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# Association between Prehypertension & Obesity in Medical professionals of Jammu region

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**Abstract*: Introduction:*** *Obesity is a major determinant of Prehypertension .The association between Weight and Blood Pressure is linear, therefore Cardiovascular disease prevention efforts should target reduction in excess weight .*
***Material & methods****: Study included 184 medical professionals of jammu region. Blood pressure & Anthropometric indices of Obesity were recorded.*
***Results****: Weight, Body mass index (BMI), Waist circumference (WC), Hip circumference(HC) & Waist- hip ratio(WHR) were statistically significantly higher in Prehypetensives as compared to normotensives.*
***Conclusion****: From the study strong association have been found between Obesity and Prehypertension, in Medical professionals of jammu, indicating the need to design more preventive programmes that target doctors as focus subjects in order to prevent its progression to clinical hypertension thus halting premature Cardiovascular diseases.*
***Key words:*** *Prehypertension, Obesity, BMI, WC, WHR.*

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## I. Introduction

Hypertension is more common in obese than in lean persons. Body weight also correlates with blood pressure within the so-called normotensive range of blood pressure. In longitudinal studies, weight gain is independently related to increase blood pressure[1,2,3]. Among people with slightly increased BP (prehypertension), long-term intervention with weight loss has been shown to be effective in the prevention of hypertension[4].

Obesity is found to be a major determinant of prehypertension even after controlling for other risks, such as age and sedentary lifestyle [5].

Body mass index (BMI), waist circumference (WC), weight to hip ratio (WHR) and weight to height ratio ($WH_tR$) are the most commonly used predictors for cardiovascular risk factors in clinical practice and epidemiological studies [6].

Among these four anthropometric indices, weight to height ratio ($WH_tR$) is the best predictor of cardiovascular risk factors [7]. Compared to overall obesity, central obesity is better correlated with most of the coronary artery disease (CAD) risk factors. Weight to height ratio is better predictive of CAD risk factors than waist circumference and waist-to-hip ratio[8].

Abdominal obesity is increasingly recognized as a major risk factor for CVD. Compared with body mass index, anthropometric measures of abdominal obesity appear to be more strongly associated with metabolic risk factors, incident CVD events and death [9,10].

The cardio-metabolic risk associated with abdominal obesity is attributed to the presence of visceral adipose tissue (VAT), which promotes insulin resistance, dyslipidaemia and hypertension [11,12]. Waist circumference and waist-hip ratio are the most common proxy measures of visceral adipose tissue. Both measures are correlated with visceral adipose tissue; however, waist circumference is more strongly associated with visceral adipose tissue [13,14]. Despite this, waist hip ratio may be a better predictor of CVD risk as hip circumference is inversely associated with the development of cardio-metabolic risk factors and CVD [15].

Obesity, abnormalities of glucose metabolism and insulin resistance are major factors associated with prehypertension and hypertension [16].

Aims & objectives: was to study the association of Prehypertension and Anthropometric measurements of Obesity in medical professionals of jammu region.

## II. Material & methods

The present study entitled "To study Association between Prehypertension & Obesity in medical professionals of Jammu region" was undertaken for a period of one year *w.e.f.* November 1, 2012 to October 31, 2013 in the Postgraduate Department of Physiology in collaboration with the Department of Biochemistry, Government Medical College, Jammu. The aim was to estimate the Obesity indices (such as weight, body mass index, waist circumference, hip circumference, waist hip ratio), and its association with Prehypertension in medical professionals of Jammu city.

The study included 184 medical professionals from Medical Colleges of Jammu region. They were grouped in to males and females. All the subjects were requested to present themselves in Postgraduate Department of Physiology, Government Medical College, Jammu.

Male and female subjects consenting to participate in the study were explained all aspects of the project in detail to eliminate their fear and apprehension.

World Health Organization (WHO) stepwise approach was used to study the profile of risk factors of cardiovascular disease.

A brief personal and family history of subjects participating in the study was taken and subjects with known risk of cardiovascular disease were excluded from study. Written consent was obtained from all the subjects participating in the study.

Subjects were asked about their dietary intake, smoking habits, alcohol intake and physical activity.

