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RESEARCH ARTICLE

A Comparative Study of blood lipid profile and blood pressure in obese and non obese.

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Abstract

Background: Obesity leads to morbidity as well as mortality. There is usually increased level of total cholesterol, LDL-cholesterol, VLDL-cholesterol, triglycerides and decreased level of HDL-cholesterol in obesity. These are the risk factors for cardiovascular disease, hypertension, diabetes mellitus, pulmonary disorder and gall stones. **Method:** In this cross sectional study, patients admitted in GGH General Hospital, Jamnagar between May 2012 and April 2013 were taken. a total of 105 patients were included. Parameters like serum cholesterol, serum triglycerides, serum HDL, serum LDL & serum VLDL used. Obesity index BMI measured using standard protocol. Both systolic & diastolic Blood pressure measured. **Result:** significant raised in total cholesterol & triglycerides noted in obese as compare to non obese. LDL-cholesterol was also increased significantly. But HDL cholesterol was significantly raised in non obese. Significant raised in systolic & diastolic blood pressure noted in obese as compare to non obese. **In conclusion,** abnormal lipid profiles are more common among obese patients. Elevated cholesterol, triglycerides, LDL & VLDL seen in obese patients. , elevation of blood pressure is more in obese as compare to non obese.

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Introduction

Obesity can be seen as cluster of noncommunicable disease called “New World Syndrome”. The WHO has described obesity as one of today’s most neglected public health problem, affecting every region of the globe [1]. Excess of fat is disadvantage rather than asset, it may “lengthen the waist line but shortens the life line” of the individuals by imposing an extra burden on cardiovascular system. With changing food habits and sedentary lifestyles, the prevalence of obesity has increased markedly in Western countries faster than the developing ones [2].

As India is currently going through the so called “nutrition transition” which is associated with a change in the structure of the diet, reduced physical activity and rapid increase in the prevalence of obesity.[3]. Hypertension in youth is associated with obesity.[11] It is speculated that obesity may be the strongest modifiable risk factor for hypertension[12]

BMI is promulgated by the WHO as the most useful epidemiological measure of obesity. It is nevertheless a crude index that does not take into account the distribution of body fat [13]

Obesity is one of the key risk factors for other chronic diseases together with smoking, high blood pressure and high blood cholesterol type-2 Diabetes mellitus. Raised BMI increased the risk of cancer of the breast, colon, prostate, endometrium, kidney and gallbladder [3].

In adults, high LDL is strongly associated with a higher risk of coronary heart disease (CHD) while high HDL is usually protective. Lowering lipids through dietary or pharmacological therapy has been shown to decrease the incidence of atherosclerotic events. [4].

The metabolic defects that ensue in obesity include increased levels of free fatty acids resulting from insulin resistance, increased LDL, VLDL and triglycerides and decrease in HDL. Increased free fatty acids to liver as a function of obesity is primarily responsible for over production of VLDL and this is probably the key to increased LDL via the sequence: VLDL to IDL, IDL to LDL [5].

Therefore in this study attempt has been made to correlate serum lipid profile & blood pressure with BMI among the overweight and obese subjects. So aim of study is to determine the effect of obesity on the serum lipid profile & try to compare the levels of lipid profile between obese subjects and non-obese subjects.

Material and Methods

This study was a hospital based cross sectional descriptive study conducted G.G.H. Hospital, Jamnagar between May 2011 and May 2013.

Subjects were recruited according to simple random sampling method meeting the selection criteria.

Inclusion criteria:

A subject who have Body Mass Index (BMI) > 18.5 kg/m², Age more than 20 years, both male and female, No. of subjects to be included in study: Total 105. They were divided into 3 groups according to BMI Group I - Normal weight (18.5 to 24.9 kg/m²), Group II - Overweight (25 to 29.9 kg/m²) Group III - Obese (more than 30 kg/m²)

Exclusion criteria:

Subjects who were come in OPD & IPD for taking treatment and routine check up and were known case of obesity secondary to hypothyroidism, Cushing's syndrome, Hypothalamic disease, Pregnant women. Weight gain due to fluid retention but not due to fat like in congestive cardiac failure, renal failure, cirrhosis with ascitis.

Subjects were explained the purpose and protocol of the study. After informed consent, BMI & blood pressure measured. blood sample were collected to measure following parameters: Serum Cholesterol, Serum Triglyceride, Serum HDL, Serum LDL, Serum VLDL.

