

Anthropometric Parameters and Its Relation with Hypertension in Young Healthy Subjects with Parental Hypertension History: A Cross Sectional Study

Sanket Jheetay^{1*}, Gurdeep Singh Jheetay²

^{1*}Demonstrator, Department of Physiology, Teerthankar Mahaveer Medical College, Moradabad, UP, India.

²Professor & HOD, Department of Anaesthesia, Teerthankar Mahaveer Medical College, Moradabad, UP, India.

ABSTRACT

Introduction: Worldwide hypertension is emerging as a modern epidemic. In both children and adults the adverse association of cardiovascular risk factors with parental history of disease is well recognized. The study aimed to measure the anthropometric parameters of young healthy adults having parental history of hypertension and to correlate the anthropometric parameters of these individuals with those of the young healthy individuals who do not have parental history of hypertension.

Materials and Methods: This was a cross sectional study conducted in Teerthankar Mahaveer Medical College and research center of Moradabad district. By the pre-tested structured interview questionnaire data was collected. The anthropometric parameters measured in the study were height in cm, Weight in kg, skin fold thickness, body mass index, waist hip ratio. Blood pressure was measured as per the WHO guidelines. Blood pressure was measured as per the WHO guidelines.

Results: Among the 100 participants studied, 73 (73%) were males and 47 (47%) were females. The average age was 19.76 years (SD ± 2.01) with a median of 20 years, varying from 18 to 24 years. The mean systolic blood pressure in males with history of hypertensive parents was 130.9 ± 16.2 as against 124.7 ± 11.3 in females with history of hypertensive parents. The difference was statistically significant ($p=0.002$). The mean diastolic blood pressure was also significantly higher

in males with history of hypertensive parents than females with history of hypertensive parents (92.7 ± 12.1 in males versus 90.6 ± 18.4 in females).

Conclusion: Findings of the present study suggest that children of hypertensive patients have a great possibility of developing future hypertension in comparison of individual having normotensive parents. Therefore, we strongly suggest that subjects having history of parental hypertension should be educated about the possibility of future hypertension to prevent hypertension in such population.

Key words: Parental Hypertension, BMI, Waist Hip Ratio, Hypertension.

*Correspondence to:

Sanket Jheetay,
Demonstrator, Department of Physiology,
Teerthankar Mahaveer Medical College,
Moradabad, UP, India.

Article History:

Received: 03-02-2018, Revised: 01-03-2018, Accepted: 24-03-2018

Access this article online

Website: www.ijmrp.com	Quick Response code 
DOI: 10.21276/ijmrp.2018.4.2.041	

INTRODUCTION

Worldwide hypertension is emerging as a modern epidemic. ¹ High blood pressure is often called the "Silent Killer" as it has been found associated with increasing both morbidity and mortality via various cardiovascular disorders (CVD) and its co-morbidity which accounts for 20-50% of all deaths.^{1,2}

It has been estimated that hypertension contribute 4.5 percent of global disease burden and also it has been recorded that globally hypertension accounts for more than 5.8 percent of total deaths, 1.9% of years of life lost and 1.4% disability adjusted life years. For an individual with a family history of hypertension in industrialized country risk of becoming hypertensive been estimated to be up to four times higher than average.^{3,4}

Hypertension due to its role in the causation of coronary heart disease, stroke and other vascular complications has been becoming a chronic condition of concern. Growing trend of hypertension is a worldwide phenomenon.⁵ In the adult population essential hypertension is prevalent as major risk factor for CVD.^{6,7} The most often prevalent atherosclerosis risk factor in families is due to hypertension. It is one of the major risk factors for cardiovascular mortality, which accounts for 20–50 percent of adult deaths and also the commonest disorder, posing a major public health challenge to population and socio-economic and epidemiological transition.⁸ Especially in India, obesity and hypertension have recently been observed to be prevalent not

only in middle aged population, but also in young adults, which has been mainly due to the abrupt change in lifestyle.⁹ In both children and adults the adverse association of cardiovascular risk factors with parental history of disease is well recognized.^{10,11} For the successive development of disease a family history of CVD has been shown to be a risk factor. Familial aggregation has been shown to occur for hypertension and obesity in adults.¹² In fact high blood pressure values in childhood may be followed by hypertension in adults.¹³ Body mass index have significantly higher in children with positive family history of CVD.¹⁴

