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RESEARCH ARTICLE

HYPERTENSION AND ITS RELATIONSHIP WITH ANTHROPOMETRIC MEASUREMENTS (BMI PROFILE AND WAIST: HIP RATIO)

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ABSTRACT

Introduction: High prevalence of non-communicable diseases particularly hypertension is gaining much importance in developing countries. Associations between body mass index (BMI) and blood pressure (BP) have been consistently observed but the unresolved question is, whether there is a linear relationship across the entire BMI range. There is further need to study the relationship of anthropometry with hypertension to assess its applicability in all populations.
Aims/Objectives: To analyze the better anthropometric predictor of Hypertension.
Results and discussion: Of the 39 hypertensive we found in our study 8 showed family history of hypertension i.e. about 20.5%, this shows that familial hypertension is also a major cause of concern. WC > BMI > WHR as indicators of hypertension (relative p values- 0.001, 0.038, 0.94 for waist circumference, body mass index and waist hip ratio respectively).
Conclusion: The accuracy of anthropometric measurements as indicators showed that waist circumference was a better indicator than BMI which in turn is preferred over waist hip ratio.

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INTRODUCTION

High prevalence of non-communicable diseases particularly hypertension is gaining much importance in developing countries. Prevalence of hypertension has increased several folds over the last few years due to change in lifestyle which is becoming more sedentary in nature. Prevalence rates help us understand better the epidemiology of hypertension and also help us assess the association of risk factors with the condition. Among the various risk factors of hypertension role of obesity indicated by BMI higher than 25 kg/m2 is significant because increase in body weight leads to increase in blood pressure resulting from greater systemic resistance and blood volume due to hemodynamic and metabolic dysfunctions (Mufunda, 2007). Being overweight is associated with two- to six-fold increase in the risk of developing hypertension (Deshmukh *et al*., 2006). Few studies in urban and rural Indian population have showed strong relationship between different anthropometric indicators and blood pressure levels. Recent studies have shown that the abdominal obesity may be a more reliable indicator of cardiovascular risk than BMI in Indians. Indians do not have generalized obesity but tend to have higher intra-abdominal fat mass and excess truncal subcutaneous fat (Hariram Vuppaladadhiam and Talwar, 2005). There has been a change in cut off levels for BMI for the Indian population. Associations between body mass index (BMI) and blood pressure (BP) have been consistently observed but the unresolved question is, whether there is a linear relationship across the entire BMI range. Recently studies have been conducted to see the occurrence of hypertension in lean populations as well (Kaufman *et al*.). This would contribute towards the knowledge of burden of hypertension in the community which will help plan for prevention and control activities. There is further need to study the relationship of anthropometry with hypertension to assess its applicability in all populations.

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AIMS/OBJECTIVES

To analyze the better anthropometric predictor of Hypertension.

MATERIALS AND METHODS

STUDY DESIGN: A cross-sectional study.

STUDY POPULATION: Patients visiting RL jalappa hospital, Medicine opd

STUDY PERIOD: 2 months.

INSTRUMENTS

- Measuring tape- non-expandable
- Weighing scale
- Sphygmomanometer & sthethoscope
- Pre-tested questionnaire

Procedure

Oral consent was obtained from the participants to take their anthropometric measurements and blood pressure. The questions were asked orally after sufficient training of the interviewers and the questionnaire was subsequently filled. The objective of the study and the method was explained to the eligible people and they were requested to stay at home on the scheduled date and time. Those who were absent were asked to be present at the second visit. Pregnant women and those who were unable to stand erect were excluded from the study.

Measurement of blood pressure: After explaining the procedure to the participants, blood pressure was measured on right arm by auscultatory method using mercury sphygmomanometer. The individual was made comfortable and seated at least for five minutes in the chair before measurement. Blood pressure was classified according to the 7th Joint National Committee on detection, evaluation and treatment of hypertension (JNC 7th) criteria.

Normal Systolic and diastolic < 120/80

Pre- hypertensives: Systolic 120-139 or diastolic 80-89mm of Hg
Stage-1 hypertensives: Systolic 140-159 or diastolic 90-99 mm of Hg
Stage-2 hypertensives: Systolic 160 or diastolic 100mm of Hg

Hypertension is systolic blood pressure (SBP) >140 mmHg, and diastolic blood pressure (DBP) >90mmHg.

Anthropometric measurement: Body weight was measured (to the nearest 0.5 kg) with the subject standing motionless on the weighing scale. Height was measured (to the nearest 0.5 cm) with the subject standing in an erect position against a vertical scale and with the head positioned so that the top of the external auditory meatus was in level with the inferior margin of the bony orbit. BMI was calculated as weight in kilograms divided by squared height in meter. Waist circumference was measured at the level halfway between the iliac crest and the costal margin in the mid-axillary line after exhaling with the subject in standing position. Hip circumference was measured at the level of greater trochanters with the subject in standing position and both feet together.

DATA ANALYSIS

The data collected was analysed using SPSS Version 22 and the findings were tabulated.

RESULTS

A total of 187 participants were included in the study.

Table 1. General socio-demographic distribution

AGE	NUMBER	PERCENTAGE (%)
18-30	61	32.6
31-40	44	23.5
41-50	45	24
51-60	16	8.6
61-70	12	6.5
71-80	8	4.2
>81	1	.5
SEX		
MALE	58	31
FEMALE	129	69

32.6% of the population covered were young adults in the 18 to 30 age group. 69% of the population covered was female owing to the time of the visits.

