

## Prevalence & Determinants Of Isolated Systolic Hypertension In Young Healthy Adults

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**Abstract:** Background: ISH is the most common type of hypertension in people over 60 years of age and increase in SBP being the principal characteristic in this population. Interestingly, data from a number of studies suggest that ISH is also prevalent in adolescents and young adults but findings from previous studies examining this question are inconclusive, so the aim of our study is to know prevalence and determinants of ISH in young healthy individuals. Method: We performed a cross section study on 400 young individuals between 18 to 30 years in western Rajasthan. The participants were then subjected to a set of questionnaire which included socio-demography determinants (age, sex, occupation and annual household income), personal habits (dietary habits, smoking, alcohol consumption), past history and family history of hypertension. They were then subjected to the measurement of height, weight, pulse rate, blood pressure, fasting blood sugar and serum cholesterol level. Result: In our study 9.25% were hypertensive (systolic, diastolic or both systolic and diastolic) and from this ISH were 4.25%, IDH were 1.5%, SDH were 3.5%, systolic hypertension in 7.75% and diastolic hypertension in 5%. Conclusion: ISH have quite high prevalence in young adults and is more common than SDH. Female gender, rural inhabitants, non-vegetarian diet, low socio-economic status, family history of hypertension, smoking, alcoholism, BMI and Serum Cholesterol level are important determinants of ISH in young adults.

**Key words:** Isolated systolic hypertension (ISH), Isolated diastolic hypertension (IDH), Systolic diastolic hypertension (SDH), Systolic blood pressure (SBP), Diastolic blood pressure (DBP).

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**Introduction:** For a long time the diastolic hypertension was thought to be the most important as an indicator of high BP. In many people with hypertension, both systolic and diastolic pressures are high, whereas in some, systolic pressure may be raised while diastolic pressure is normal. This is isolated systolic hypertension or ISH. It is the most common type of hypertension in people over 60 years of age and increase in SBP being the principal characteristic in this population. Interestingly, data from a number of studies suggest that ISH is also prevalent in adolescents and young adults<sup>1,2,3,4</sup> but findings from previous studies examining this question are inconclusive<sup>5,6,7,8</sup>. So, the aim of our study is to find out the prevalence and the determinants of isolated systolic hypertension in the young healthy adults in western Rajasthan.

**Material and Method:** The present study was conducted on 400 young individuals of western Rajasthan of age group from 18 to 30 years. The numbers of years completed on last birthday were taken as age of the subject. The study

population was divided into 4 groups depending on their age: - (1) 18-21 years (2) 22-24 years (3) 25-27 years (4) 28-30 years. Then the participants were subjected to a set of questionnaire which included socio-demography determinants (age, sex, occupation and annual household income), personal habits (dietary habits, smoking, alcohol consumption), past history and family history of hypertension. They were then subjected to the measurement of height, weight, pulse rate, blood pressure, fasting blood sugar and serum cholesterol level. An informed consent of the participants was taken. Limitations:-As the scope of the present study does not collect data on the menstrual status among the women, and thus, we have not controlled the potential effect of menstrual status on the risk of blood pressure in women.

**Measurement of Blood Pressure:** The auscultatory method of BP measurement with a properly calibrated and validated sphygmomanometer has been used. Subjects were made to sit comfortably in a chair for at least 5 minutes with arm supported at heart

level. The appropriate size cuff (bladder length 80% and width at least 40% of arm circumference) used to ensure accuracy. The Systolic BP was defined as appearance of the first sound (korotkoff phase 1) and Diastolic BP was defined as disappearance of the sound (korotkoff phase 5). Three blood pressure readings of each subject were recorded at an interval of 5 minutes each. The mean of these three readings was considered for the present study.

Statistical analysis was conducted using the Student's t test and ANOVA test for independent groups (two tailed), with the help of Microsoft EXCEL 2010 and the MSOffice 2010. The level of significance was taken as p-value <0.05 and with the help of p-value for

each determinant, we found the effect on the Systolic blood pressure, whether significant or insignificant.

**Table 1: Criteria of Hypertension**

Categories	SBP	DBP
Normal	<140 mmHg	<90 mmHg
ISH	≥ 140 mmHg	≤90 mmHg
IDH	≤140 mmHg	≥90 mmHg
SDH	≥ 140 mmHg	≥90 mmHg

**Result:** Table 2 shows that ISH increases according to age. IDH does not show any significant correlation. SDH and Total HTN also increase according to age. ISH is more than SDH in the age groups 18-21 and 22-24 years, after this, both are equal.

**Table 2: Correlation of ISH, IDH and SDH with Age**

AGE (Years)	No. of Subjects	ISH (%)	IDH (%)	SDH (%)	Total HTN (%)	Mean SBP	p-value
18-21	135	3 (2.22%)	2 (1.48%)	2 (1.48%)	7 (5.18%)	115.47±8.88	<b>&lt;0.05</b>
22-24	82	4 (4.87%)	1 (1.2%)	2 (2.44%)	7 (8.53%)	118.70±9.61	
25-27	83	4 (4.81%)	1 (1.2%)	4 (4.81%)	9 (10.84%)	120.58±10.59	
28-30	100	6 (6%)	2 (2%)	6 (6%)	14 (14%)	121.24±12.17	
Total	400	17 (4.25%)	6 (1.5%)	14 (3.5%)	37 (9.25%)	118.63±10.57	

Table 3 show the correlation of ISH with various determinants of which gender, BMI, dietary habits, socio-economic status, smoking, family h/o hypertension and serum cholesterol level are significant.

