a measure of skeletal bony tissue-leg, pelvis, spine and skull(Jelliffe-1991) Weight: Weight of the subjects were measured using the portable bathroom weighing scale. The scale was checked for accuracy before taking the measurements. Body mass Index: The Body mass Index was calculated from heights and weights of all subjects using the formula .Categorization of the subjects based on their BMI into various groups was done as per WHO 1995

Body mass Index=Weight in Kg

Height in m²

Waist circumference/Hip circumference: Waist circumference was taken on the narrowest circumference between ribs. Hip circumference was also measured using a non stretch inch tape

with 0.1 cm accuracy.

Waist Hip Ratio: Waist Hip ratio was calculated using the formula

$$\text{Waist Hip Ratio} = \frac{\text{Waist circumference(cm)}}{\text{Hip circumference(cm)}} \quad (\text{Boyle 1993})$$

Fat Composition Analyzer

Body fat percentage (stored fat) and visceral fat percentage(Fats which surrounds organs) is measured through bioelectrical impedance. Subject details like height, age, sex to be fed in the machine. The subjects were made to stand erect with shoulder straight by holding tight two sides of nodes like handling two wheeler till it records body fat percentage and visceral fat

Body fat percentage=10 to 20% (Male),20 to 30 %(Female)

Visceral fat percentage= 1 to 9 %(Male and Female)

Biochemical Examination

The serum lipid profile is useful in determining the amount of different lipids in the blood in order to assess the risk levels of CVD.

Estimation of cholesterol, triglyceride and various forms of lipoprotein are done to screen people who may be at high risk of cardiovascular Diseases (Guthrie 1989).The lipid fractions namely total cholesterol, triglycerides ,low density lipoprotein, high density lipoprotein were estimated for all the samples selected. Blood was drawn early morning at fasting state with the help of technician and stored in a vial. The subjects were informed previously to be in fasting state. The estimation was done on the same day

Total cholesterol was estimated using the expand enzymatic procedure given by Aleain et al (1994)

Serum triglycerides was estimated using GPOPAP procedure given by Werner et al (1981)

HDL Cholesterol was estimated using CHOD-PAD method furnished by Grove(1989)

LDL Cholesterol levels were computed using the formulae

LDL = Total cholesterol-Triglyceride-HDL

3. RESULTS AND DISCUSSION

The Total number of subjects:100 (Male-50 and female -50) taken from Bangalore City, Karnataka.

DISTRIBUTION OF SUBJECTS IN ACCORDANCE TO AGE

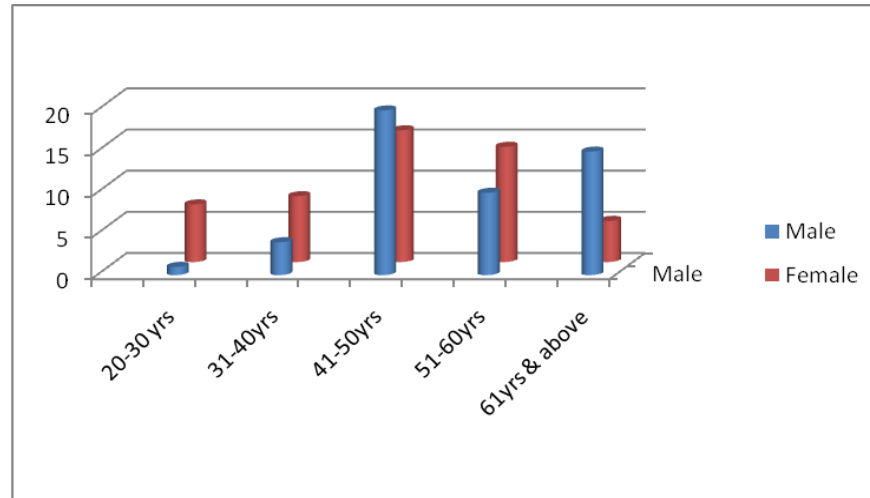


FIG 1

Male and Female subjects were selected in the age group between 20 to 70 years through random sampling method.

4. RELIGION

The selected subjects were classified into three groups of religion as

- a. Hindu
- b. Muslim
- c. Christian

There were around 80 hindus,11 muslims and 9 christians out of 100 selected subjects.

