



A STUDY OF ASSOCIATION OF ANTHROPOMETRIC INDICES OF CENTRAL OBESITY WITH CARDIOVASCULAR RISK FACTORS IN CENTRAL INDIA.

General Medicine

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ABSTRACT

Background: This study was undertaken to study the relationship between different anthropometric indicators of obesity and cardiovascular risk factors. **Methodology:** it was an observational study conducted in the department of general medicine from January 2019 to December 2019 and a total of 150 patients were studied in which measures like BMI, WC, WHR and WHtR were calculated and association was studied with Cardiovascular disease risk factors like hypertension, type 2 diabetes and hyperlipidemia. **Results:** Out of 150 patients with CVD risk factors studied 50 patients were with hypertension, 50 were having type 2 DM and 50 were with dyslipidemia. Waist circumference was found to be highly significantly associated with dyslipidemia, Waist to Hip ratio (WHR) BMI was found to be highly significantly associated with dyslipidemia and Waist to Height Ratio (WHtR) was found to be highly significantly associated with all three i.e. dyslipidemia, hypertension and type 2 Diabetes Mellitus.

KEYWORDS

obesity, anthropometry, cardiovascular risk factors

INTRODUCTION

Over-weight and obesity are defined as abnormal or excessive fat accumulation that may impair health. (1) For thousands of years, overweight and obesity were exceptional, rarely seen and never studied. In some cultures, indeed, obesity was prized, indicating status and wealth. (2). India has been called "the diabetes capital of the world" and "every fifth diabetic in the world is an Indian". (3). In 2000, India topped the world with the highest number of people with diabetes mellitus (31.7 million). Currently, India has more than 62 million diabetic individuals. It is predicted that by 2030 diabetes mellitus may afflict up to 79.4 million individuals in India. (4) According to the WHO 2008 estimates, the prevalence of HTN in Indians was 32.5% (33.2% in men and 31.7% in women). About 33% urban and 25% rural Indians are hypertensive. (5)

Asian Indians are known to have a unique pattern of dyslipidemia with Lower HDL cholesterol, increased TGs levels and higher proportion of low density lipoprotein (LDL) cholesterol. Hypercholesterolemia was found in 13.9%, hypertriglyceridemia in 29.5%, low HDL in 72.3% and high LDL in 11.8% of the population. (6)

Clinical evidence suggests that the association of type 2 diabetes mellitus (DM) with central obesity (where visceral adipose tissue is stored) is stronger than the association with general obesity. (7)

Hence this study was undertaken to study the relationship between different anthropometric indicators of obesity and cardiovascular risk factors.

Methodology It was a cross sectional observational study carried out in the department of general medicine at a tertiary care teaching hospital from January 2019 to December 2019 for a period of 1 year.

INCLUSION CRITERIA:

- Patients having age > 18 yrs, male or female.
- Patients having either of cardiovascular disease risk factors like hypertension or type 2 diabetes mellitus or dyslipidemia.

EXCLUSION CRITERIA

- Patients having age < 18 yrs.
- Patients having other chronic illness like Chronic Kidney Disease (CKD), Chronic Obstructive Airway Disease (COPD), Ascites, Lump in the abdomen.
- Pregnant women.
- Patient having multiple CVD risk factors (Hypertension, type 2 Diabetes

Mellitus and Dyslipidemia).

- Patients on weight-loss programme like diet or heavy exercise

(Gymnasium).

- Patients on metformin and lipid lowering drugs.

g) Patient unwilling to take part in above study.

- Patient not meeting above inclusion criteria.

By using simple random sampling method, total 150 patients taken for study. 50 patients each of hypertension, type 2 diabetes mellitus and dyslipidemia selected in each group of disease, 25 patients of either sex were taken.

Statistical analysis:

SPSS version 16 was used for analysis and P value less than 0.05 were considered as statistically significant.

Results: In our study out of total 150 patients studied, 50 patients were with hypertension, 50 were having type 2 DM and 50 were with dyslipidemia.

(table 1)

In the present study, Mean BMI in patients with hypertension was 28.50 ± 2.01 , in type 2 DM was 27.92 ± 1.89 and in dyslipidemia was 28.79 ± 2.01 . Mean Waist circumference in patients with hypertension was 85.24 ± 5.30 , in type 2 DM was 85.30 ± 5.07 and in dyslipidemia was 87.18 ± 4.97 . Mean waist hip ratio in patients with hypertension was 0.88 ± 0.05 , in type 2 DM was 0.90 ± 0.05 and in dyslipidemia was 0.91 ± 0.05 . Mean Waist to height ratio in patients with hypertension, type 2 DM and dyslipidemia was the same 0.52 ± 0.03

(table 2)

Waist circumference was found to be highly significantly associated with dyslipidemia, Waist to Hip ratio (WHR) BMI was found to be highly significantly associated with dyslipidemia and Waist to Height Ratio (WHtR) was found to be highly significantly associated with all three i.e. dyslipidemia, hypertension and type 2 Diabetes Mellitus (table 3)

DISCUSSION:

Obesity is an independent risk factor for cardiovascular diseases (CVD) and is strongly associated with other cardiovascular risk factors like hypertension, dyslipidemia and type 2 diabetes mellitus. Against this background, various anthropometric indices of obesity such as body mass index (BMI), waist to hip ratio (WHR), waist circumference (WC) and waist to height ratio (WHtR) have been suggested as screening tools to identify

individuals at risk of CVD.(8) But it is still not clear regarding superiority of one anthropometric index over the other and which is best for predicting CVD risk factors.

