

**PREVALENCE OF PREHYPERTENSION AND HYPERTENSION AND ITS CORRELATION WITH ANTHROPOMETRIC MEASUREMENTS IN MEDICAL STUDENTS OF CENTRAL INDIA**J. Jain<sup>1</sup>, H. Mathur<sup>2</sup>, S. Apte<sup>3</sup>, U. Sinha<sup>4</sup>, K. Agarwal<sup>5</sup>, R. Chanchlani<sup>6</sup>**HOW TO CITE THIS ARTICLE:**

J. Jain, H. Mathur, S. Apte, U. Sinha, K. Agarwal, R. Chanchlani "Prevalence of Prehypertension and Hypertension and its Correlation with Anthropometric Measurements in Medical Students of Central India". Journal of Evolution of Medical and Dental Sciences 2014; Vol. 3, Issue 10, March 10; Page: 2429-2433, DOI: 10.14260/jemds/2014/2155

**ABSTRACT: BACKGROUND:** Hypertension is a growing health problem in Asia, while most studies describe hypertension in older adults and elderly there is paucity of data on hypertension in teenagers and young adults. **MATERIAL AND METHODS:** A cross sectional study was conducted from Dec 2013 to Jan 2014 in Chirayu medical College and Hospital. A total of 300 students were included in the study those who volunteered for participation. Hypertension was diagnosed based on drug treatment for hypertension or if the blood pressure was greater than 140/90 mmHg – Joint National Committee 7 (JNC VII) Criteria.<sup>8</sup> Anthropometric measurements including weight, height, waist and hip measurements were obtained using standardized techniques. **RESULTS:** Out of total 300 subjects 128(42.6%) were prehypertensives, 20 (6.66%) had stage I hypertension and 04 (1.3%) had stage II hypertension. Out of total 300 subjects 40 (13.3%) subjects had BMI < 18.5, 168 (56%) had BMI between 18.5 and 23.9, 38 (12.6%) had BMI between 24- 26.9 and 54 (18%) had BMI ≥27. **CONCLUSION:** Overweight and obesity are a major health hazard all over the world and are becoming a major health threat among both the sexes and all age groups. Substantial proportions of young adult medical students are prehypertensives, overweight and obese. Our results highlight the necessity to institute effective prevention and health promotion programs targeting younger age groups.

**KEYWORDS:** BMI, Central Adiposity, Hypertension, Obesity, Overweight.

**INTRODUCTION:** Hypertension is a growing health problem in Asia.<sup>1</sup> While most studies describe hypertension in older adults and elderly there is a paucity of data on hypertension in teenagers and young adults. Hypertension may be more common among young adults than previously thought, data from the National Study of adolescent Health (Add Health) indicate.<sup>2</sup> There is a growing concern about this as the cases might not be detected because of inadequate screening. Obesity increases the risk of cardiovascular diseases in adults.<sup>3</sup> The world health organization (WHO) has declared obesity as a disease of pandemic significance.<sup>4</sup> Hypertension alone is among most prevalent risk factor of cardio & cerebrovascular disease.<sup>5</sup> In recent years, body mass index (BMI) has become the measurement of choice for many obesity researchers and health professionals to measure overweight & obesity in adults.<sup>6</sup> BMI describes relative weight for height, is not gender specific. The evaluation of central adiposity by way of the waist to hip ratio (WHR) has been recognized as a substantial component in the assessment of cardiovascular disease risk factors due to an association between WHR & hypertension.<sup>7</sup> The objective of present study was to measure the prevalence of hypertension in medical college students and find out any relationship of their blood pressure status with BMI, WC & WHR.

