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SCREENING OF LIPID PROFILE IN NON- OBESE HYPERTENSIVE SUBJECTS AT A TERTIARY CARE HOSPITAL IN BIHAR

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AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration among all authors. Author AK designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors RKS and VS managed the analyses of the study. All authors read and approved the final manuscript.

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ABSTRACT

Background: Obesity is a significant risk factor for metabolic syndrome in adults. Central fat distribution greatly alters the lipid profile and induces atherogenic dyslipidemia even in normoglycaemic, non-hypertensive subjects.

Aim and Objectives: Hence, the aim of the present study to assess lipid profile changes in non-obese hypertensive subjects. Obesity, hypertension and dyslipidemia are the three highly significant risk factor for the deranged lipid profile. Obesity can be defined as excess accumulation of body fat arising from a sustained or a periodic positive energy balance that when energy intake exceeds energy expenditure [1]. Indicators of overweight are useful in the diagnosis and management of obesity in both children and adults.

Materials and Methods: This study was conducted on newly diagnosed cases of essential hypertension attending medical outdoor of M.G.M. Medical College, Kisanganj. A complete clinical examination including laboratory investigation was done to exclude any systemic or other diseases which are likely to affect blood lipid levels directly or indirectly.

Results: The association between dyslipidaemia, obesity and hypertension is well established and all have been found to be major risk factor for the development of CAD, a leading cause of visits to physician and cause of death .

Conclusion: Our study was carry out to know the effect of obesity on lipid profile profile only in hypertensive and not in general population, and the study found some definite but paradoxical effects. These are that in obesity on a background of hypertension, the total and LDL cholesterol as also the HDL cholesterol are decreased, but on use other hand, the value of VLDL cholesterol and triglycerides are grossly and significantly increased. These finding have two major Clinical implications in that obese hypertensives will be more prone to metabolic syndrome and type 2 diabetes mellitus, and steps should be taken to prevent them accordingly and also apart from statins one should treat the obese hypertensives with fibrates, fat restriction and physical exercise also.

Keywords: Obesity; lipid profile; dyslipidaemia; hypertension.

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1. BACKGROUND

Obesity, hypertension and dyslipidaemia is these are the three highly significant risk factors for overall human health, life expectancy and easily morbidity, particularly in relation to cerebrovascular and cardiovascular disease profiles. These factors are so extremely well known that they don't need my references to note. Obesity can be defined as excess accumulation of body fat arising from a sustained or a periodic positive energy balance that is when energy intake exceeds energy expenditure [1]. The most common method of classifying overweight and obesity is based on Body Mass Index (BMI). According to the World Health Organization (WHO) classifies individual with BMI 25-29.99 Kg/ m^2 as overweight while individuals with BMI> 30 Kg/ m^2 are termed obese. Obesity can also be measured by knowing the body fat contest using various methods like Waist circumference (WC), Waist-Hip ratio (WHR), Skin and subcutaneous fat thickness in various areas of the body and also by measuring the Bio-electrical impendence of the body which is grossly affected by the body fat. Obesity is strongly related with hypertension dyslipidaemia and metabolic syndrome. In our thesis we are particularly interested in established the relationship of obesity with hypertension and lipid profile status [2]. Hypertension is the most common cardiovascular morbidity seen in the primary care and leads various fatal or severely morbid conditions like myocardial infarction, cerebral haemorrhage, cerebral thrombosis, renal failure, heart failure and death, if not detected early and treated appropriately. As per INC 812) report hypertension is regarded and is treatable in all adults with a B.P.> 140/90 mm Hg and in person with diabetes, CKD or related systemic co-morbidities the same values are maintained to define hypertension. We all know that.

