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Original Research Article

CORRELATION OF ANTHROPOMETRIC PARAMETERS WITH BLOOD PRESSURE: AN ANTHROPOMETRIC STUDY IN NORTH INDIAN HARYANAVI MALES

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ABSTRACT

Background and objectives: This study was undertaken to determine the correlation between anthropometric parameters with blood pressure in adult male population of Haryana.

Materials and Methods: A cross sectional study was conducted in 300 north indian haryanvi males aged 25-40 years belonging to two endogamous groups (baniyas&jats). Measurements include subjects systolic and diastolic blood pressure, anthropometric measurements include height,weight,hip and waist circumference were taken and data was statistically analysed.

RESULTS: Mean ±SD for weight,BMI and WHR were found to be more in baniyas than jats and p-value was found to be statistically significant.Increased anthropometric indices (BMI, WC, WHR, WHtR) and increased prevalence of hypertension was seen (50%) in baniyas and (39.33%) jats. BMI, WC, WHtR have a strong correlation with the hypertension and prehypertension .Information was obtained about lifestyle and dietary habits of the subjects.

Conclusion: Sedentary life style and changes in dietary habits resulted in high anthropometric indices further increase the prevalence of hypertension and prehypertension.Preventive measures should be undertaken to reduce the rising burden of hypertension.

KEY WORDS: Anthropometry, Obesity, Haryanvi, Blood Pressure, Baniyas, Jats, Males.

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INTRODUCTION

Hypertension is the major health problem in india and other developing countries.Overweight and obesity have detrimental effects on hypertension.Several anthropometric indices such as height,weight, body mass index (BMI),waist–to-hip ratio(WHR),waist to height ratio(WHtR) and waist circumference(WC) are used as indicators of obesity.These measures are compared to reference standards to assess the risk of various cardiovascular diseases especially hypertension [1]. Thus it is important to study the relation between height, weight, waist circumference,body mass index and hypertension in order to decide which anthropometric indices have a direct relation with the occurrence of hypertension. Several studies from various populations have reported

significant association between different anthropometric indicators and blood pressure [2,3,4]. Most of the studies have shown linear relationships between anthropometric measures and risk of cardiovascular diseases [4,5]. But as far as the studies among the endogamous groups of haryana population are concerned, very few studies have been made to screen out the effects of anthropometric indices on blood pressure. Therefore, the present study was undertaken to find out the correlation of anthropometric indices with blood pressure between the two endogamous groups of north indian haryanvi adult males.

MATERIALS AND METHODS

A cross sectional study in Department of Anatomy MMIMSR, Mullana - Ambala was conducted among 300 healthy males (25-40 years of age) of known endogamous groups (baniyas & jats) of Haryana in the year (2012-2014). The subjects were taken from the urban and rural population of haryana. Persons with known hypertension, coronary artery disease, diabetes mellitus were excluded from the study. The study was approved by institutional ethical committee. The subjects were informed about the study, formal consent was taken from them and following anthropometric measurements were taken:

1. Height: Height in centimeters was measured (to the nearest 0.1centimeter, and then converted in meter by dividing the reading by100)with a flexible metallic measuring tape with the subject, standing barefooted in an erect position against an even wall or hard surface with the head positioned so that the top of the external auditory meatus in level with the inferior margin of the bony orbit [6].

2. Weight: Weight in kilograms (to the nearest 0.5kg) was recorded with the subject standing motionless on the weighing scale, barefooted wearing minimum clothes and maintaining the privacy.

3. Circumferences: The waist and hip circumferences in centimeters were measured with a non-stretchable measuring tape. These circumferences were measured twice, to the nearest centimeter and the mean was used for subsequent analysis.

i) Waist circumference (cms) was measured by using bone landmarks as references. The WHO guidelines recommend the measurement of waist circumference at the mid point between the lowest rib and the iliac crest (the highest point of the ilium) [7].

ii) Hip circumference (cms) was measured at the level of the greater trochanters in centimeters. It should be taken around the widest portion of buttocks,with the tape parallel to the floor [7].

