

Available online on 15.11.2014 at <http://jddtonline.info>**Journal of Drug Delivery and Therapeutics**

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## RESEARCH ARTICLE

**BLOOD PRESSURE MULTI-FACTORIAL INFLUENCE AND TRENDS IN INDIAN MEDICAL STUDENTS****\*Sinha Ritesh kumar<sup>1</sup>, Kumar Mantu<sup>2</sup>, Kumar Mukesh<sup>3</sup>, Nivedita<sup>4</sup>, Chandra Satish<sup>5</sup>**<sup>1</sup>Junior Resident, Department of Pharmacology, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand, India<sup>2</sup>Junior Resident, Department of Pharmacology, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand, India<sup>3</sup>Junior Resident, Department of Pharmacology, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand, India<sup>4</sup>Junior Resident, Department of Pharmacology, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand, India<sup>5</sup>Professor, Department of Pharmacology RIMS, Ranchi, Jharkhand, India*\*Corresponding Author's Email: riteshrims@gmail.com***ABSTRACT**

The definition of hypertension has continuously evolved over the last 50 years. Hypertension is currently defined as a blood pressure greater than 140/90 mmHg. One in every four people in the US has been diagnosed with hypertension. The incidence of hypertension is increasing day by day. More and more young adults are developing pre-hypertension which is not diagnosed early. It will increase the burden on society and family. Lifestyle modifications in the developing world, time pressure, stress in early life and change in diet are only few factors which effect the hypertension.

**Keywords:** Hypertension, pre- hypertension, lifestyle modification

**INTRODUCTION**

Hypertension (HTN) or high blood pressure, sometimes called arterial hypertension, is a chronic medical condition in which the blood pressure in the arteries is elevated. Blood pressure is summarised by two measurements, systolic and diastolic, which depend on whether the heart muscle is contracting (systole) or relaxed between beats (diastole). This equals the maximum and minimum pressure, respectively. There are different definitions of the normal range of blood pressure. Normal blood pressure at rest is within the range of 100–140 mmHg systolic (top reading) and 60–90 mmHg diastolic (bottom reading). High blood pressure is said to be present if it is often at or above 140/90 mmHg.

Hypertension is classified as either primary (essential) hypertension or secondary hypertension; about 90–95% of cases are categorized as "primary hypertension" which means high blood pressure with no obvious underlying medical cause.<sup>1</sup> The remaining 5–10% of cases (secondary hypertension) are caused by other conditions that affect the kidneys, arteries, heart or endocrine system.

Hypertension puts strain on the heart, possibly leading to hypertensive heart disease and coronary artery disease.<sup>2</sup> Hypertension is also a major risk factor for stroke, aneurysms of the arteries (e.g. aortic aneurysm), peripheral arterial disease and chronic kidney disease. Dietary and lifestyle changes can improve blood pressure control and decrease the risk of health complications, although drug treatment is still often

necessary in people for whom lifestyle changes are not enough or not effective. The treatment of moderately high arterial blood pressure (defined as >160/100 mmHg) with medications is associated an improved life expectancy while treatment of milder elevation is not.<sup>3,4</sup>

**MATERIAL AND METHOD**

A study was conducted on 200 second year undergraduate medical students during year 2013-14 in a medical college in ranchi. Each student were asked to fill a questionnaire recording his age, sex, diet and family history of hypertension. Body Mass Index (BMI) was calculated using weight and height. WHO criteria of BMI was used and the body types were categorized as underweight (BMI<18.5), normal (18.5-24.9) and obese (>30)<sup>1</sup>. Blood pressure was measured and classified as per the Seventh Report of the Joint National Committee where Pre-hypertension is systolic BP (SBP) of 120-139 mmHg or diastolic BP (DBP) of 80-89 mmHg and Hypertension stage 1 is SBP of 140-159 or DBP of 90-99 mmHg<sup>2</sup>. Subjects were informed about the study and their voluntary written consent was taken.

**RESULT**

Mean BP were computed for weight, height, BMI and blood pressure, data was analysed using chi-square test to find association between hypertension and variables (BMI of <25 & BMI >25, diet – vegetarian and non-vegetarian and presence or absence of family history of hypertension). Those found to be significantly associated

with hypertension ( $P < 0.05$ ) were then entered in multiple logistic regression.