5. CLASSIFICATION OF SUBJECTS AS PER SOCIO ECONOMIC STATUS

SOCIO ECONOMIC STATUS

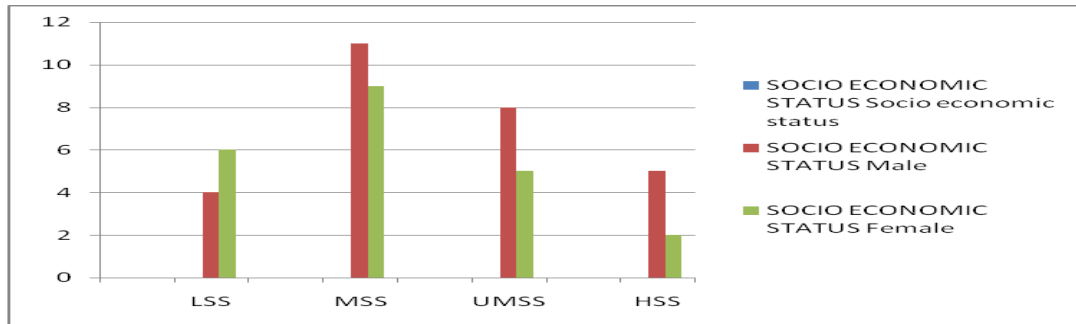


FIG 2

LSS-Lower

MSS-Middle

UMS-Upper middle

HSS-Higher socio economic status

The data were collected and classified into four classes according to socio economic status. The were LSS,MSS,UMS,HSS and the values were mentioned in the fig-2. Most of the subjects belong to middle and upper middle socio economic status.

DISTRIBUTION OF PATIENTS AS PER THEIR DIET TYPE

33% subjects were vegetarian, 49% non vegetarian and 18% were mixed diet type.

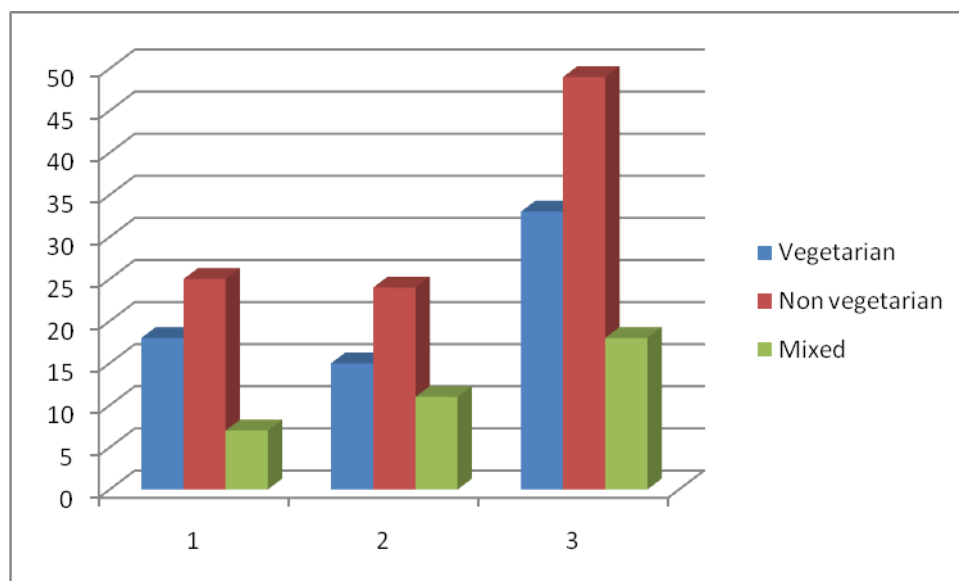


FIG 3

ANTHROPOMETRIC MEASUREMENTS

DISTRIBUTION OF THE SELECTED SUBJECTS ACCORDING TO BMI

BMI	MALE(%)	FEMALE(%)	TOTAL(%)
<21	5	8	13
21 – 25(Normal)	19	10	29
26-30(Overweight)	20	20	40
31-40(Obese)	4	8	12
40& above(Morbid obese)	2	4	6

TABLE.NO 1

Among the subjects interviewed 6% were morbid obese, 12% obese, 40% were overweight,29% normal and 13% were underweight. The subjects of age group between 21-30 years of both sexes have higher BMI compared to other age groups