**Physical measurements**

Record of body weight, height, waist circumference and hip circumference was made as per WHO standards. The body mass index and waist hip ratio were calculated.

**Body weight:** The weight of the subjects was measured by using calibrated weighing machine.. The weight was recorded to the nearest kilogram (kg)[17].

**Height:** A vertical measuring rod was fixed to the wall and the subjects were asked to remove the shoes and stand on flat floor in front of the measuring rod with feet parallel and heels, buttock, shoulders and back of head touching vertical measuring rod.. The height was recorded to the nearest centimeter (cm) [18].

**Body mass index (BMI):** Body mass index was calculated by dividing weight (kg) by height squared ($m^2$) *i.e.*

$$\frac{\text{Weight (kg)}}{\text{Height } (m^2)}$$

Regarding the classification of the subjects in overweight and obese categories, the BMI interpretation used is:-

– BMI < 25 Normal
– BMI 25-30 Indicates overweight
– BMI > 30 Obese [19]

**Waist circumference:** It was measured at the midpoint between the lower border of the rib cage and iliac crest with measuring tape in centimeter (cm).

**Hip circumference**: It was measured at the level of greater trochanter, recorded up to the nearest centimeter (cm).

**Waist-hip ratio (WHR):** It was measured as waist-hip ratio and taken in per cent.

WHR interpretation:

– WHR > 0.9 in men indicated abdominal obesity
– WHR > 0.85 in women indicated abdominal obesity[20].

**Blood pressure**

The blood pressure was recorded by auscultatory method using mercury sphygmomanometer. Subject was made to sit and after a gap of 5min, the cuff of blood pressure apparatus was placed around the upper arm with the centre of bag lying over the brachial artery, keeping its lower edge about 3 cm above the elbow. The chest piece of the stethoscope was placed at the level of bifurcation of brachial artery. Cuff was inflated and pressure was raised to about 40 to 50 mmHg above systolic blood pressure (found by palpatory method). The pressure was lowered gradually until a clear tapping sound was heard which was taken as systolic blood pressure. The pressure was further lowered and the level at which sound became muffled was taken as diastolic blood pressure. Mean of the three readings were taken [21].

Prehypertension was defined as systolic blood pressure 120-139 mmHg and/or diastolic blood pressure 80-89 mmHg. Hypertension was taken as systolic blood pressure $\geq$140 mmHg and diastolic blood pressure $\geq$90 mmHg[22].

**Plan of analysis**

Data were analyzed using computer software MS Excel for Windows and EPI info version 6.1. Results were expressed as mean ± standard deviation. Student's t-test was used to compare the parameters

## III. Observations & Result

**Table 1:** Comparison of mean weight of normotensive and prehypertensive subjects

| Study Groups | Weight (kg) Mean ± Standard deviation | Equality of means 't'-value | Statistical inference (2-tailed) |
|---|---|---|---|
| Normotensive (n=47) | 56.55 ± 6.94 | -5.05 | p=.000; Highly significant |
| Prehypertensive (n=137) | 63.47 ± 8.46 | | |

The above table shows comparison of mean weight of normotensive and prehypertensive subjects.

- Mean weight of normotensive subjects is 56.55 ± 6.94 kg and that of prehypertensive subjects is 63.47 ± 8.46 kg.
- Thus, subjects in prehypertensive group have more mean weight than those in normotensive group.
- The difference between the two groups is statistically highly significant (p=.000).

**Table 2:** Comparison of mean body mass index (BMI) of normotensive and prehypertensive subjects

| Study Groups | BMI ($kg/m^2$) Mean ± Standard deviation | Equality of means 't'-value | Statistical inference (2-tailed) |
|---|---|---|---|
| Normotensive (n=47) | 22.92 ± 2.49 | -2.017 | p=.021; Significant |
| Prehypertensive (n=137) | 25.40 ± 2.85 | | |

The above table shows comparison of mean body mass index (BMI) of normotensive and prehypertensive subjects.

- Mean BMI of normotensive subjects is 22.92 ± 2.49 $kg/m^2$ and that of prehypertensive subjects is 25.40 ± 2.85 $kg/m^2$.
- The difference between the two groups is statistically significant (p=.021).