Obesity has been described as an epidemic in many places throughout the world and its prevalence is of great concern. The World Health Organization (WHO) has defined obesity as having a body mass index (BMI) over 30 (body mass/ ht2). BMI does not directly assess how much fat a person has but is an indirect assessment that assumes that a higher body mass is due to an increasing percentage of the body's mass being fat 1191 Body mass index (BMI), which was defined by the World Health Organization (WHO), has been used for many years as a global index for assessing obesity [3]. Although hypertension and obesity are both closely associated, there is no universal anthropometric marker of this association. This is probably due to distinct population characteristics, and in the case of Brazil, the highly heterogeneous population [4,5]. The current estimated frequency of hypertension in India is 10-15% in rural and 25-30% in urban population as shown in different epidemiological studies. Due to the stress and tension inherent within the altering life patterns there is a changing trend in the overall prevalence of hypertension [6,7]. The probability of escalating cardiovascular diseases in rural India is a public health concern and not much research had been done to know about the burden and risk factors in rural areas [8,9] Hypertension is directly responsible for 57% of all stroke deaths and 24% of all coronary heart disease deaths in India .The meta-analysis of eight studies carried out in urban areas gives a pooled prevalence rate of 164.18 per thousand and in rural areas was 15744 per thousand. 4 Pooling of epidemiological studies shows that hypertension is present in 25% urban and 100% rural subjects in India [10]. Almost 30-65% of adult urban Indians are reported to be either overweight (BMI>=25) or obese (BMI>=30) or have central obesity [11]. Apart from the age groups 25-34 and 65+, the mean BMI was significantly higher for women compared to men across age-groups The standardized prevalence of overweight ($25Kg/m^2 \leq BMI < 30Kg/m^2$) and obesity ($BMI \geq 30Kg/m^2$) was respectively 23.89% and 11.19% for the study population, 23.79% and 7.59% for men, and 28.8% and 21.2% for women. Abdominal obesity was present in 14% of men and 59.5% of women [11].

2. MATERIALS AND DETAILS OF EXPERIMENTAL STUDY

2.1 Human Volunteers

- ✓ This study was conducted on newly diagnosed cases of essential hypertension attending medical outdoor of M.G.M. Medical College, Kisanganj.
- ✓ A complete clinical examination including laboratory investigation was done to exclude any systemic or other diseases which are likely to affect blood lipid levels directly or indirectly.

2.2 Group Formation

It contain 25 Non-obese male and female hypertensive subjects with (Systolic B.P- 140-200 mm of Hg, Diastolic B.P- 90-110 mm of Hg, B.M.I- Less than 25%)

2.3 Selection Criteria

2.3.1 Inclusion criteria

1. Only Hypertensive subjects will be included.

2. Age- All subjects will be from 35-60 yrs age group.
3. Sex - Both male and female will be selected for the study.
4. Body weight - Body weight will be in kilograms.
5. Body Height - It will be in cms.
6. Body Mass Index (B.M.I.) - Body weight in kg/ Body height in m

2.3.2 Exclusion criteria

1) Other than hypertensive subject.
2) Any other disease which affect lipid profile.

Study Period: From November 2012 To April 2014.

Blood Collection: Blood samples analysis was done for total cholesterol, triglyceride, HDL-cholesterol, VLDL cholesterol, LDL cholesterol by using Friede Wald's equation.

3. RESULTS AND DISCUSSION

3.1 Significance of Demographic Variables Gender wise in Non Obese Hypertensive Patients

The mean age of female patient was 48.32±7.28 years and that of the male patients was 46.48 ± 8.4 years.The age different in the two sexes is negligible and in significant (p>0.05). The mean height in female was 152.52 cm (±9.06) and that male was168.52cm (±6.21). As expected this different is quite remarkable and highly significant (t= 6.51; p<0.001). The mean weight of the female 49.04 kg (±7.35) compared to the mean value is males being 64.88 (± 5.32). The calculated mean BMI female is 21.17(±1.32) and that is male is 22.82 (±0.82) kg/m^2. This table shows that among hypertensive non obese individual chosen in our study, the mean height and weight of the male (in the same age group) are significantly greater than those in female, but the BMI being the ratio and wt., should have been the same, yet the non-obese female chosen (below cut of point 23) had a significantly lower BMI (p<0.001) than that in males. The average height in Indian males in one study [12] is 164.7 cm and in another study done in rural area [13]. It is 161.2cm.In our study though it is in a rural District [i.e. Kishanganj]. In Bihar average height is higher (168.5 cm) than both the above studies .In most of the advance and western countries the average height in male is greater than 170 cm [14,15] and in some countries like Croatia Czech Republic, Denmark etc. [16,17,18] the average height in male is >180 cm Among Asian Couturiers in Japan the average male height is > 170 cm 84 but in china it is the same as in India [19,20]. Therefore the mean male body weight in adults in USA is 78.65 kg. If the mean height American adult male is 1.74 m. ,then mean BMI of American males is wt./m^2 =78.65 kg/1.74m^2 =78.65/3.0276 kg/m^2 =25.98 kg/m^2 In adult Indian population the range is deemed to be 18-23 (the ideal Indian BMI).In our study ,the BMI of non obese female is 21.17 ± 1.32 non obese male 22.82 ± 0.27 in all hypertensive female it is 24.92±4.09. In case of male in our study, in non obese hypertensive it is 22.82±0.27, in male obese hypertensive 27.5+1.43 and all category of hypertensive male it is 25.16 ± 20.1. This value is just a bit less than that is an American population, but still it is higher than desired value.