DISTRIBUTION OF PATIENTS ACCORDING TO WAIST CIRCUMFERENCE AND WAIST HIP RATIO

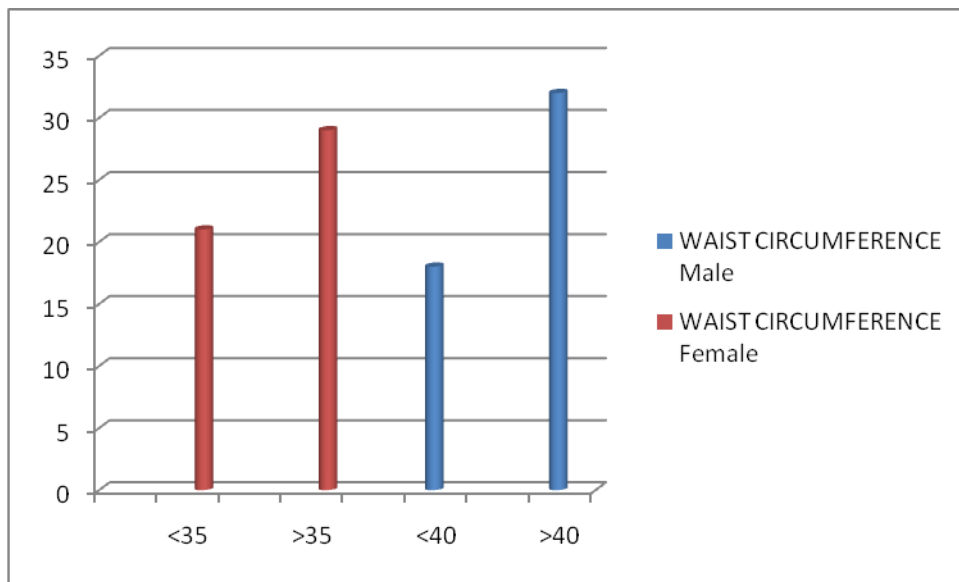


FIG 4

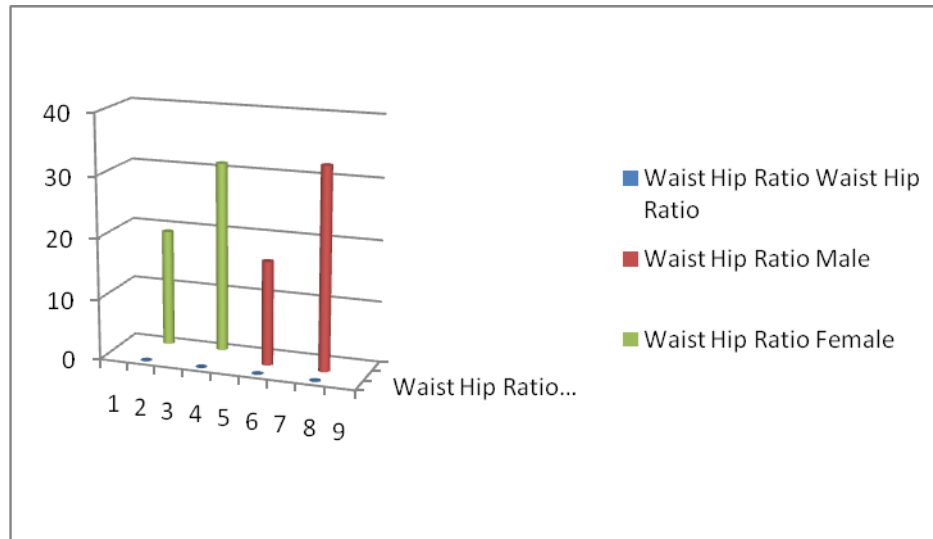


FIG 5

Waist and hip circumference of all subjects were measured and waist hip ratio were calculated according to Boyle(1993).Among 100 subjects 21 female subjects and 18 male subjects had normal waist circumference(<35 inch& <40 inch)respectively.29 female subjects and 32 male subjects had higher values(>35 inch&>40 inch).19 female subject,17 male subject had waist hip ratio in normal range and 31 female subjects ,33 male subjects had waist hip ratio on higher side(>0.85,>0.95 inch) respectively.

