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PREVALENCE AND ASSOCIATED RISK FACTORS FOR PRE-HYPERTENSION AMONGST YOUNG ADULTS IN NAGPUR: A COMMUNITY BASED CROSS SECTIONAL STUDY

Community Medicine

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ABSTRACT

Pre-hypertension has been introduced as a new category for BP and deemed as a cardiovascular risk factor. Identifying pre-hypertension in younger adults helps in halting the progression of disease. This study was conducted to estimate the prevalence of pre-hypertension and its associated risk factors among young adults(18-40 years) of Nagpur. This community cross sectional study was carried out in urban filed practice area of Government Medical College Nagpur including 300 subjects. Demographic, behavioural variables, anthropometric and BP were measured. The prevalence of pre-hypertension in our study which was found to be 52.66% (59.41% in females; 49.25% in males). It was seen that age group of 18-29 years and underweight was a significant protective factor against pre-hypertension; whereas male gender, alcohol use, tobacco use, overweight and central obesity were risk factors for pre-hypertension. After applying logistic regression, age [OR-1.10 (1.06 to 1.14)], male gender [OR-2.69 (1.37 to 5.27)], underweight [OR-0.37 (0.16 to 0.85)] and overweight [OR-4.63 (1.79 to 11.95)] emerged as significant factors.

KEYWORDS

Pre-hypertension, young adults, risk factors

INTRODUCTION:

Pre-hypertension was defined as systolic blood pressure(SBP) of 120–139mmHg and/or diastolic blood pressure(DBP) of 80–89mmHg. The concept of prehypertension was introduced by JNC-7 report with the objectives of defining this classification of BP to draw clinical and public healthy attention on the prevention of people in this range.[1] Prehypertension is considered as a precursor of clinical hypertension and increases risk of cardiovascular disease and related early death.[2,3] Moreover, prehypertension is often linked to target organ damage, such as early arteriosclerosis, small vascular damage, coronary artery calcification, vascular remodel¬ing, and left ventricular hypertrophy.[4–8] Therefore those with pre-hypertension need to be monitored and given possible intervention to bring back BP to normal range or prevent its progression.

The National Health and Nutrition Examination Survey of 1999-2006 indicated that the overall prevalence of prehypertension in healthy adults was 36.3% worldwide.[9] The prevalence of pre-hypertension in India is also increasing.[10] Various studies conducted in India have shown prevalence of pre-hypertension to be ranging from 24.6-65%.[10–15] Many studies have been conducted in children, adolescents and older adults for hypertension. Studies have been conducted in young adults in developed countries but there is paucity of research in this age group in developing countries like India and more so in central India. Studies on prevalence of pre-hypertension and associated risk factors are furthermore scarce. Estimating the prevalence and identifying risk factors for pre-hypertension in younger adults can help in giving interventions to normalize or halt its progression to advanced stages of hypertension. So, we conducted this study to estimate prevalence of pre-hypertension and its associated risk factors and among young adults (18-40years) in Nagpur.

METHODOLOGY:

This community based cross sectional study was carried out in the urban filed practice area of Government Medical College Nagpur which caters to approximately 1000 families accounting to 15000 populations during November2016–February 2017. Those who were permanent residents of the area, ageing between 18–40 years with no documented raised BP and who consented were included in the study. Pregnant women and subjects with pre-existing thyroid, renal and other cardiac diseases were excluded. Ethical committee permission was sought before beginning of the study.

Sample size for the study was calculated taking the prevalence of pre-hypertension of 45.3% as stated in the study conducted by Kini S etal [16], with 95% confidence interval and absolute precision of 6%; derived to be 264. With 10% non-response rate added, sample size was 290. A total of 300 subjects were included in study. The houses were selected by simple random sampling method since we had list of all the houses in the area. Further, selection of subjects was made using Kish grid technique.[17] Data collection was done using a pre-designed proforma having demographic variables like age and gender and behavioural risk factors like smoking, tobacco chewing and alcohol use. Status of smoking, tobacco chewing and alcohol use was assessed and classified into non-smoker/never used smokeless tobacco, current smoker/smokeless tobacco user, past smoker/smokeless tobacco user; and life-time abstainer, current drinker, former drinker respectively as per the IDSP NCD risk factor survey classification.[18] Physical activity was measured using the WHO/FAO guidelines[19] on human energy requirements. The anthropometric variables like height, weight, waist and hip circumference were measured according to WHO STEPS guidelines.[20] Height and weight was measured to the accuracy of 0.1cm and 0.1kg respectively. Subsequently body mass index(BMI) was calculated and classified as per the WHO guidelines into underweight (<18.5kg/m^2), normal (18.5-24.99kg/m^2), overweight (25.0-29.9kg/m^2) and obese (>30.0kg/m^2).[21] Waist-hip ratio was classified separately for males and females.[22] BP was measured using mercury sphygmomanometer by auscultatory method.[23] Three readings were taken 3 minutes apart and average of second & third readings was taken as the final reading. JNC-8 guidelines were used to diagnose and classify into normotension, pre-hypertension and hypertension.[24] Pre-hypertension was defined as SBP 120-139mmHg and DBP 80-89mmHg. Those having higher readings were diagnosed to have hypertension and were further referred for management.[24]

STATISTICALANALYSIS:

The data was collected and compiled using EpiInfo Version7.2. Descriptive statistics like mean, standard deviation and percentages were calculated. Chi square test was used to find difference between two proportions. Significance level was set at 5%($p<0.05$). Unadjusted odds ratio was calculated for various risk factors studied. Stepwise logistic regression analysis was done to calculate adjusted odds ratio(AOR).