Obesity is a growing global health concern, with a rapid increase being observed in morbid obesity. Obesity is associated with an increased cardiovascular risk and earlier onset of cardiovascular morbidity.¹⁵ In the young adults of today obesity is occurring as a common phenomenon. For hypertension overweight and obesity is known to be a significant risk factor. Obese persons are approximately six times as likely to develop heart disease as normal weighted persons. According to World Health Report, "Reducing Risks, Promoting Healthy Life" has identified obesity as one of the ten leading risk factors globally.¹⁶ In obese individuals essential hypertension is much more common than normal weight individuals. A positive association of weight and Blood Pressure has also been confirmed by George Smith.¹⁷ Further, it is confirmed that decreased cardiovascular risk is associated with change in the Body Mass Index (BMI) from higher range to lower side.¹⁸ As an indicator of body fat distribution, waist-hip ratio is used. The waist-hip ratio is the preferred measure of obesity for predicting cardiovascular disease, with more universal application in individuals and population groups of different body builds. In Swedish men and women in 1984, studies of waist-hip ratio as dominant cardiovascular risk factors were reported.¹⁹ The present study was conducted to compare any observed differences can be explained in the mean BP, BMI, waist-hip ratio in young adult of hypertensive and normotensive parents. The study aimed to measure the anthropometric parameters of young healthy adults having parental history of hypertension and to correlate the anthropometric parameters of these individuals with those of the young healthy individuals who do not have parental history of hypertension.

MATERIALS AND METHODS

This was a cross sectional study conducted in Teerthanker Mahaveer Medical College and Research Center of Moradabad district. The study was approved by the Institutional Ethical Committee. The participants were the students from Teerthanker Mahaveer Medical College. All the students were contacted and self reported parental history regarding hypertension was taken. The list was finalized, of where the parental history of hypertension was there or not. 50 case each of both the groups having parental history of hypertension and those whose having no history hypertension was selected randomly. If the participant was excluded because of any reason or consent was not given, other participant was included randomly from the list. Thus the two groups were formed one with the history of parental hypertension containing 50 students and another group with no parental history of hypertension also containing 50 students. The participants were approximately equally distributed across age (18–24 years), sex, and education.

By the pre-tested structured interview questionnaire data was collected. An interview had questions related to past history of hypertension, past admissions for cardiovascular diseases and past treatment for cardio active drugs like antihypertensive, antilipidemic, etc and steroid. A personal history of smoking or other addictions and diet habits, parental history of hypertension was recorded. The anthropometric parameters measured in the study were height in cm, Weight in kg, skin fold thickness, body mass index, waist hip ratio. Blood pressure was measured as per the WHO guidelines. Blood pressure was measured as per the WHO guidelines.¹⁸

The classification of hypertension was taken as defined by WHO in 1999.¹⁸ Body weight was measured (to the nearest 0.5 kg) with the subject standing straight on the weighing scale, and with the weight distributed equally on each leg. Height was measured (to the nearest 0.5 cm) with the subject standing in an erect position against a vertical scale and with the head positioned so that the top of the external auditory meatus was level with the inferior margin of the bony orbit (Frankfurt's plane). The body mass index, or BMI (weight in kilograms divided by the square of the height in meters), is recommended by the World Health Organization as the most useful epidemiological measure of obesity. It is however a crude index that does not take into account the distribution of body fat, resulting in variability in different individuals and populations. WHO criteria was used for classification of the BMI. Waist Circumference was measured at the narrowest level and hip circumference was measured at the maximal level over light clothing, using a non-stretchable measuring tape, without any pressure to the body surface, and both were recorded to the nearest 0.1 cm. As the measurements were taken over light clothing, participants were asked to remove tight or loose garments and belts intended to alter the shape of the body, and the person performing the measurement inspected the tension of the tape on the subject's body to ensure that it had the proper tension (not too loose or too tight). The narrowest waist is easy to identify in most subjects. However, for some subjects there is no single narrowest waist because of either a large amount of abdominal fat or extreme thinness. In the present study, when the narrowest point of waist was difficult to identify (particularly in obese subjects), we measured waist circumference immediately below the end of the lowest rib, because in most subjects the narrowest waist is at the lowest rib. WHR was calculated as WC divided by hip circumference.