DISTRIBUTION OF PATIENTS ACCORDING TO BODY FAT PERCENTAGE

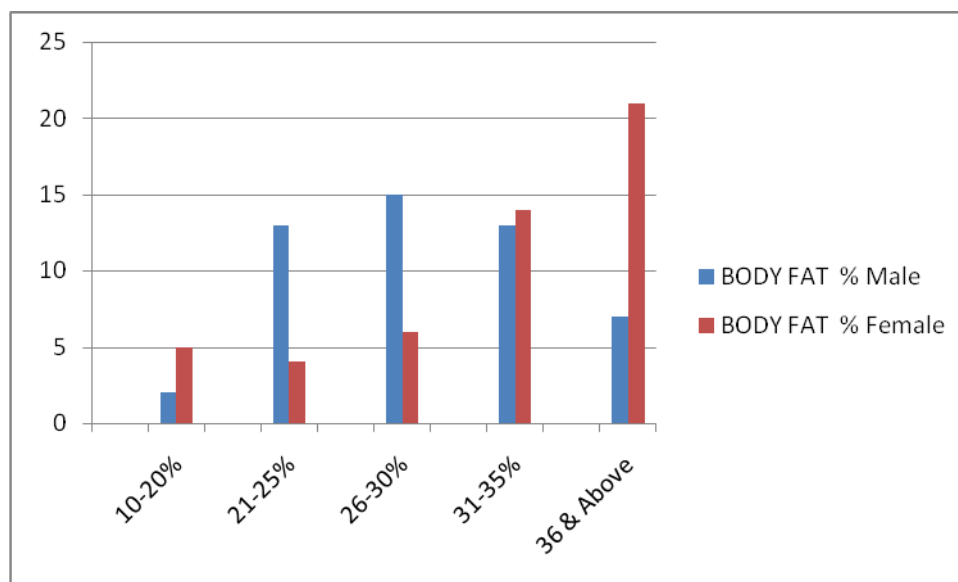


FIG 6

Body fat percentage above 20% in male and 30% in female indicates risk.

2% of male subjects was having normal body fat % between 10 – 20% and 10% of female subjects was having normal body fat % between 21-30%. 33% of male subjects had higher body fat % and 27% of female subjects had higher body fat percentage.

6. DISTRIBUTION OF PATIENTS ACCORDING TO VISCERAL FAT PERCENTAGE

Visceral fat above 9 indicates risk.It was found that 38% of subjects was having normal visceral fat level between 1-9. 48 % of subjects with visceral fat in the range 10-19 and 14% in the range above 19.Comparitively male subjects was having higher visceral fat level than female subjects.

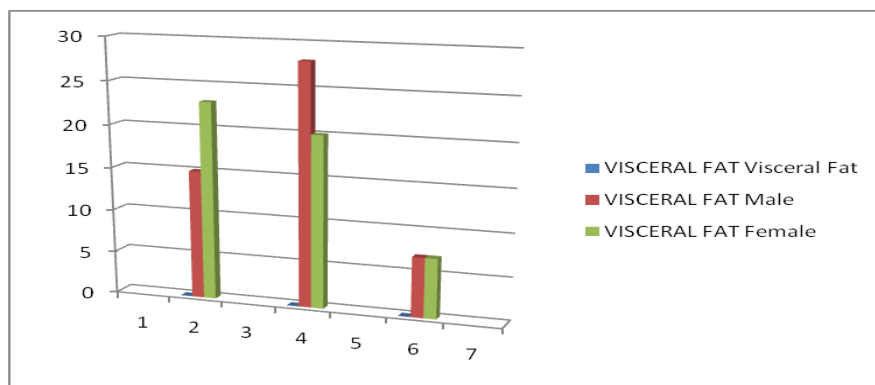


FIG 7

DISTRIBUTION OF PATIENTS ACCORDING TO TOTAL CHOLESTEROL

According to NCEP guidelines total cholesterol below 200mg/dl is desirable.200-239 mg/dl is borderline and 240mg/dl or greater is high risk(Erust,1988) which leads to hyper cholesterolemia, the results of the present study reveal the following facts.

Total Cholesterol	No of persons		Total Percentage
	Male(%)	Female(%)	
200mg/dl	7	10	17
200 – 239 mg/dl	31	23	54
>240 mg/dl	9	20	29

TABLE NO 2

It was observed that 29 subjects were at high risk and 50 subjects were at moderate risk. Susan et al(2006) found that south Asians have higher rates of lipid abnormalities, low levels of HDL, higher levels of LDL, elevated triglycerides and lipoprotein a levels.