RESULTS:

The age and gender wise distribution of the subjects are shown in Table 1.

Table 1: Demographic characteristics of the subjects

Demographic characters	No	%
Age group*		
18-29	134	44.66
30-40	166	55.33
Gender		
Male	199	66.33
Female	101	33.66

*in years, No-Number, %-percentage

The mean age of subjects was 29.09±8.96 years with majority of them, 166 (55.33%) being in age group of 30-40 years. Majority of subjects were males 199 (66.33%)

Table 2: Prevalence of pre-hypertension based on gender

Prevalence	Overall (n=300)		Male (n=199)		Female (n=101)	
	No	%	No	%	No	%
Pre-hypertension	158	52.66	98	49.25	60	59.41

Table 2 shows prevalence of pre-hypertension in our study which was found to be 52.66%. Prevalence was higher among females (59.41%) in comparison to males (49.25%).

Table 3: Risk factors for pre-hypertension among the study subjects

Risk factors	Overall (n=300)		Male (n=199)		Female (n=101)		P value
	No	%	No	%	No	%	
Alcohol Use	31	10.33	09	04.52	22	21.78	<0.0001*
Smoking	53	17.67	11	05.52	42	41.58	<0.0001*
Tobacco use	99	33.00	53	26.63	46	45.54	<0.0001*
Physical activity level*							
<1.69 (Sedentary)	41	13.67	27	13.57	14	13.86	0.94
≥1.69 (Moderate-vigorous)	259	86.33	172	86.43	87	86.13	
Body mass index@							
Underweight (<18.5 kg/m^2)	48	16.00	31	15.58	17	16.83	0.5243
Normal (18.5-24.99 kg/m^2)	149	49.67	99	49.75	50	49.50	
Overweight (25.0-29.9 kg/m^2)	74	24.67	51	25.63	23	22.78	
Obesity (>30.0 kg/m^2)	29	09.66	18	09.04	11	10.89	
Central Obesity							
Present$	122	40.67	91	45.73	31	30.69	0.01*
Absent	178	59.33	108	54.27	70	69.31	

*- According to Joint report of WHO/FAO/1985 for human energy requirements, @-WHO classification of body mass index,$- ≥0.85 for female, ≥0.90 for male,

Table 3 shows distribution of various behavioural and anthropometric risk factors for pre-hypertension in the study population. It was seen that use of alcohol, tobacco and smoking was significantly higher in males in comparison to females. Central obesity was also seen to be higher in males in comparison to females, and this difference was significant.

Table 4: Unadjusted Odds ratio for risk factors for pre-hypertension in the study subjects (n=230)#

Risk factors	Pre-hypertension
Age group	
18-29	0.21 (0.12-0.38)*
30-40	1(Reference)
Gender	
Male	2.24 (1.25–4.02)*
Female	1(Reference)
Alcohol Use	
Yes	3.30 (1.06–10.21)*
No	1(Reference)
Smoking	
Yes	1.88 (0.90–3.93)
No	1(Reference)
Tobacco use	
Yes	2.43 (1.33–4.46)*
No	1(Reference)
Physical activity level	
Sedentary	1.00 (0.51–1.98)
Moderate to vigorous	1(Reference)
BMI	
Underweight (<18.5 kg/m^2)	0.36 (0.17-0.77)*
Normal (18.5-24.99 kg/m^2)	1(Reference)
Overweight (25.0-29.9 kg/m^2)	4.49 (1.86-10.85)*
Obesity (>30.0 kg/m^2)	2.38 (0.80-7.01)
Central Obesity	
Present	2.11 (1.20–3.71)*
Absent	1(Reference)

*significant values

those who were hypertensive have been excluded.

Table 4 shows unadjusted odds ratio for risk factors for pre-hypertension in the study population. It was seen that age group of 18-29 years was seen to be a significant protective factor against pre-hypertension; whereas males had higher odds of pre-hypertension. Use of alcohol and tobacco use were also found to be significant risk factor. But smoking and physical activity were not found to be a significant risk factor. Regarding BMI, it was noticed that being underweight was protective and being overweight was found to be a significant risk factor. Also central obesity was found to be a significant risk factor in this study.

