
Review Article**Isolated Systolic Hypertension in Young Healthy Adults- A Review****Priya Jangid¹, Madhurima Maheshwari², Khemlata Tilwani¹, Mukesh Nagal³, N.D. Soni⁴**¹Assistant Professor, Department of Physiology, Dr S. N. Medical College, Jodhpur (Raj), India²Medical Officer, Dr S. N. Medical College, Jodhpur (Raj.), India,³Consultant Physician, Medi pulse hospital, Jodhpur (Raj.), India,⁴Professor & head, Department of Physiology, Dr S.N. Medical College, Jodhpur (Raj.), India***Corresponding author**

Dr. Priya Jangid

Email: dr.priyajangid@gmail.com

Abstract: ISH have quite high prevalence in young adults and is more common than SDH. The high prevalence rate may account in part for the higher cardiovascular mortality and this should be considered an important target for cardiovascular preventive strategy. Female gender, age, non-vegetarian diet, low socio-economic status, smoking, BMI and Serum Cholesterol level are important determinants of ISH in young adults.**Keywords:** Isolated systolic hypertension (ISH), isolated diastolic hypertension (IDH), systolic diastolic hypertension (SDH), systolic blood pressure (SBP), diastolic blood pressure (DBP).

Introduction

The isolated systolic hypertension 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. 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 [2, 3]. So, in our study we found the prevalence and the determinants of isolated systolic hypertension in the young healthy adults in western Rajasthan.

Prevalence of ISH:

In our study, 9.25% are hypertensive (systolic, diastolic or both systolic and diastolic). ISH increase according to age. IDH do 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, the mean SBP also increases as the age advances. So, in our study we observed that the prevalence of hypertension between the age group 18-30 years is quite higher in our region. Moreover, the prevalence of systolic hypertension is quite higher than diastolic hypertension and ISH is more common than SDH. The study is supported by that of Regina C. Grebla *et al.*; [4], who concluded that ISH in young adults had a higher prevalence than systolic/diastolic hypertension in young adults. This is also supported by Tanu Midha *et al.*; [5], according to which a significant increase in the prevalence of ISH was seen with an increase in age. This is in accordance with the study of Ruchika Goel *et al.*; [6], who observed that hypertension was seen in

6.4% students aged 14–19 years of which 2.7% were isolated systolic, 2.0% were isolated diastolic and 1.7% were both.

Determinants of ISH:

In our study, ISH is positively correlated with age, female gender, non-vegetarian diet, and low socio-economic status, smoking, alcohol, BMI and Serum Cholesterol level.

We observed that ISH increase according to age and this is supported by the study of Gopinath N *et al.*; [7]. In our study ISH is slightly higher in females, this is supported by the study of Van den Ban GC *et al.*; [8], who observed that the prevalence of ISH was 6.3% in the women and 3.0% in the men.

We also observed that non-vegetarians have higher prevalence of ISH, IDH, SDH and Total HTN as compared to vegetarians. This is in accordance with Orna Ophir *et al.*; [9]. Role of diet has been proven in DASH (Dietary Approaches to Stop Hypertension), TONE16 (Trial of Non-pharmacological Interventions in the Elderly), and many more trials. The diet should be rich in fruits, vegetables, low in saturated and total fat and high in fibre content. It causes SBP reduction by 8 -14 mm Hg [10]. This may be due to the dietary salt that tends to raise our blood pressure, while the dietary potassium tends to lower it. This may be one of the reasons that vegetarians have lower blood pressure than those who eat a carnivorous or omnivorous diet, since fruits and vegetables are naturally high in potassium.

In our study we observed that the subjects with the low socio-economic status have quite higher prevalence of ISH, IDH, SDH and Total HTN which may be due to their lack of education, lack of awareness, increased salt intake or poor dietary habits. This is in accordance with Kulaga *et al.*; [11], who concluded that low socio-economic status and sedentary lifestyle are associated with higher BP in children and adolescents.

In our study, we observed that smokers show significantly higher ISH, SDH and Total HTN as compared to the non-smokers. Smoking has also been found to be a determinant of isolated systolic hypertension among younger US adults (18–39 year olds); this is of concern because even small increases in systolic blood pressure in early adulthood increase risk of further cardiovascular disease (CVD) morbidity in later life. Our study is supported with that of Mohd. Rasheeduddin, Imran *et al.*; [12], their results indicate that there is a significant hemodynamic change including an increase in heart rate, blood pressure, stroke volume and cardiac output in both long-term and short-term smokers immediately after cigarette smoking compared to the non-smoking group. We also observed that alcoholics have more ISH, SDH and Total HTN than non-alcoholics and this is in accordance with Saverio Stranges *et al.*; [13].

BMI <18.5 is only associated with ISH and ISH, IDH, SDH and Total HTN increase as the BMI increases from ≥ 18.5 onwards. This indicates strong correlation between BMI and ISH, IDH, SDH and Total HTN. Obesity can increase the risk of hypertension to fivefold as compared with normal weight, and up to two-thirds of hypertension cases can be attributed to excess weight [14]. More than 85% of cases occur in those with a Body mass index greater than 25. Our study is supported by Alireza Moafi *et al.*; [15] who observed that high systolic blood pressure was more common in the students with BMI > 25 kg/m² ($p < 0.001$). Jonathan M. Sorof *et al.*; [16] also concluded that ISH is more prevalent in obese than in non-obese students.