Derived Anthropometric indices were calculated as follows:

Body Mass Index (BMI): weight (kgs)/height $(m)^2$).

Conventional BMI cut off 6 points were applied to classify the studied population into the following :

i) Underweight (BMI <18.5 Kg/m2).

ii) Normal weight (BMI > 18.5 - <25.0 Kg/m2)

iii) Over weight (BMI $\geq$ 25.0 Kg/m2)

iv) obesity (BMI $\geq$ 30 Kg\m2)

Waist-Hip Ratio (WHR): WHR = WC (cm) /HC (cm)

The cut-off value used was 0.9. [8].

Waist-Height Ratio (WHtR): WHtR = WC(cm)/ Height (cm)

The cut-off value used was 0.5. [8].

4. Blood Pressure: As per JNC (Joint National Committee) guidelines [9].

Normal – Systolic and Diastolic < 120/80 mm Hg

Prehypertension – Systolic 120-129; Diastolic 80-89mm of Hg

Hypertension (stage -1) - Systolic 140-159;Diastolic 90-99 of mmHg

(stage -2) - systolic > 160 ;diastolic >100 mm of Hg

For statistical analysis the data was imported in SPSS 20 software and was analysed for descriptive frequency of all variables. Mean, standard deviation, t- test, Pearson's correlation coefficient were used to investigate the relationship between anthropometric measurements and blood pressure among study groups. Probability value (p-value) $\leq$ 0.05 have been considered to be significant and & p-value <0.001 highly significant.

RESULTS

Mean ±SD for weight,BMI and WHR were found to be more in baniyas than jats and p-value was found to be statistically significant. (Table 1)

Anthropometric indices BMI (overweight, obesity), WC, WHR, WHtR were more in baniyas and prevalence of hypertension in baniyas was 50% and 39.33% in jats. (Table 2)

A significant positive correlation was seen between BP and anthropometric indices such as BMI, WC and WHtR among baniyas and jats.(Table 3)

Table 1: Baseline data of study population.

Variables	Jats (Mean ± SD)	Baniyas (Mean±SD)	p-value
Age	31.51±5.32	32.63±4.65	0.347
Height	1.70±7.40	1.71±5.66	1
Weight	63.25±10.52	73.09±10.66	0.000**
SBP	132.04±16.95	130.53±10.34	1
DBP	87.38±13.65	88.47±8.81	1
BMI	21.68±3.52	25.03±3.86	0.000**
WC	82.67±6.84	82.53±7.64	1
HC	91.61±8.75	89.39±8.58	0.142
WHR	0.90±0.04	0.92±0.03	0.000**
WHtR	0.48±0.04	0.48±0.04	1

Table 2: Prevalence of elevated anthropometric indices and hypertension among study groups.

Study groups	Overweight (BMI >25.0-29.9)	Obese (BMI≥30)	WC (≥ 90cm)	WHR (≥0.9)	WHtR (≥0.5)	Prehypertension	Hypertension
Baniyas	62(41.33%)	12(8%)	29(19.33%)	117(78%)	64(42.66%)	64(42.66%)	75(50%)
Jats	14(9.33%)	4(2.66%)	18(12%)	68(45.33%)	49(32.66%)	69(46%)	59(39.33%)

Table 3: Comparison of Correlation Coefficient of anthropometric variables with blood pressure among study population.

Variables	Systolic blood pressure (SBP)		Diastolic blood pressure (DBP)	
	Jats	Baniyas	Jats	Baniyas
Age	0.199*	0.121	0.224**	0.208*
Height	0.138	-0.076	0.116	-0.048
Weight	0.341**	0.419**	0.730**	0.356**
WC	0.323**	0.440**	0.374**	0.466**
HC	0.447**	0.493**	0.408**	0.451**
BMI	0.282**	0.418**	0.265**	0.348**
WHR	-0.314**	-0.185*	-0.151	-0.006
WHtR	0.246**	0.427**	0.306**	0.444**

Table 4: Diet and physical activity in baniya and jat males of Haryana.