Investigations were done using following Method

Serum cholesterol was estimated by enzymatic cholesterol oxidase – peroxidase (end point colorimetry), Serum Triglyceride was estimated by enzymatic (GPO/Trinder) (end point colorimetry), Serum HDL - cholesterol was estimated by Polyethylene Glycol (endpoint colorimetry), Serum LDL - cholesterol was estimated by Friedwald's formula, Serum VLDL - cholesterol was estimated by Formula = Serum triglyceride / 5. BMI is measured by formula = body weight in (kg)/height in meter²

Statistics

Mean & SD were calculated. Unpaired student's 't' test was applied to test difference between means. Pearson Correlation co-efficient (r) was calculated to test correlation between parameters. Statistical significance was accepted at P value of <0.05.

Result

The study was carried out on 105 subjects, out of which 55 were male and 50 were female.

The subjects were divided into three groups according to their body mass index and each group contains 35 subjects.

Group – I : Normal weight (18.5 - 24.9)

Group – II : Overweight (25.0 - 29.9)

Group – III : Obese (> 30.0)

TABLE -1 mean value of age & BMI.

GROUP	No. of Subjects	Age (years)		BMI (kg/m ²)	
		Mean	± SD	Mean	± SD
I	35	39.37	10.76	22.40	2.10

II	35	42.63	10.57	27.70	1.34
III	35	49.05	8.57	33.62	1.81

TABLE NO. 2 mean value of lipid profile parameters.

Parameters	Group I		Group II		Group III	
	Mean	± SD	Mean	± SD	Mean	± SD
Cholesterol	174.90	19.30	196.80	22.37	216.68	24.31
Triglycerides	122.28	28.08	145.46	37.19	168.91	23.35
HDL	47.88	8.18	43.86	6.05	40.54	5.80
LDL	101.40	15.92	126.23	21.07	144.43	22.14
VLDL	25.61	5.06	26.71	4.71	31.71	5.34
TC / HDL	3.75	0.75	4.56	0.80	5.44	0.95
LDL / HDL	2.19	0.60	2.94	0.71	3.64	0.79

TABLE NO. 3 CORRELATION COEFFICIENT BETWEEN LIPID PROFILE AND BODY MASS INDEX

	Correlation Coefficient r	p	95% CI for r
Cholesterol	0.6723	< 0.0001	0.55 – 0.76
Triglycerides	0.5834	< 0.0001	0.44 – 0.70
HDL	-0.4164	< 0.0001	-0.56 – 0.24
LDL	0.7068	< 0.0001	0.59 – 0.79
VLDL	0.5297	< 0.0001	0.37 – 0.65
TC/HDL	0.6811	< 0.0001	0.56 – 0.77
LDL/HDL	0.6760	< 0.0001	0.55 – 0.76

Table 3 shows there is positive correlation between different lipid parameters & BMI

TABLE NO. 4 COMPARISON BETWEEN NON-OBESE SUBJECTS AND OBESE SUBJECTS

Parameters	Non obese (Group I+II)	Obese (Group III)	t-test	p value
Cholesterol	185.85	216.68	6.267	< 0.0001***
Triglycerides	133.87	168.91	5.385	< 0.0001***
HDL	45.87	40.54	-3.717	0.0003
LDL	113.81	144.43	6.636	< 0.0001***

VLDL	26.16	31.71	5.296	< 0.0001 ^{***}
TC/HDL	4.15	5.44	6.945	< 0.0001 ^{***}
LDL/HDL	2.57	3.64	6.770	< 0.0001 ^{***}

*** p < 0.01 = Significant

Table -4 shows comparison of different lipid parameters between obese & non obese. Result shows that cholesterol, triglycerides, LDL, VLDL, TC/HDL, LDL/HDL were significantly higher in obese group.