Serum cholesterol level ≥ 200 mg/dl is significantly associated with ISH, SDH and Total HTN. The occurrence of high serum cholesterol levels in hypertensive patients, as found in the present study may be due to variety of causes such as genetic factors or increased consumption of dietary animal fats. This study is in accordance with that of Akuyam S. A *et al.*; [17], who demonstrated that serum cholesterol levels increase as the BP rises in both hypertensive patients and normotensive subjects.

Conclusion:

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. No evidence is available that they

may be benefitted from antihypertensive treatment; on the contrary, there are prospective data that the condition does not necessarily precede to systolic/diastolic hypertension [18]. On the basis of current evidence, these young individuals can only receive recommendations on lifestyle, should be closely follow-up and if still uncontrolled then the anti-hypertensive treatment should be given. Long-term follow-up of these individuals is now required to determine whether they are at increased risk compared with age-matched normotensive individuals.

References:

1. Colhoun HM, Dong W, Poulter NR; Blood pressure screening, management and control in England: results from the health survey for England 1994. *J Hypertens.* 1998; 16:747–752.
2. Franklin SS, Jacobs MJ, Wong ND, L'Italien GJ, Lapuerta P; Predominance of Isolated Systolic Hypertension among Middle-Aged and Elderly US Hypertensives: Analysis Based on National Health and Nutrition Examination Survey (NHANES) III. *Hypertension.* 2001; 37(3).
3. Nichols WW, O'Rourke, Michael F; McDonald's Blood Flow in Arteries: Theoretical, Experimental and Clinical Principles. 5ed Hodder Headline Group, London, UK; 2005.
4. Regina C. Grebla Carlos J. Rodriguez, N. Borrell, Thomas; Prevalence and Determinants of Isolated Systolic Hypertension among Young Adults: the 1999 – 2004 U.S. National Health and Nutrition Examination Survey. *J Hypertens.* 2010; 28(1): 15–23.
5. Tanu Midha, Idris MZ, Saran RK, Srivastava AK, Singh SK; Isolated Systolic Hypertension and its Determinants - A Cross-sectional Study in the Adult Population of Lucknow District in North India. *Indian J Community Med.* 2010; 35(1): 89–93.
6. Ruchika Goel, Anoop Misra, Sunil K Agarwal, Naval Vikram; Correlates of hypertension among urban Asian Indian adolescents. *Arch Dis Child* doi; 10.1136/adc.2009.16234.
7. Gopinath N, Chadha SL, Sood AK, Shekhawat S, Bindra SP, Tandon R; Epidemiological study of hypertension in young (15-24 yr) Delhi urban population : *Indian J Med Res.* 1994;99:32-7
8. Van den Ban GC, Kampman E, Schouten EG, Kok FJ, van der Heide RM, van der Heide-Wessel C; Isolated systolic hypertension in Dutch middle aged and all-cause mortality: a 25-year prospective study: *Int J Epidemiol.* 1989; 18(1):95-91.
9. Orna Ophir, Gari Peer (Peresecenschi), Joseph Gilad, Miriam Blum, Alexander A viram; Low blood pressure in vegetarians: the possible role

- of potassium: Am J Clin Nutr 1983; 37:755-762.
10. Apple LJ, Espeland MA, Easter L, Wilson AC, Folmar S, Lacy CR; Effect of reduce sodium intake on hypertension control in older individuals: results from the Trial of Non pharmacological Intervention in the Elderly(TONE) : Arch Int Med 2001;161(5):685-93.
 11. Kulaga, Lit win, Pan, Feber, Wojcik, Grajda, Gurzkowska, Napieralska; Lifestyle and Socioeconomic Determinants of Blood Pressure in School-Aged Children and Adolescents : Journal of Hypertension: June 2010; 28: e399
 12. Rasheeduddin Imran M, Sambasiva Rao P; A Comparative Study of the Acute Effect of Tobacco Smoking on Cardiovascular System in Smokers to the Non-Smoking Individuals : International Journal of Recent Trends in Science And Technology, 2013; 6(2): 67-72.
 13. Saverio Stranges, Tiejian Wu, Joan M. Dorn, Jo L, Freudenheim, Trevisan, M *et al.*; Relationship of Alcohol Drinking Pattern to Risk of Hypertension : Hypertension. 2004; 44(6): 813-819.
 14. Haslam DW, James WP; Obesity: Lancet, 2005; 366 (9492): 1197–209.
 15. Alireza Moafi, Soheila Rahgozar, Majid Ghias; A Study on Body Mass Index, Blood Pressure, and Red Blood Cell Indices in New Entering Students of the University of Isfahan : Int J Prev Med. 2011; 2(4): 280–285.
 16. Jonathan M. Sorof, Tim Poffenbarger, Kathy Franco, Lillian Bernard, Ronald J. Portman; Isolated systolic hypertension, obesity, and hyperkinetic hemodynamic states in children: The Journal of Pediatrics, 2002; 140(6): 660–666.
 17. Akuyam S, Aghogho UB, Aliyu IS, Bakari AG; Serum total cholesterol in hypertensive Northern Nigerians : International Journal of Medicine and Medical Sciences 2009; 1(3): 073-078.
 18. O'Rourke MF, Adji A; Guidelines on guidelines: focus on isolated systolic hypertension in youth. J Hypertension 2013; 31:649–654. 17, 93–100.