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**MATERIAL AND METHODS:** A cross sectional study was conducted from Dec 2013 to Jan 2014 in Chirayu medical College and Hospital. A total of 300 students were included in the study those who volunteered for participation in the study. A predesigned and pretested questionnaire was filled by the students after the purpose of study was explained to them. Blood pressure was recorded in the sitting position in the right arm to the nearest 2mmHg using the mercury sphygmomanometer. Two readings were taken 15 minutes apart and mean of two was taken as the blood pressure. Hypertension was diagnosed based on drug treatment for hypertension or if the blood pressure was greater than 140/90 mmHg – Joint National Committee 7 (JNC VII) Criteria.<sup>8</sup> Anthropometric measurements including weight, height, waist and hip measurements were obtained using standardized techniques.<sup>9, 10</sup> Height was measured with a tape to the nearest cm. Subjects were requested to stand upright without shoes with their back against the wall, heels together and eyes directed forward. Weight was measured with a traditional spring balance that was kept on a firm horizontal surface. Subjects were asked to wear light clothing and weight was recorded to the nearest 0.5 kg. Proforma were analyzed after excluding the incomplete ones. BMI was used as a measure of obesity and was derived by using the standard formula.

**RESULTS:** Out of total 300 subjects participated in the study 104() were male and 196() were female. Age range of the subjects was 17-26 years with a mean age of 19.57 years. Out of total 300 subjects 128(42.6%) were prehypertensives, 20 (6.66%) had stage I hypertension and 04 (1.3%) had stage II hypertension. (Table no. 1).

Out of total 300 subjects 40 (13.3%) subjects had BMI < 18.5, 168 (56%) had BMI between 18.5-23.9, 38 (12.6%) had BMI between 24-26.9 and 54 (18%) had BMI ≥27. (Table no. 2).

Out of total 300 subjects 38 (12.6%) were alcohol consumers. The association of hypertension with alcohol consumption and non-consumption is significant (P value 0.0037). Out of total 300 subjects 10(3.3%) were smokers. The association of hypertension with smoking and nonsmoking is significant (P value 0.0001). Out of total 300 subjects 40 (13.3%) subjects had BMI < 18.5, 168(56%) had BMI between 18.5-23.9, 38 (12.6%) had BMI between 24-26.9 and 54 (18%) had BMI ≥27. The association of hypertension with obesity is significant (P value 0.0001). Out of total 104 males 36(34.6%) had WC more than 90 cm and out of total 196 females 144(73.46%) had WC more than 80 cm. The association of hypertension with WC is significant (P value 0.0001). Out of total 104 males 52(50%) had WHR >.9 and out of total 196 females 108(55.1%) had WHR >.85. The association of hypertension with WHR is not significant (P value 0.3147) (Table no. 3).

**DISCUSSION:** The present study found that the proportion of prehypertension and hypertension in college students were 41.3% and 7.9% respectively. These results were similar to the study done by Al-Majed HT, Sadek AA in Kuwait.<sup>11</sup> In present study the prevalence of hypertension in males and females were 3.9% in both and the prevalence of prehypertension in males and females were 18.6% and 22.6%, whereas in other studies prevalence of both prehypertension and hypertension was found more in males than females.<sup>12, 13</sup>

Regarding the smoking habit, the percentage of students who smoked in relation to the status of blood pressure, that is, hypertension was found in 40% of the subjects who were smokers in comparison to 7.5% those who were non-smokers (P value). Whereas in an another study done by Makwana N, Shah V, Khambhati S, Choudhary M, Goswami K, Yadav S, hypertension was found in

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28.21% of the subjects who were smokers in comparison to 4.74% those who were non-smokers (P value 0.8379).<sup>14</sup>

In present study out of total 300 subjects 38(12.66%) were found overweight in which females outnumbered twice than males. Similarly out of total 300 subjects 54 (18%) were found obese with m: f ratio of 20:34. Whereas in another study done by Shamail Zafar et al in Pakistan, out of total 483 medical students 99 (20.5%) of subjects were found as overweight and 30 (6.2 %) as obese.<sup>15</sup>