**Discussion:-** In our study we have taken 400 individuals randomly between the age group 18-30 years, out of these 400 individuals, total 37 (9.25%) are hypertensive (systolic, diastolic or both systolic and diastolic). In our study, the mean age of subjects is 23.86 ± 3.9 and the mean systolic blood pressure is 118.63 ± 10.57. So, we observed that the prevalence of hypertension between the age group 18-30 years is quite higher in our region. We also

found that the prevalence of systolic hypertension is quite higher than diastolic hypertension and ISH is more common than SDH hypertension.

In our study, ISH increases according to age. IDH does not show any significant correlation. SDH and Total HTN also increase according to age. ISH is more than SDH in the age groups 18-21 and 22-24 years, after this, both are equal. Mean SBP of age group 18-21 years is 115.47 ± 8.88, 22-24 years is 118.70 ± 9.61, 25-27 years is 120.58 ± 10.59 and 28-30 years is 121.24 ± 12.17. So, the mean SBP also increases as the age advances.

**Table 3: Correlation of ISH with various parameters**

	No. of Subjects	ISH (%)	Mean SBP	p-value
<b>GENDER</b>				
MALE	308	13 (4.22%)	119.31 ±10.59	<b>&lt;0.05</b>
FEMALE	92	4 (4.34%)	116.37 ±10.18	
<b>BODY MASS INDEX(BMI)</b>				
<18.5	24	2 (8.33%)	119.41 ±10.30	<b>&lt;0.05</b>
18.5-24.99	321	12 (3.7%)	117.5 ± 9.94	
25-29.99	45	2 (4.44%)	123.19 ±11.77	
≥30	10	1 (10%)	132 ±10.28	
<b>HABITANT</b>				
RURAL	224	11 (4.9%)	118.6 ±10.78	0.94
URBAN	176	6(3.4%)	118.58 ±10.3	
<b>DIETARY HABBIT</b>				
NON-VEGETARIAN	94	5 (5.31%)	120.65 ±10.89	<b>&lt;0.05</b>
VEGETARIAN	306	12 (3.92%)	118.01 ±10.39	
<b>ANNUAL HOUSEHOLD INCOME</b>				
<100000	196	14 (7.14%)	120.6±12.02	<b>&lt;0.05</b>
100000-399999	134	2 (1.49%)	116.98±8.39	
≥400000	70	1 (1.42%)	116.28±8.81	
<b>SMOKING</b>				
SMOKERS	35	2(5.7%)	123.42±9.71	<b>&lt;0.05</b>
NON-SMOKERS	365	15(4.1%)	118.17±10.48	
<b>ALCOHOL CONSUMPTION</b>				
ALCOHOLIC	44	3(6.8%)	121.27±11.8	0.079
NON-ALCOHOLIC	356	14(3.93%)	118.31±10.36	
<b>FAMILY H/O HYPERTENSION</b>				
PRESENT	115	9 (7.82%)	123.84 ±12.44	<b>&lt;0.05</b>
ABSENT	285	8 (2.8%)	116.53 ±8.89	
<b>FASTING BLOOD SUGAR(FBS)</b>				
< 100mg/dl	374	16 (4.27%)	118.5± 10.53	0.36
≥ 100mg/dl	26	1 (3.84%)	120.46± 10.91	
<b>SERUM CHOLESTEROL</b>				
<200 mg/dl	375	9 (2.4%)	117.52 ±8.97	<b>&lt;0.05</b>
200-239 mg/dl	17	6 (35.2%)	136.94 ±10.87	
≥240 mg/dl	8	2 (25%)	145.5 ±6.06	

Our study is also supported by that of Regina C. Greblaet al<sup>9</sup>. They concluded that ISH in young adults had a higher prevalence than systolic/diastolic hypertension ( $1.57 \pm 0.23\%$  vs.

$0.93 \pm 0.18\%$ ) in young adults. Our study is supported by TanuMidhaet al<sup>10</sup>, according to which the prevalence of ISH according to JNC-7 criteria was 4.3%, which was 5.1% in men and

3.6% in women aged 20 years and above. A significant increase in the prevalence of ISH was seen with an increase in age. This is in accordance with the study of RuchikaGoel et al<sup>11</sup>. They observed that hypertension was seen in 6.4% students aged 14–19 years in New Delhi, India of which 2.7% were isolated systolic, 2.0% were isolated diastolic and 1.7% were both.

**Conclusion:** In our study, we concluded that prevalence of ISH, IDH, SDH and Total HTN are significantly high in young adults in our region and collectively, the study suggests that physicians caring for young adults should be more aware of the need to monitor weight and blood pressure even when they are considered normal. As in our study, ISH is positively correlated with age, female gender, non-vegetarian diet, low socio-economic status, family history of hypertension, smoking, BMI and Serum Cholesterol level, whereas, ISH does not show significant correlation with rural/urban in-habitants, alcohol consumption and fasting blood sugar level. In our study, a number of young healthy males have ISH but various studies show that sometimes they have normal BP. No evidence is available that they may be benefitted from antihypertensive treatment. On the basis of current evidence, these young individuals can only receive recommendations on lifestyle, their follow-up should be done and if still uncontrolled then the anti-hypertensive treatment should be given. At present, available evidence is scanty and controversial. Long-term follow-up of these individuals is now required to determine whether they are at increased risk compared with age-matched normotensive individuals.

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Conflict Of Interest-None