TABLE NO.5 MEAN VALUE OF BLOOD PRESSURE PARAMETERS

Parameters	GROUP I		GROUP II		GROUP III	
	Mean	± SD	Mean	± SD	Mean	± SD
SBP	119.37	6.65	126.40	8.94	134.68	13.95
DBP	78.34	3.74	81.88	4.57	85.94	7.18
PP	41.03	3.58	44.51	5.75	48.74	7.93
MAP	92.02	4.60	96.72	5.77	102.19	9.24

According to above table, mean value of all blood pressure parameters like systolic, diastolic, pulse and mean arterial pressure are higher in overweight and obese subjects as compared to normal weight subjects

TABLE NO. 6 CORRELATION COEFFICIENT BETWEEN BLOOD PRESSURE AND BODY MASS INDEX

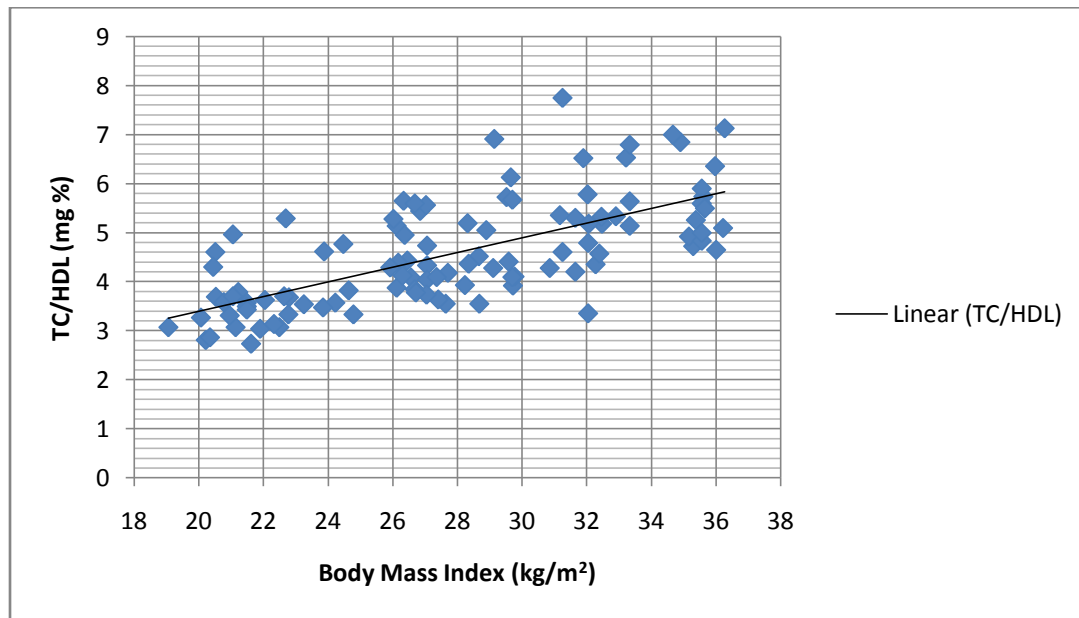
	Correlation Coefficient r	p	95% CI for r
SBP	0.6002	< 0.0001	0.46 – 0.71
DBP	0.5656	< 0.0001	0.42 – 0.68
PP	0.5494	< 0.0001	0.40 – 0.67
MAP	0.5945	< 0.0001	0.45 – 0.70

TABLE NO. 7 COMPARISON BETWEEN NON-OBESE SUBJECTS AND OBESE SUBJECTS

Parameters	Non obese (Group I+II)	Obese (Group III)	t-test	p value
SBP	122.88	134.68	5.349	< 0.0001***
DBP	80.11	85.94	5.087	< 0.0001***
PP	42.77	48.74	4.687	< 0.0001***
MAP	94.37	102.19	5.348	< 0.0001***