Table 5: Logistic regression for risk factors of pre-hypertension in the study subjects(Final model)

Risk factor	Odds ratio	95 % CI	P value
Age	1.10	1.06-1.14	0.000*
Gender			
Male	2.69	1.37-5.27	0.004*
Female	1(Reference)		
BMI			
Underweight (<18.5 kg/m^2)	0.37	0.16-0.85	0.020*
Normal (18.5-24.99 kg/m^2)	1(Reference)		
Overweight (25.0-29.9 kg/m^2)	4.63	1.79 to 11.95	0.001*
Obesity (>30.0 kg/m^2)	1.36	0.42 to 4.39	0.598

*significant values, Pseudo R^2=0.0800

Table 5 shows the result after applying stepwise logistic regression analysis for risk factors of pre-hypertension in the study subjects. Final model included age above 30 years, male gender and being overweight and having central obesity as significant risk factor for hypertension in young adults. Being underweight was found to be a protective factor for hypertension. For every one year increase in age, odds of being pre hypertensive increased by 1.10 (1.06-1.14) and being a male increased the chances of being pre hypertensive by 2.69 times. Also, subjects who were overweight were having 4.63 odds of being hypertensive.

DISCUSSION:

This community based cross sectional study was conducted on young adults between age group of 18-40 years residing in the urban filed practice area of Government Medical College, Nagpur. The prevalence of pre-hypertension among this age group was 52.66%. Proportion of pre-hypertension was higher amongst females (59.41%) in comparison to males (49.25%).

The prevalence of hypertension in this age group found in our study was similar to study conducted by Grotto I etal[25] (overall 48.9%; male 50.6%; female 35.9%), Yilmazel G etal[26] (overall 49.0%; 53.1% in males, 44.9% in females) Kini S etal[16] (overall 45.2 %; men 58%, females 36.5%) and Al-Majed HT etal[27] (39.4%). Whereas studies by

Ray S etal[28] showed higher prevalence(80%). On the other hand studies by Pengpid S etal[29] (overall 13.9%, 36.1% men and 6.8% women) and Reddy VS etal[30] (overall 26%; male 15.0%, female 4.8%) inferred with lower prevalence when compared to our study. But contrary to many other studies conducted by various authors, [25,27,31,32] our study reported higher prevalence of pre-hypertension in females in comparison to male.

Regarding the risk factors, it was seen that use of alcohol, tobacco and smoking was significantly higher in males in comparison to female. This observation was in concordance with studies conducted by Pengpid S etal[29] & Ferguson TS etal[31]. Present study also showed significant difference in central obesity amongst males and females, which is similar to findings in study conducted by Yilmazel G etal[26] & Ferguson TS etal[31]. But unlike in studies conducted by Grotto I etal[25], Pengpid S etal[29], Yilmazel G etal[26] and Ferguson TS etal[31] which showed significant difference in BMI and physical activity between males and females, our study did not.

We found significant association between age, gender, alcohol use, tobacco use, underweight, overweight and central obesity with pre-hypertension among young adults in this study population; age group 18-29 years and underweight emerged as protective factors and other factors were seen to be as risk factor against development of pre-hypertension. Studies conducted by Yu D etal[32], Ray S etal[28], Guo X etal[33], also supported the finding of age and gender as significant risk factors for pre-hypertension. The gender difference might be due to the fact that oestrogen is protective for cardiovascular diseases in females of this age group. Behavioural risk factors like consuming alcohol and tobacco use were found to be significant risk factors, similar to studies conducted by Pengpid S etal[29], Guo X etal[33]. On the other hand, smoking and physical activity was not found to be a significant risk factor similar to study conducted by Ferguson TS etal[31] and Pengpid S etal[29]. Our study inferred that overweight and central obesity were significant risk factor which is in concordance with many other studies conducted by Yu D etal[32], Yilmazel G etal[26], Hu L etal[34], Grotto I etal[25], Pengpid S etal[29], Ray S etal[28], Guo X etal[33]. Being underweight was found to a protective factors, whereas obesity (BMI >30kg/m2) was not found to be significant risk factors, which may be due to the fact that there were very less number of subjects in this study who were obese.

Our bivariate analysis data also showed age, gender, BMI and central obesity to be significant risk factor for pre-hypertension. Similar results were highlighted in a meta-analysis[33] and also many other studies[10,28,29,35]. No association was seen between smoking and tobacco use with pre-hypertension, unlike seen in other studies [27,35,36]. Also, unlike in some other studies[37,38] this study did not find an association between alcohol consumption and pre-hypertension.

CONCLUSIONS AND RECOMMENDATIONS:

The study found high prevalence of prehypertension in the study population especially in females. In this study, lower age and underweight were identified as protective factors for pre-hypertension. Also risk factors, like male gender, overweight and central obesity were identified as independent risk factors which can help in the prediction of pre-hypertension and implementation of intervention programs directed to this age group. Often, young adults are considered apparently healthy and pre-hypertension as a condition is neglected in young adults and they are rarely screened for the same and related risk factors, making them prone to develop hypertension and related complications.

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