Table 1. Statistical significance of demographic variable by gender of non- obese patients

Gender	Female (n=25		Male (n=25)		T	p
D. variable	Mean	SD	Mean	SD		
Age	48.32	7.28	46.48	8.4	0.74	>0.05
Ht	152.52	9.06	168.52	6.21	6.51	<0.001
Wt	49.04	7.35	64.88	5.32	7.81	<0.001
BMI	21.17	1.32	22.82	0.27	5.47	<0.001

Table 2. Comparison of bp, wc, hc & whr by gender of non- obese hypertensive patients

Gender	Female (n=25		Male (n=25)		t	p
D. variable	Mean	SD	Mean	SD		
SBP	160.80	7.64	164.08	10.62	1.12	>0.05
DBP	95.12	2.83	97.60	6.20	1.63	>0.05
WC	79.76	4.80	86.72	8.34	3.23	<0.01s
HC	75.32	4.78	92.12	4.91	10.96	<0.001
WHR	1.059	0.024	0.955	0.024	13.70	<0.001

Table 3. Comparison of lipid profile by gender of non obese hypertensive patients

Gender	Female (n=25)		Male (n=25)		t	P
D. variable	**Mean**	**SD**	**Mean**	**SD**		
CHOLT	239.32	13.40	262.20	13.68	5.34	<0.001
HDL	35.72	6.46	31.04	3.14	3.40	<0.001
LDL	169.60	16.51	197.80	11.38	7.03	<0.001
VLDL	33.40	2.53	32.56	3.82	0.92	>0.05
TG	167.00	12.67	166.80	27.98	0.03	>0.05

3.2 Comparison of SBP, DBP, WC, HC and WHR by Gender of Hypertensive Patient without Obesity (Table 2)

The mean systolic blood pressure (SBP) of female non obese hypenensive patient is 160.8±7.64 mm of Hg and the diastolic blood pressure (DBP) in the same age group is 95.12±2.83 mm of Hg. The waist circumference of this group is 79.76± 4.80 cm, the hip circumference (HC) is 75.32±4.78 cm, and the waist hip ratio (WHR) is 1.059± 0.024. On the other hand, the mean SBP of male non obese hypertensive patients is 164.08± 10.62 mm of Hg .The mean DBP in the same group is 97.60±6.20 mm of Hg. In this hypertensive group both systolic and diastolic blood pressure is statistically same in both sexes (p>0.05 in both SBP and DBP). The WC, HC and WHR in male non obese hypertensive patients are 86.72±8.34 cm, 92.12±4.9 cm and 0.955±0.24 respectively. All these three parameters when compared between the two sexes in the non obese hypertensive group are statistically significant (p<0.01, <0.001 and <0.001).