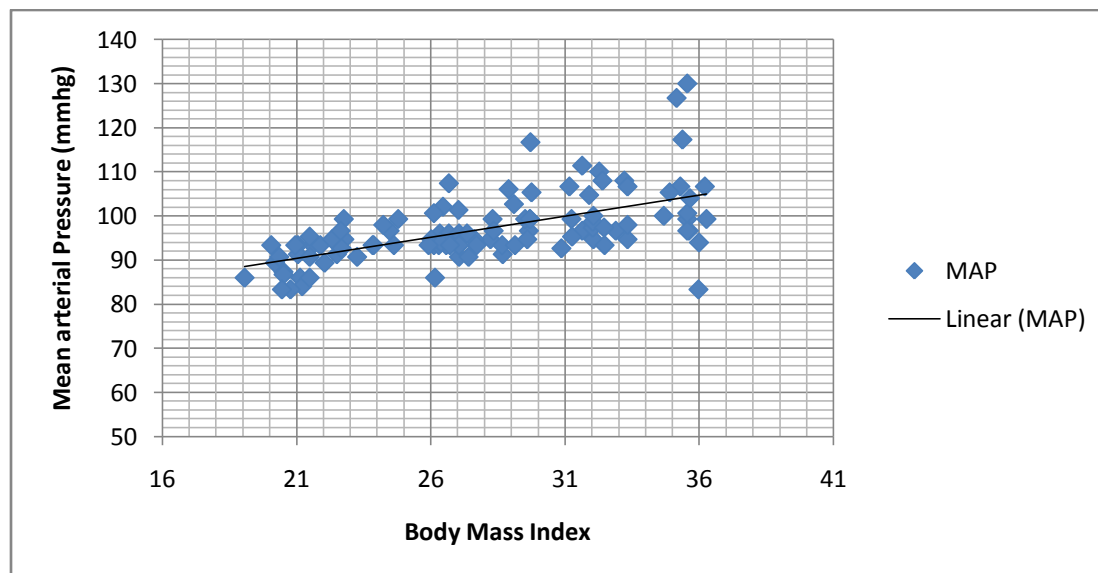
*** p < 0.01 = Significant

SCATTERED DIAGRAM SHOWS RELATION BETWEEN BMI AND TC/HDL



This scattered chart suggests that there is linear relationship between body mass index and TC/HDL ratio. So as the BMI increased this is associated with increased in TC/HDL ratio.

SCATTERED DIAGRAM SHOWS RELATION BETWEEN BODY MASS INDEX AND MEAN ARTERIAL PRESSURE



This scattered chart suggests that there is linear relationship between body mass index and mean arterial pressure. So as the BMI increased this is associated with increased in mean arterial pressure.

DISCUSSION

Obesity may increase the risk of many diseases such as diabetes, atherosclerosis, hypertension, hyperlipidemia, gall bladder diseases and cardiovascular diseases. In this study value of all lipid profile parameters except HDL are significantly higher in overweight and obese subjects as compared to normal weight subjects.

In the present study, the mean serum cholesterol is significantly higher in obese subjects than in non-obese subjects. However study conducted by Mukhopadhyay SK[6], Thakur JS et al.[7] carried out on obese patients, who attended the SSKM Hospital, Kolkata shows significantly higher level of serum cholesterol in obese subjects as compared to non-obese subjects. Another study conducted by Abdul Rahman [8] found significantly higher level of serum cholesterol in obese subjects as compared to non-obese subjects and that is comparable with present study.

However study conducted by Nitesh Mishra et al[9] found no statistically significant change in serum cholesterol level in obese subjects.

In the present study, the mean serum triglyceride is significantly higher in obese subjects than in non-obese subjects. Another studies conducted by Nitesh Mishra et al.[9], Mukhopadhyay SK [6] and Thakur JS et al.[7] found significantly higher level of serum triglyceride in obese subjects as compared to non-obese subjects and that is comparable with present study.

However study conducted by Abdul Rahman [8] found no statistically significant change in serum triglyceride level in obese subjects.

Contrast present between my study & Abdul Rahman [8] is may be because in my study patients who attend the outpatient department were taken while in study conducted by Abdul Rahman[8] students of Riyadh College of Health Science taken as subjects who were very young as compare to my group.

In the present study, the mean serum HDL is significantly lower in obese subjects than in non-obese subjects. However studies conducted by Nitesh Mishra et al.[9], Mukhopadhyay SK [6] and Thakur JS et al.[7]

found significantly lower level of serum HDL-Cholesterol in obese subjects as compared to non-obese subjects and that is comparable with present study.

Another study conducted by Abdul Rahman [8] found no statistically significant change in serum HDL-Cholesterol level in obese subjects.

In the present study, the mean serum LDL and VLDL Cholesterol is significantly higher in obese subjects than in non-obese subjects. However studies conducted by Mukhopadhyay SK found significantly higher level of serum LDL and VLDL Cholesterol in obese subjects as compared to non-obese subjects and that is comparable with present study.

Another studies conducted by Nitesh Mishra et al. and Abdul Rahman found no statistically significant change in serum LDL-Cholesterol level in obese subjects.

In the present study, the mean value of systolic and diastolic blood pressure is significantly higher in overweight and obese subjects than in normal weight subjects.

Similar study conducted by Renu Lohitashwa et al[14]. on first year medical and dental students of 17 – 20 years age group enrolled in the academic years 2008– 09 and 2009 – 10 to J. N. Medical College, Belgaum found significantly higher mean value of systolic and diastolic blood pressure in overweight and obese subjects as compared to normal weight subjects and that is comparable with present study. However study conducted by Huber AR et al.[15] also found significantly higher mean value of systolic and diastolic blood pressure in overweight and obese subjects as compared to normal weight subjects.