In present study out of total 300 subjects 180(60%) had central obesity as defined by WC cut off values for men >90 cm and women >80 cm. Out of these 180 subjects 36 (12%) were males and 144(48%) were females. Whereas in another study done by Shamail Zafar et al in Pakistan, out of total 483 medical students abdominal adiposity was present in 56 subjects (11.59%) with males more obese than females, almost similar findings were there in a study from Iran which showed prevalence to be around 11.4%.<sup>15, 16</sup>

Significant number of study participants had central adiposity as defined by WHR (60%). Prevalence being more in female subjects (65.3%). Whereas in another study done by Renulohitashwa and Parvati Patil et.al in 2013 showed overall WHR (73.3%) and prevalence being more in female subjects (84.3%).<sup>17</sup>

**CONCLUSION:** Overweight and obesity are a major health hazard all over the world and are becoming a major health threat among both the sexes and all age groups. Substantial proportions of young adult medical students are prehypertensives, overweight and obese. Our results highlight the necessity to institute effective prevention and health promotion programs targeting younger age groups. In view of the fact that medical students are not representative of the general population, studies should be extended to the young adult population and investigate the presence of obesity and major CVD risk factors and their trends over time.

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| <b>Hypertension</b> | <b>Males<br/>n (%)</b> | <b>Females<br/>n (%)</b> | <b>Total<br/>n (%)</b> |
|---------------------|------------------------|--------------------------|------------------------|
| Normal              | 36(12)                 | 116(38.6)                | 152(50.6)              |
| Pre HTN             | 56(18.6)               | 68(22.6)                 | 124(41.3)              |
| Stage I             | 08(2.6)                | 12(3.9)                  | 20(6.6)                |
| Stage II            | 04(1.3)                | 00(00)                   | 04(1.3)                |
| <b>Total</b>        | <b>104(34.6)</b>       | <b>196(65.3)</b>         | <b>300(100)</b>        |

**Table no. 1: Distribution of the subjects according to the JNC 7 classification**

| <b>BMI</b>   | <b>Males<br/>n (%)</b> | <b>Females<br/>n (%)</b> | <b>Total<br/>n (%)</b> |
|--------------|------------------------|--------------------------|------------------------|
| <18.5        | 10(3.33)               | 30(10.0)                 | 40(13.3)               |
| 18.5 - 23.9  | 60(20.0)               | 108(36.0)                | 168(56.0)              |
| 24 - 26.9    | 14(4.66)               | 24(8.0)                  | 38(12.66)              |
| ≥27          | 20(6.66)               | 34(11.33)                | 54(18.0)               |
| <b>Total</b> | <b>104(34.6)</b>       | <b>196(65.3)</b>         | <b>300(100)</b>        |

**Table no. 2: Distribution of the subjects according to the BMI**

| Risk Factor               | Number of Subjects | Hypertension |     | Chi square value | P value |
|---------------------------|--------------------|--------------|-----|------------------|---------|
|                           |                    | Yes          | No  |                  |         |
| Alcohol consumption (yes) | 38                 | 08           | 30  | 8.433            | 0.0037  |
| (No)                      | 262                | 18           | 244 |                  |         |
| Smoking (yes)             | 10                 | 04           | 06  | 15.96            | 0.0001  |
| (No)                      | 290                | 22           | 268 |                  |         |
| Obesity (BMI <18.5-23.9)  | 208                | 04           | 204 | 67.01            | 0.0001  |
| (BMI 24 - 26.9)           | 38                 | 2            | 36  |                  |         |
| (BMI ≥27)                 | 54                 | 20           | 34  |                  |         |
| WC (> cut off value)      | 180                | 20           | 160 | 16.01            | 0.0001  |
| (< cut off value)         | 120                | 06           | 114 |                  |         |
| WHR (> cut off value)     | 180                | 18           | 162 | 1.011            | .3147   |
| (< cut off value)         | 120                | 08           | 112 |                  |         |

Table no. 3: Association of hypertension with various risk factors

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Date of Submission: 13/02/2014.  
Date of Peer Review: 14/02/2014.  
Date of Acceptance: 18/02/2014.  
Date of Publishing: 04/03/2014.