According to JNC-VII criteria, 15.5% of the students were pre-hypertensive while 3% were stage 1 Hypertensive.

Table I: depicts the values of different variables with respect to the hypertension stage

N =200	Normal b.p	Pre-hypertension	Hypertension Stage-1
n( % of HT )	163 (81.5%)	31 (15.5%)	6(3%)
BP (Mean+ SD)	113.41±5.67	127.78±4.72	145.65±5.76
SBP mmHg	72.96±6.75	83.96±3.62	94.76±3.77
DBP mmHg			
BMI (n) kg/m <sup>2</sup>	121(60.5%)	27(13.5%)	3(1.5%)
<25	23(11.5%)	23(11.5%)	3(1.5%)
≥25			
DIET	99(49.5%)	12(6%)	4(2%)
Veg	43(21.5%)	40(20%)	2(1%)
Non-Veg			
Family History	33(16.5%)	21(10.5%)	2(1%)
Present	115(57.5%)	25(12.5%)	4(2%)
Absent			

HT= HYPERTENSION

Since the Stage 1 hypertension had only 6 subjects, we clubbed the subjects of pre-hypertension and stage 1 hypertension into a single group for appropriate statistical analysis.

Table II: Shows the respective P-values and Odds Ratio for BMI, diet and family history.

Variable	Code	N & % of Hypertension	Unadjusted OR (95% CI)	P-value
BMI kg/m <sup>2</sup>	<25 = 0	(n=151) 30(19.8%)	1	<0.001
	>25 = 1	(n=49) 26(53.1%)	3.028(1.469–5.556)	
DIET	Veg = 0	(n=115) 16(13.9%)	1	<0.001
	Non-veg = 1	(n=85) 42(49.4%)	3.674(2.038–7.192)	
Family history	Absent = 0	(n=145) 29(20.0%)	1	0.028
	Present = 1	(n=55) 23(41.8%)	2.130(1.102–3.828)	

All three variables were found to be significant after the application of Chi-square test.

After applying multiple logistic regression, only BMI & diet was found to be significantly associated with hypertension. High prevalence of hypertension in the adolescents could be because majority of the study population belongs to upper middle or middle socio-economic status, where there is an altered eating habits and increased fat contents in the diet. Most of them give up their sports and active lifestyle long before, during their school life, in their quest to pursue a medical career and lead a sedentary lifestyle with an addition of mental stress to get through the competitive medical entrance exam, some of the contributory factors which cannot be overlooked upon<sup>3</sup>. Our study showed BMI >25 has 3 times more likelihood of developing hypertension as compared to BMI <25. Mohan and Uchiyama also observed an increasing prevalence of sustained hypertension in the obese younger age groups as compared to their lean counterparts<sup>4,5</sup>. This study also emphasizes upon the association of diet with BP. Non-vegetarians showed 3.7 times more likelihood of developing hypertension. Consumption of food of animal origin is highly significantly associated with increase in BP<sup>6</sup>. Study by Melby reported that only 16% of the vegetarians were hypertensive compared with 31.1 % of the non-vegetarians<sup>7</sup>. Vegetarian diets have a relatively

high polyunsaturated to saturated fat ratio, are low in total fat and has high fiber content- having the tendency to reduce body weight and modulates blood viscosity, along with the BP-lowering properties of individual nutrients<sup>8</sup>. Family history of hypertension also plays a pivotal role in the development of hypertension. Our study showed significance of family history at 8% level and those with positive family history were 1.8 times more likely to be hypertensive, similar to the study by Young<sup>9</sup>. This association could be due to impairment in baroreflex sensitivity in hypertension which in part is genetically determined<sup>10</sup>. Higher levels of angiotensinogen, cortisol and 18-OH corticosterone seen in the offsprings of high parental blood pressure may also lead to abnormalities of glucocorticoid metabolism and the renin-angiotensin system<sup>11</sup>. In conclusion, our study emphasizes upon the alarming prevalence of pre-hypertension in the adolescent Indian males which can be attributed to various factors like weight, BMI, dietary habits and family history. Early modification in these variables can be very useful in decreasing the future prevalence of hypertension.

**ACKNOWLEDGEMENTS**

We would like to thank the undergraduate students for their co-operation in providing us with the informations

that made this study possible. Also we like to thank our teachers and staff who helped us to carryout our work.

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