EVALUATION OF PRE-HYPERTENSION, HYPERTENSION AND ITS ASSOCIATED FACTORS AMONG 1st YEAR MEDICAL STUDENTS

THILIP KUMAR G*, PRABHAVATHI K, KARTHICK N, POORNIMA KN, SARAVANAN A
Department of Physiology, SRM Medical College Hospital & Research Centre, Kattankulathur, Chennai - 603 203, Tamil Nadu, India.
Email: Physiothilip08@gmail.com

ABSTRACT

Background and Objectives: Pre-hypertension is associated with increased progression to hypertension and cardiovascular risk. The objective of this study is to evaluate the prevalence of pre-hypertension and hypertension, as well as the associated factors among 1st year medical students who are from a similar socioeconomic status, dietary habits and lifestyle.

Materials and Methods: This was a cross-sectional study conducted among 137 1st year medical students using digital blood pressure (BP) monitor on three different occasions and the average was taken and also a questionnaire was obtained to assess the associated factors and other demographic details. Data were analyzed using SPSS software and results were demonstrated using descriptive tables where Chi-square test and one-way analysis was used.

Result: The prevalence of elevated BP (pre-hypertension and hypertension) as per JNC 7 criteria, among the medical students was 46.7%. There was a significant association of pre-hypertension with the individual risk factor like the family history of diabetes mellitus, diet and stress.

Conclusion: The study shows a significant proportion of individuals with elevated BP at a younger age, associated with risk factors such as family history of diabetes, diet and stress. Elevated BP increases the risk for the development of hypertension during adolescence. Hypertension being a disease of iceberg goes unnoticed leading to chronic disease, therefore identification at the earliest can curb the disease.

Keywords: Pre-hypertension, Adolescents, Prevalence, Hypertension.

INTRODUCTION

Pre-hypertension is a significant risk for progression of hypertension thereby increasing the risk for cardiovascular (CV) diseases and cerebrovascular events [1-4]. It is defined as individuals with blood pressure (BP) above optimal levels, but not clinical hypertension, i.e., systolic BP (SBP) 120-139 mmHg or diastolic BP (DBP) of 80-89 mmHg. Individuals with pre-hypertension have a greater risk of developing hypertension later in their life [5]. Framingham states that pre-hypertension is strongly associated with an increased risk of myocardial infarction and coronary artery diseases [6]. The mortality rate has been shown to be 50% higher in the prehypertensive adult compared to normotensive counterparts. Further, the death rate in India is increasing every year due to CV diseases. There is a lack of information about the prevalence and risk factor for pre-hypertension among adolescents in India. Lifestyle modification such as physical inactivity increased consumption of diets rich in fat, sugar and calories among adolescents could have changed the body metabolism, triggering a change in their BP [7]. Early identification of pre-hypertension plays an important role in screening for metabolic syndrome and prevention of CV accident. This study aimed to identify the prevalence of pre-hypertension, hypertension and associated factors among adolescent medical students who are from similar socioeconomic status, dietary habits, and lifestyle.

MATERIALS AND METHODS

This was a cross-sectional study conducted among the 1st year medical students of 2012 batch in SRM Medical College Hospital and Research Center. A total of 150 1st year medical students were taken in the age group between 17 and 18 years. Informed consent was obtained from the student before the study. Questionnaires regarding social, economic status, family history, diet history, knowledge and attitude toward the causes and preventive measures regarding hypertension were given, and filled questionnaires were obtained from the subjects. Of the 150 students, 13 students were excluded because of the incompletely filled questionnaires.

Anthropometric measures like height in meters and weight in kilograms has been measured, and the body mass index (BMI) was calculated. Waist circumference and hip circumference were measured by inch tape and waist-hip ratio was determined. BP readings were then obtained by LIPIKIND digital BP monitor. Studies suggest that, oscillatory method had been used to measure BP on a large screening basis. In our study, BP was screened using digital BP instrument in order to avoid errors due to a noisy environment and further it is easy to measure and can be repeated without any difficulty.

BP measurements were recorded in the sitting posture after 5 minutes of rest. Three readings were taken at each sitting on three different days, and the average was considered. The pulse rate was also noted.

BP was then classified according to the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High BP (JNC 7) criteria as follows: Normal ≤120 mmHg systolic and ≤80 mmHg diastolic; pre-hypertension: 120-139 mmHg systolic or 80-89 mmHg diastolic; hypertension: ≥140 mmHg systolic or ≥90 mmHg diastolic [8] and the individuals were categorized as normotensives, pre-hypertensives, and hypertensive mentioned in Table 1.

Statistical analysis was performed by IBM SPSS software version 21. Data were presented as the mean±standard deviation. The one-way analysis of variance was used for comparison of continuous variables. Pearson Chi-square test, Likelihood ratio and linear by linear association were carried out to find out the association between BP and other associated factors such as family history of hypertension, family history of diabetes mellitus (DM), family history of coronary artery diseases, diet and anthropometric measurement. The level of
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RESULT

Around 137 subjects were enrolled in this study. Among them, 66 were males, and 71 were females. The mean age of the participant’s was 18.18±0.61 years. Among this study population 70 were normotensive, 51 were pre-hypertensive and 13 were hypertensive.