Familial hypercholesterolemia(FH) is an inherited condition in which cholesterol levels are high at birth, which often contributes to heart attack at an early age. Proper diet, exercise and medication can lower cholesterol among people with FH (PRC –Research projects-cardiovascular health-2006)

DISTRIBUTION OF TRIGLYCERIDES LEVEL AMONG PATIENTS

Triglycerides	No of persons		Total Percentage
	Male(%)	Female(%)	

<150mg/dl	9	15	24
150 – 200mg/dl	26	22	48
>200mg/dl	15	13	28

TABLE NO 3

Triglyceride levels above 200mg indicates a high risk. Triglyceride level above normal is a powerful indication of risk of heart disease (Mathur and Sharma 1968). It was seen that 28 subjects were at high risk and 48 subjects were at moderate risk.

DISTRIBUTION OF PATIENTS ACCORDING TO LDL CHOLESTEROL

LDL Cholesterol	No of persons		Total Percentage(%)
	Male(%)	Female(%)	
<150 mg/dl	16	24	40
150 – 180 mg/dl	27	22	49
>180	6	5	11

TABLE NO 4

Normal range of LDL is 150mg/dl. Suspect range is 150-180mg/dl. Above 180 is at high risk of IHD. It was found that 11 subjects were at high risk and 49 subjects were in moderate risk.

Distribution of patients according to HDL Cholesterol

The normal range of HDL is >55mg/dl. The standard risk are from 35-55. Below 35mg/dl treatment is required.

HDL Cholesterol	No of persons		Total Percentage (%)
	Male (%)	Female (%)	
>55mg/dl	13	15	<u>28</u>
35-55mg/dl	9	11	<u>20</u>
<35	27	25	<u>52</u>

TABLE NO 5

It was found that 52 subjects was having HDL level below 35mg/dl ,20 subjects was having between 35-55mg/dl and 28 subjects HDL level was normal.

COMPARISON OF METHODS IN PREDICTING OBESITY AND DYSLIPIDEMIA

DISTRIBUTION OF SUBJECTS BASED ON COMPARATIVE METHODS

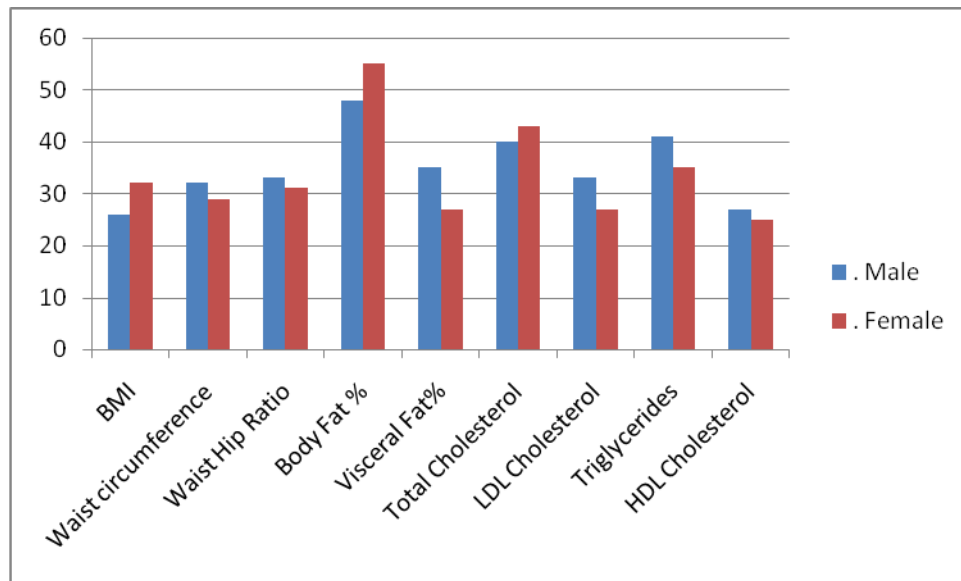


FIG NO 8

It was found that subjects with high visceral fat %, waist circumference was having elevated levels of total cholesterol or LDL or triglycerides compared to subjects with BMI on higher side.

7. CONCLUSION

Measurement of waist circumference, visceral fat percentage, total cholesterol, triglycerides, and LDL cholesterol gives values very close to each other. Though subjects with normal BMI was having elevated visceral fat and lipid profile .Fat analysis through fat composition analyzer method is considered to be quick , cost effective method to predict overweight, obesity and dyslipidemia as an initial screening tool.

8. REFERENCES

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