Table -7 CORRELATION COEFFICIENT BETWEEN BLOOD PRESSURE AND BODY MASS INDEX

STUDY	SBP	DBP	P value
Roberta SL Cassani et al.	0.33	0.39	< 0.001
Nanaware NL et al.	0.81	0.72	< 0.001
Dyer AR et al.	0.77	0.58	< 0.001
Present Study	0.60	0.56	< 0.001

Above table shows correlation coefficient between blood pressure and body mass index, which is highly significant in present study. Similar studies conducted by Roberta SL Cassani et al.[16], Nanaware NL et al.[17] and Dyer AR et al.[18]also found highly significant correlation between body mass index and blood pressure

CONCLUSION

Obese person has higher incidence of elevated serum cholesterol, triglyceride, LDL and VLDL cholesterol as compare to non obese. Non obese person shows higher level of serum HDL cholesterol as compare to obese. There is a positive correlation of serum cholesterol, triglyceride, LDL and VLDL level with body mass index in this study, and there is negative correlation of serum HDL level with body mass index. The mean values of systolic blood pressure, diastolic blood pressure, pulse pressure and mean arterial pressure are more in obese subjects as compared to non-obese subjects. There is a significant correlation between various blood pressure parameters and body mass index in this study.

From the present study, it is concluded that overweight and obese subjects are at greater risk of development of dyslipidemias & hypertension.

LIMITATON OF THIS STUDY AND FUTURE RESEARCH

Larger sample size would be more conclusive & needed for better correlation and comparison between these blood parameters in different age groups. Study of other confounding factors like effect of lipid modifying drugs may be helpful. Study involving follow up of high risk subjects over long duration would be more useful.

REFERENCES

1. Sanjay kalra, A.G.Unnikrishnan(2012). Obesity in India; the weight of the nation, journal of medical nutrition and nutraceuticals, 1,37-41.
2. Gortmaker SL, Dietz WH, Sobol AM, Wehler CA(1987). Increasing pediatric obesity in the United States. *Am. J. Dis. Child*, 141,535-540.
3. Popkin BM.(1994). The nutrition transition in low-income countries: an emerging crisis. *Nutrition Reviews*, 5, 258-298.
4. Adams L. Hyperlipidemia (2005).Minneapolis MN center for leadership, Education and training in maternal and child nutrition, Division of epidemiology and community health, school of public health, university of Minnesota, 10, 109-123.
5. Wolf RN, Grundy SM. Influence of weight reduction on plasma lipoproteins in obese patients. *Arteriosclerosis*.1983; 3:160-169.
6. Mukhopadhyay SK(2012). Study of Lipid Profile in Obese Individuals, *Al Ame en J Med Sci* 5 (2),147 -151.
7. Thaker JS, Sujay Bisht (2010). Comparative Study of BLOOD LIPID PROFILE OF OBESE AND NON-OBESE SEDENTARY COLLEGE MEN VSRD-TNTJ, Vol. I (1), 26-29.
8. Abdul Rahman Al-Ajlan(2011). Lipid Profile in Relation to Anthropometric Measurements. *International journal of Biomedical science*, 7, 112-119.
9. Nitesh Mishra et al.(2012). CENTRAL OBESITY AND LIPID PROFILE IN NORTH INDIAN MALES *International Journal of Applied Biology and Pharmaceutical Technology*, 3, 291-294.
10. Ronald G.Victor(2011). systemic hypertension: mechanisms & diagnosis, Eugene Braunwald's Heart Disease,A text book of cardiovascular medicine 9th edition,935-943.
11. Obarzanek E, Wu CO, Cutler JA, et al.(2010). Prevalence and incidence of hypertension in adolescent girls. *J Pediatr*,157,461–467.
12. Falkner B (2008). Children and adolescents with obesity-associated high blood pressure. *J Am Soc Hypertens*, 2,267–274
13. World Health Organization(2002) .Reducing risks, promoting healthy life - The World Health Report. Geneva: World Health Organization.
14. Renu Lohitashwa et al.(2012) .A cross sectional study of relationship of obesity indices with blood pressure. *International journal of basic medical science*, 3, 102-107.