Table 2 shows that the mean SBP among the normotensive, pre-hypertensive and hypertensive group were 110.82±5.4, 125.24±6.27 and 130.62±14.3 respectively, and the mean DBP among the normotensive, pre-hypertensive and hypertensive group were 69.59±7.46, 82.31±6.5, and 90.38±10.5 respectively. The differences were statistically significant (p<0.001). The mean body weight and height among the normotensive was 62.48±11.4 kg, 162.16±9.117 cm, pre-hypertensive was 71.96±13.8 kg, 171.25±9.475 cm and hypertensive was 69.75±20.63 kg, 163.81±6.40 cm respectively and this difference was also found to be statistically significant.

Based on the analysis Table 3 shows that 59.1% (39) of males and 16.9% (12) of females were found to be pre-hypertensive, and 6.1% (4) of males and 12.7 (9)% of females were found to be hypertensive, which was statistically significant.

Tables 4 and 5 shows that there was a significant association of pre-hypertension with the individual risk factor like the family history of DM, type of diet, stress. Also, other associated risk factors such as physical inactivity, duration of time spent on TV/computer, salt intake, showed a higher incidence rate among the pre-hypertensive group when compared to normal, but it was not statistical significant. No association was found between pre-hypertension and distribution of family history of hypertension, stroke, and coronary artery diseases. Also, no significant association was found between pre-hypertension and BMI, waist-hip ratio, knowledge about the hypertension. In our study, the students gave no history of smoking, alcohol intake and oral contraceptive pills.

DISCUSSION

Pre-hypertension, a new category published by the recent JNC-7 report proved in a study done by Koley modification might have a significant role in controlling hypertension as statistically significant. Therefore, it can be concluded that dietary modification might have a significant role in controlling hypertension as proved in a study done by Koley et al. [37]. Further irregular exercises

In our study, the students who eat more of non-vegetarian diet than a vegetarian diet had pre-hypertension and hypertension which was statistically significant. Therefore, it can be concluded that dietary modification might have a significant role in controlling hypertension as proved in a study done by Koley et al. [37]. Further irregular exercises
Table 3: Distribution of cases according to gender

<table>
<thead>
<tr>
<th>BP status</th>
<th>Number of cases</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males (%)</td>
<td>Females (%)</td>
</tr>
<tr>
<td>Normotensive</td>
<td>23 (34.8)</td>
<td>50 (70.4)</td>
</tr>
<tr>
<td>Pre-hypertensive</td>
<td>39 (59.1)</td>
<td>12 (16.9)</td>
</tr>
<tr>
<td>Hypertensive</td>
<td>4 (6.1)</td>
<td>9 (12.7)</td>
</tr>
<tr>
<td>Total</td>
<td>66 (100)</td>
<td>71 (100)</td>
</tr>
</tbody>
</table>

p value was analyzed by Chi square test, ***p<0.001 statistically significant.
BP: Blood pressure

Table 4: Distribution of cases according to family history of DM

<table>
<thead>
<tr>
<th>Family history of DM</th>
<th>Normotensive (%)</th>
<th>Pre-hypertensive (%)</th>
<th>Hypertensive (%)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes (65)</td>
<td>29 (39.72)</td>
<td>27 (41.5)</td>
<td>9 (13.8)</td>
<td>&lt;0.001***</td>
</tr>
<tr>
<td>No (72)</td>
<td>44 (60.27)</td>
<td>24 (33.3)</td>
<td>4 (5.6)</td>
<td></td>
</tr>
</tbody>
</table>

p value was analyzed by Chi square test, ***p<0.001 statistically significant.
DM: Diabetes mellitus

Table 5: Distribution of pre-hypertensive cases according to diet

<table>
<thead>
<tr>
<th>Diet</th>
<th>Normotensive (%)</th>
<th>Pre-hypertensive and hypertensive (%)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed (117)</td>
<td>66 (56.4)</td>
<td>51 (44.6)</td>
<td>0.009*</td>
</tr>
<tr>
<td>Vegetarian (19)</td>
<td>11 (57.9)</td>
<td>8 (42.1)</td>
<td></td>
</tr>
</tbody>
</table>

p value was analyzed by Chi square test, *p<0.05 statistically significant

and spending more times on TV and computer thereby leading a more sedentary lifestyle might have also shown to have an increased prevalence of pre-hypertension and hypertension in 1st year students but this is not statistically significant. Also, our study did not find any significant relationship between BP measurement and other factors such as family history of hypertension, coronary arterial diseases, stroke, BMI, waist-ratio. However, data from other studies have shown an association between these factors [13,38].

Limitation
Our study has certain limitation like, homogenous sample and smaller sample size. Also, a follow-up study of the pre-hypertensive adolescents would give more qualitative assessment of progression to hypertension.

CONCLUSION
Pre-hypertension remains as a more prevalent and undetected health problem among adolescents in our community. Elevated BP increases the risk for the development of hypertension in the near future. Further, it complicates the body metabolism which may result in metabolic syndrome in adolescents. In our study, prehypertensive individuals had a family history of diabetes and mixed diet pattern. Thus, specific health intervention like early lifestyle modifications, weight control and physical activity should be advocated to prevent further progression of pre-hypertension to hypertension, thereby reducing the risk of CV morbidity and mortality.

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