**Table 3:** Comparison of mean waist circumference (WC) of normotensive and prehypertensive subjects

| Study Groups | WC (cm) Mean ± Standard deviation | Equality of means 't'-value | Statistical inference (2-tailed) |
|---|---|---|---|
| Normotensive (n=47) | 79.40 ± 8.54 | -5.123 | p=.000; Highly significant |
| Prehypertensive (n=137) | 86.81 ± 8.56 | | |

The above table shows comparison of mean waist circumference (WC) of normotensive and prehypertensive subjects.

- Mean WC of normotensive subjects is 79.40 ± 8.54 cm and that of prehypertensive subjects is 86.81 ± 8.56 cm.
- The difference between the two groups is statistically highly significant (p=.000).

**Table 4: Comparison of mean hip circumference (HC) of normotensive and prehypertensive subjects**

| Study Groups | HC (cm) Mean ± Standard deviation | Equality of means 't'-value | Statistical inference (2-tailed) |
|---|---|---|---|
| Normotensive (n=47) | 94.17 ± 5.01 | -3.09 | p=.002; Highly significant |
| Prehypertensive (n=137) | 97.45 ± 6.66 | | |

The above table shows comparison of mean hip circumference (HC) of normotensive and prehypertensive subjects.

- Mean HC of normotensive subjects is 94.17 ± 5.01 cm and that of prehypertensive subjects is 97.45 ± 6.66 cm.
- The difference between the two groups is statistically highly significant (p=.002).

**Table 5:** Comparison of waist hip ratio (WHR) of normotensive and prehypertensive subjects

| Study Groups | WHR Mean ± Standard deviation | Equality of means 't'-value | Statistical inference (2-tailed) |
|---|---|---|---|
| Normotensive (n=47) | 0.83 ± 0.06 | -4.77 | p=.000; Highly significant |
| Prehypertensive (n=137) | 0.88 ± 0.05 | | |

The above table shows comparison of mean waist-hip ratio (WHR) of normotensive and prehypertensive subjects.

- Mean WHR of normotensive subjects is 0.83 ± 0.06 and that of prehypertensive subjects is 0.88 ± 0.05.
- The difference between the two groups is statistically highly significant (p=.000).

## IV. Discussion

In the present study we found that Prehypertensives have higher values of Weight, BMI, WC, HC& WHR than normotensives and the difference is statistically significant. This shows that Prehypertensives are at high risk of developing cardiovascular diseases.

High dietary content in fat has been suggested to acutely stimulate peripheral alpha 1 and beta adrenergic receptors thereby leading to elevation of sympathetic activity and hypertension [23].

Similarly, in human, combined alpha &beta adrenergic blockade significantly reduced blood pressure in obese relative to lean patients [24].

Hence our finding that Obesity is major predeterminant of Prehypertension , and that a lack of physical activity is common in doctors indicating that such an approach would probably be the most effective strategy. Various studies have been reviewed and found to have similar results as our study.

Our study is in agreement with [25], who found that Prehypertensives had significantly increased weight than normotensives .

Similar observations were made by [26], who found that Prehypertensives had higher BMI than normotensives.

Our study is in accordance with that of [27], who found that Prehypertensives had more waist circumference than normotensives.

Our study is also in agreement with [28], who studied the prevalance of Prehypertension as well as association with cardiovascular risk factors in north Indian upper socioeconomic population and found that Prehypertensives had high prevalence of cardiovascular risk factors including BMI, central obesity and waist hip ratio.

Hence it can be concluded that there is a strong association between Prehypertension and Obesity in Medical professionals of jammu . Our study provides important information of the high burden of cardiovascular risk factors such as Prehypertension and Obesity in apparently healthy doctors.

Lack of time, sedentary lifestyle and high stress level could explain the propensity for increased risk among doctors.

## V. Conclusion

From the study, strong association have been found between prehypertension and obesity, indicating the need to design more preventive programs that target medical professionals. Doctors should be motivated to adopt a healthy lifestyle including , salt reduction, regular exercise and maintaining a normal body weight. Applying these approaches can halt premature cardiovascular complications.

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