3.3 Comparison of Lipid Profile of Non Obese Hypertensive Individuals (Table 3)

The mean total cholesterol in female non obese hypertensive patient was 239.32±13.40 mg/d1, the HDL 35.92±6.46 mg/d1,LDL169.60±16.51 mg/dl, VLDL 33.4 ±2.53 mg/dl and the triglyceride 167.00±12.67 mg/dl. The same value in male non obese hypertensive in our study are 262.20±13.68 mg/dl, 31.01±3.14 mg/dl, respectively. In all of these the sex difference is statically significant, the male values being higher in case of total cholesterol (p<0.001) & LDL cholesterol (p<0.001), but male value are lower than the corresponding female value in case of HDL cholesterol, VLDL cholesterol are triglyceride (p<0.001, p<0.05 and p<0.05 respectively). While corresponding the effects of obesity on lipid profile of hypertensive female patients in our research project, it has been founded that the mean total cholesterol of non obese female patients is 239.32 ± 13.40 mg/dl. The HDL, LDL, VLDL and triglyceride levels in the female non-obese population are 35.92±6.46 mg/dl, 169.60±16.50 mg/dl, 33.40 ± 2.53 mg/dl and 167.00 ± 12.67 mg/dl respectively. The value in TC, HDL and LDL are almost the same; rather, the LDC-C level is less in obese hypertensive females than in non-obese similar population. But the VLDL and triglyceride levels are significantly increased in the obese category of the similar population. Triglycerides= 255.20 ± 33.59 mg/dl in obese female hypertensive versus 169.00 ± 12.67 mg/dl in the corresponding non-obese population ($p < 0.001$), providing that the difference is statistically highly significant. In our study on the effect of obesity in male hypertensives on lipid profile, it has been found that the TC, HDL - C, LDL - C, VLDL - C and triglycerides in non- obese male hypertensive are respectively. 262.20 ± 13.68 mg / dl, 31.04 ± 3.14 mg / dl , 197.80 ± 11.39 mg / dl. 32.56 ± 3.82 mg / dl and 166.80± 27.98 mg /dl. The mean levels in their study on non - obese hypertensive patients were: TC = 230.22 ±42.78 mg / dl (compared to our values: 250.76 ± 17.69 mg / dl); HDL - C = 43.90 ± 977 mg / dl (versus our study values = 33.48 ± 560 mg / dl); LDL - C = 146.86 ± 33.25 mg / dl (versus our study values = 183.70 ± 19.20 mg / dl) VLDL - C = 39.27± 17.67 mg / dl (versus our study values = 32.98 ± 3.24 mg / dl); Triglycerides = 199.30 ± 88.03 mg / dl (versus our study values = 166.90 ± 21.50 mg / dl). Obviously, our HDL - C value, along with VLDL - C and Triglycerides values were considered lower than values obtained by them. In short, our studies have shown that despite the well-established fact that lipid profile shows a deterioration both hypertension and obesity (deterioration means ↑TC, LDL - C, VLDL - TGL and HDL - C), but when both obesity and hypertension are concomitantly present, then the lipid profile assumes a typical pattern (i.e. ↑ Triglycerides) compared to non-obese hypertensive individuals [21]. Our net - reaches have not revealed the existence of any study so far matching the goals and methodology envisaged as in ours, that is no further deterioration due to obesity in hypertensive in ours, that is no further deterioration due to obesity in hypertensive in the values of TC and LDL - rather than a slight betterment of those, and vis- a-vis a significant and notable deterioration (i.e. Increase) in the values of VLDL - C and triglycerides.

The cause behind these peculiar changes are matters of further and broader research and can only be hypothesized in the present stage, viz (a) The presentation of increased free fatty acids to liver as a function of obesity in primarily responsible for over production of VLDL as well as triglycerides [22]. (b) Increased fat levels in obesity increased insulin level which is turn increases VLDL and triglycerides [23,24].

4. CONCLUSION

Our study was envisaged to know the effect of obesity on lipid profile profile only in hypertensive and not in general population, and the study found some definite but paradoxical effects. These are that in obesity on a background of hypertension, the total and LDL cholesterol as also the HDL cholesterol are decreased, but on use other hand, the value of VLDL cholesterol and triglycerides are grossly and significantly increased. These finding have two major Clinical implications in that obese hypertensives will be more prone to metabolic syndrome and type 2 diabetes mellitus, and steps should be taken to prevent them accordingly and also apart from statins one should treat the obese hypertensives with fibrates, fat restriction and physical exercise also. Our studies have been done in Kisangani, Bihar which comprises a semi urban and rural population. So, a more elaborate and multicentric study covering all categories of population is required to be done to establish the findings more definitely and conclusively.

CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the authors.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. WHO. Obesity and Over Weight. Fact sheet No.-311; 2006.
   Available:http://www.who.int/media centre/fact sheet/fs311/en/index.html
2. Obesity, preventing and managing the global epidemic. WHO Technical Report Series. 2000;894.
3. Ekezie J. Anyanwu EG, Danborno B. Anthony U. Impact of urbanization on obesity, Anthropometric Profile and Blood Pressure in the Igbos on Nigeria. 2011;3:242-246.
4. Teresa S Mendoza. Nutrition Epidemiology Section, NSTD Division, Medical School of Ribeirão Preto, American Journal of Hypertension. 2009;22(9):980-4.
5. Shah B, Gupta R, Mathur P, Saxena M, Agarawal RP, Bhardwaj A, et al. An action plan for non communicable diseases prevention, surveillance, management and control in economically deprived Indian states: Lessons from Rajasthan. South Asian J Prev Cardiol. 2006;10:5-45.
6. Prakash C. Deevania R Gupta. Hypertension in south Asians. South Asian J Prev Cardiol. 2004;8(3):144-8.
7. Antezana PS. World Health Organisation. Epidemiologic Aspects of Hypertension in the World available.
   Assessed on 15.09.2014.
8. Chow C. Cardona M, Raju PK, Lyengar S, Sukumar A, Raju R, et al. Cardiovascular disease and risk factors among 345 adults in rural India-the Andhra Pradeshrural health Initiative. Int J Cardiol. 2007;116(2): 180-5.
9. Mathur P, Shah B. Research priorities for prevention and control of no communicable diseases in India. Indian J Community Med. 2014;36:72-7.
10. Manidi RS, Kulkarni B, Singh A. Secular trend in height in different states in India in Relation to socio-economic characteristic and dietary intake. Food and Nutrition Bulletin. 2011; 32(1);23-24.
11. Venkaiah K, Damayanti K, Nayak MK, Vijayraghavan K. Diet and Nutritional status of Normal Adolescents in India. 2002; 1119-1125.
12. Moody Alison. 10 Adult Anthropometric measures, overwight and obesity, Health Survey for England (Report) Health and Social Information Care. 2012,2013;20.
13. Mc Dowell, Margaret A. Anthropometric reference data for children and adult, United States. 2003-2006. National Health Statistics Report. 2008;10.
14. Growth chart for Croatia, Collegium Antropologicum 36 (Supplement).
15. Vignerova J Brabec M, Blaha P. Two centuries A growth among Czech children and youth Economics and Human Biozoay. 2006;4(2): 237-52.

16. Garcia Jaume. The evolution of adult height in Europe, A Brief note Eco Humbiol. 2007;5(2): 340-9.
17. Yang XG, L YP, Ma GS, et al. Study of weight and height A Chinese Prof Zhonghoaliuxinabiang Xne Zazh1. 2005;26(7): 489-93(in Chinese).
18. Ideal weight is America from 1988 to 1994, NHANES III Survey; 1995.
19. Wolf RN, Grundy SM. Influence of weight reduction on patients in obese plasma lipoproteins Arterosclerosis. 1983;3:160-169.
20. Cerundy SM, MOK HYI, Zech L. Transport of very low density lipoproteins, triglyceride in varying degrees of obesity and hyper triglyceridemia. J. Clin. In Vest.1979;63:1274-76.
21. Equsa G, Beltz WF, Grundy SM. Influence of obesity on metabolism of a poliprotein B in humans. J Clin Invest.1985;76:596-600.
22. WHO. Hypertension: Report of WHO Scientific Group Technical Report Seris. 1978;657:87-95.
23. Andre Pascal Kengne, 12 Paschal Kum Awah Leopold Fezeu and Jean Claude Mbanya Afr Health Sci. 2007;7(1):38-44.
24. Srinivas Paik, Bhagoji SB, Biswas A. A study on lipid profile of hypertensive patients in Mangalor. INT 1 Phar Sci and BM. 2014; 2(2):1-10.