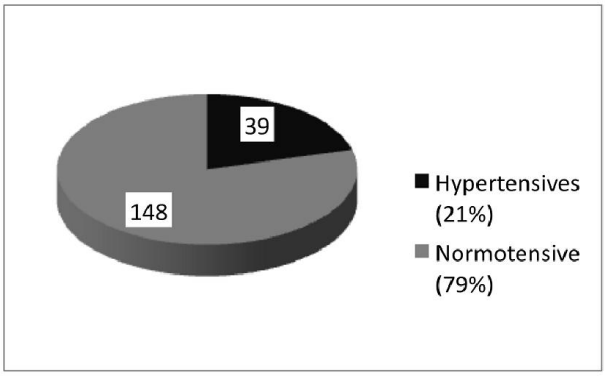

Chart 1. Showing prevalence of hypertension in study population

Out of the 39 cases present 28 were known cases and 11 were newly discovered cases of hypertension.

Table 2. Demographic distribution among hypertensives

AGE	NUMBER	PERCENTAGE (%)
18-30	1	1.6
31-40	5	11.36
41-50	12	26.6
51-60	7	43.7
61-70	9	75
71-80	5	62.5
SEX		
MALE	11	18.9
FEMALE	28	21.7

Majority of the people in the 70-80 year age group are hypertensive which is about 62.5% of them. A higher prevalence of 21.7% was seen among females. Among the population covered most of them had normal BMI's (50% in males and 33% in females). Waist hip ratio was normal for 57% of the males while 80% of women were found to be obese. And according to waist circumference the majority of population among both males and females were normal. 41% of the women who were obese suffered from hypertension. While 21% of the women and 16% of the men who were obese according to their WHR were hypertensive.

Table 3. Anthropometric measurements of sample population

BMI	MALES	FEMALES
<18.5	19(32.7%)	37(28.6%)
18.5-23	29(50%)	43(33.3%)
23-25	3(5.17%)	15(11.6%)
>25	7(12.06%)	34(26.3%)
WAIST HIP RATIO		
NORMAL	33(56.9%)	26(20.2%)
OBESE	25(43.1%)	103(79.8%)
WAIST CIRCUMFRENCE		
NORMAL	16(57.1%)	133(83.6%)
OBESE	12(42.9%)	26(16.4%)

Table 4. Anthropometric measurements of hypertensives

BMI	MALES	FEMALES
<18.5	4(21.05)	4(10.8)
18.5-23	5(20.68)	8(18.6)
23-25	0(0)	2(13.3)
>25	1(3.7)	14(41.17)
WAIST HIP RATIO		
NORMAL	6(21.2)	6(23.07)
OBESE	4(16)	22(21.35)
WAIST CIRCUMFERENCE		
NORMAL	10(62.5)	10(7.5)
OBESE	1(8.3)	18(69.2)

Waist circumference showed 69% of obese women to be hypertensive and only 8%.

Table 5. Effect of Stress on Hypertension

STRESS	HYPERTENSIVE	
	NO(number/percent)	YES(number/percent)
SEVERE	4(2.7%)	3(7.6%)
MODERATE	35(23.64%)	11(28.2%)
NO STRESS	109(73.64%)	25(64.1%)
TOTAL	148(100%)	39(100%)

Only 7.6% of the hypertensives complained of severe stress and 2.7% of the non-hypertensive complained of stress.

Table 6. Effect of Exercise on Hypertension

EXERCISE	HYPERTENSIVE	
	NO(number/percent)	YES(number/percent)
REGULAR	12(8.1%)	10(7.19%)
NON REGULAR	3(2.02%)	0(0.00%)
NO EXERCISE	133(89.8%)	29(74.3%)
TOTAL	148(100%)	39(100%)

7% of hypertensive regularly exercises, while 10.12% of non-hypertensive exercised regularly.

DISCUSSION

Hypertension has become one of the most important non-communicable lifestyle diseases in the world today with drastic increase in number of cases of past few decades. Our study aimed at seeing the prevalence of this disease in a semi-urban setting and also to see the relation it has with its various risk factors. Of the 39 hypertensives we found in our study 8 showed family history of hypertension i.e. about 20.5%, this shows that familial hypertension is also a major cause of concern. However we found that prevalence of hypertension is more in women i.e 21.8% while it is only 18.9% in males this is due to the non-representative nature of our sampling in order to meet our convenience. This is hence contradictory to the gender dichotomous findings of the surveys conducted earlier by Tesfaye. WC > BMI > WHR as indicators of hypertension (relative p values- 0.001,0.038,0.94 for waist circumference, body mass index and waist hip ratio respectively). From our findings we can see that 41% of hypertensive women and 3% hypertensive men are obese although there are a significant number of hypertensive's even in low BMI ranges.18% of hypertensive women and 20 % hypertensive men have normal BMI. 7% of hypertensives regularly exercise in order to keep their condition under control. Exercise is a standard recommendation by most medical practioners in order to avoid hypertension and maintain blood pressure levels.

Conclusion

The accuracy of anthropometric measurements as indicators showed that waist circumference was a better indicator than BMI which in turn is preferred over waist hip ratio.

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