Variables	Baniyas (150)	Jats (150)
non-vegetarian diet	28 (18.66%)	57 (38%)
high fat intake	45 (30%)	48 (32%)
high salt intake	61 (40.66%)	58 (38.66%)
sedentary lifestyle	93 (62%)	38 (25.33%)
Smoking	23 (15.33%)	64 (42.66%)
Alcoholic	30 (20%)	60 (40%)

DISCUSSION

WHR, WHtR, WC are commonly used to predict the risk of obesity related morbidity and mortality as they account for regional abdominal adiposity.BMI indicates general obesity whereas WHR, WHtR, WC indicates central obesity. Higher BMI and WHR was observed in baniyas than jats and the difference is statistically significant (Table 1). Naik et al. [10] also found similar values of males in Andhra Pradesh (0.91±0.05). WHtR indicates body fat distribution and values $\geq$ 0.5 have been employed to determine obesity related cardiovascular risks. WHtR is similar in both groups which is in accordance with the study done by Deshmukh et al. [11] in men of rural wardha (0.44±0.065) and Kapoor et al. [12] in adult tribal males of india (0.43±0.03).

In the present study, deranged anthropometric indices in baniyas and jats further increase the prevalence of prehypertension (42.66%) in baniyas and (46%) in jats and hypertension (50%) in baniyas and (59%) in jats (Table 2).This can be due to sedentary lifestyle, changes in dietary habits in the form of high fat and salt intake in diet as seen in baniyas. Baniyas form the main commercial elements of the population of Northern and Northwestern India. They hold large business, earn a lot of money and are considered to have a high socio-economic status. Males of this community in this sample lead a sedentary and very comfortable life. With large-scale socio-economic development, higher socio-economic groups they have acquired all the modern gadgets, which made their life comfortable and reduced the physical activity among them. Jats constitute a major portion of the total population of haryana and include a great mass of the dominant landowners. Jats are

known for their strenuous work under extreme weather conditions. Jats males being physically active showed an increased prevalence of prehypertension and hypertension due to faulty dietary habits in the form of smoking, alcohol intake and non-vegetarian food in their diet (Table 4). Study done on adult jains [13] males of Delhi reported prehypertension as 37.1% and hypertension as 24.2%. Low prevalence was seen in jains due to their high literacy rate and own food habits and deities. Hence, prevalence of hypertension among two endogamous groups indicated that the frequency of this silent killer (hypertension) was more in study population due to their increased anthropometric indices such as BMI, WHR, WHtR.

Our study is also supported by previous studies done by Hazarika et al [14], who reported that increasing age, sedentary life style, extra salt intake, regular smoking, BMI> 25 and WHR >0.9 have an increased risk of hypertension. Madhukumar et al. [15] revealed higher proportion of hypertension in males who were overweight and obese with BMI >25,alcoholics, smokers and had additional high salt intake. Association between additional salt intake, smoking,alcohol lead to the increased risk of prehypertension and hypertension as observed by Singh [16].

In the present study, a significant positive correlation was seen between anthropometric indices (BMI, WC,WHtR) and diastolic blood pressure among study groups (Table 3) which is similar with the study done by Hazarika et al. [17] reported association of hypertension with increased value of BMI and WHR.

CONCLUSION

BMI, WC, WHtR have a strong correlation with systolic and diastolic blood pressure in Haryanvi males aged 25-40 years. Sedentary life style in baniyas and changes in dietary habits in the form of high fat,salt intake,smoking and alcohol consumption in jats were associated with increase in anthropometric parameters and thus increased risk of pre-hypertension and hypertension. Therefore,lifestyle and dietary modifications,health education and awareness about hypertension need to be given priority.

Conflicts of Interests: **None**

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