In the present study, mean age of patients with hypertension was 44.24 ± 4.32 , in Type 2 DM was 44.26 ± 4.21 and in dyslipidemia was 43.72 ± 3.92 . In our study, anthropometric indices of obesity studied (BMI, WC, WHR, WHtR) were found significantly associated (above cut off value) more in the age group 41-45 yrs. Bener A et al (9) in their study on 1552 participants found that the mean age was 42.66 ± 11.1 . The association between the anthropometric indices and CVD risk factors was stronger in people aged 35-45.

Hypertension:

In the present study, in the patients with hypertension, among the 4 anthropometric indices studied, WHtR was highly significantly associated, BMI and WC were significantly associated and WHR was not significantly associated with hypertension.

Cai LI et al (10) in a cross sectional study on 5720 adults, concluded that WHtR performed better than BMI and WC for the association with hypertension and diabetes.

Vrdoljak D et al (11) in their study on 2467 participants found that WHtR was a better predictor than all other anthropometric indices for hypertension and dyslipidemia and concluded that BMI and WHtR are important tools in predicting CVD risk in general practitioner's practice.

Park Y et al (12) in their cross sectional study involving 2952 participants concluded that WHtR has the best predictive value for evaluating the metabolic risk factors as compared to BMI or WC alone among subjects with normal BMI and WC.

Thus the results of this study are comparable and consistent with the studies mentioned above.

Type 2 DM

In present study in patients with type 2 DM, among the 4 anthropometric indices studied, WHtR was highly significantly correlated, WC and WHR were significantly correlated while BMI was not significantly correlated with type 2 DM.

Xu F et al (13) in their study on 3031 subjects in a community based prospective cohort study found that WHtR, WHR, WC and BMI were positively associated with hyperglycemia and concluded that WHtR and WC were best predictors of hyperglycemia.

Nyamdorj R et al (14) concluded that WHtR was stronger than BMI in association with diabetes.

Among Asian populations, central obesity has been shown to be a more consistent predictor of diabetes than is total obesity, while general obesity has been shown to be a better predictor among White US populations and Europeans. (7)

Dyslipidemia

Pua Y et al (8) in their cross sectional study suggested that BMI, WHR, WC and WHtR may be used as screening tools for cardiovascular risk factors including dyslipidemia of which WHtR may be the best anthropometric index.

The findings in the present study indicate that WHtR is better than other anthropometric indices for hypertension, type 2 DM and dyslipidemia. WHtR is advantageous because it is easy and cheap to measure and so can be effectively used in public health and hence serve as a standard screening tool for better comparisons of epidemiological data between different studies. (10)

Conclusion: The study concludes that the anthropometric indices of central obesity like WHtR, WC and WHR were associated more significantly with cardiovascular risk factors than measure of general obesity like BMI.

Tables and figure

Table 1 showing cardiovascular risk factor distribution in the study

Sr no.	CVD risk factors	Number of cases
1	Hypertension	50
2	Type 2 DM	50
3	Dyslipidemia	50
Total		150

Table 2 showing distribution of age and anthropometric indices in CVD risk factors:

	HTN	Type 2 DM	Dyslipidemia
Age	44.24 ± 4.32	44.26 ± 4.21	43.72 ± 3.92
BMI	28.50 ± 2.01	27.92 ± 1.89	28.79 ± 2.01
WC	85.24 ± 5.30	85.30 ± 5.07	87.18 ± 4.97
WHR	0.88 ± 0.05	0.90 ± 0.05	0.91 ± 0.05
WHtR	0.52 ± 0.03	0.52 ± 0.03	0.52 ± 0.03

Table 3 showing correlation of anthropometric indices with CVD risk factors.

Anthropometric index	HTN	P value	Type 2 DM	P value	Dyslipidemia	P value
BMI >cut off value <cut off value	47.06% 26.26%	0.0282 S	31.37% 34.34%	0.7146	56.86% 21.21%	<0.0001 HS
WC >cut off value <cut off value	40.70% 23.44%	0.0266 S	41.86% 21.88%	0.0102 S	47.67% 14.06%	<0.0001 HS
WHR >cut off value <cut off value	30.19% 35.05%	0.5459	45.28% 26.80%	0.0257 S	52.83% 22.68%	0.0002 HS
WHtR >cut off value <cut off value	52.33% 24.76%	<0.0001 HS	55.56% 23.81%	<0.0002 HS	77.78% 14.29%	<0.0001 HS

HS: Highly significant, S: Significant

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