Inclusion Criteria include All apparently healthy students of Teerthanker Mahaveer University, Moradabad. Age group between 18–24 years of both sexes. Participant having the History of taking cardio active drugs like antihypertensive, antilipidemic, etc were excluded from the study and students who leave the examination midway due to any reason.

Statistical Analysis

The collected data was depicted in tabular form and interpreted statistically and analyzed. The collected data was statistically analyzed by using the standard tests to ascertain the clinical relevance of the present study. Appropriate statistical tests of significance like Chi square and multiple logistic regressions were applied wherever necessary and MS Excel and SPSS package were also used. Quality assurance measures were taken appropriately.

Figure 1: Distribution of study participants in relation to Blood Pressure.

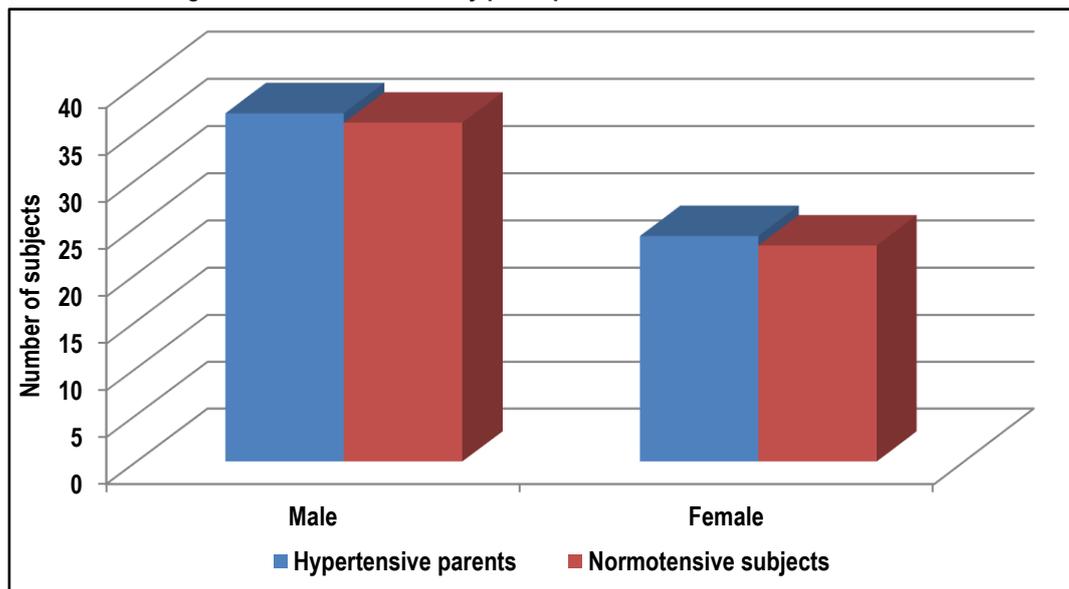


Table 1: Comparison of Mean Blood Pressure of the participants.

Blood Pressure (Mean \pm SD)	Male		Female	
	Hypertensive parents	Normo-tensive parents	Hypertensive parents	Normo-tensive parents
SBP (mm Hg)	130.9 \pm 16.2	106.8 \pm 13.2	124.7 \pm 11.3	102.2 \pm 10.7
DBP (mm Hg)	92.7 \pm 12.1	69.9 \pm 9.6	90.6 \pm 18.4	63.2 \pm 14.2
p- value	< 0.01* (significant).			

Table 2: Distribution of Body Mass Index in relation to family history of hypertensive parents.

Body Mass Index	Male		Female		Total
	Body Mass Index <25	Body Mass Index >25	Body Mass Index <25	Body Mass Index >25	
Hypertensive parents	24 (64.9)	13 (35.1)	18 (75)	6 (25)	61 (61)
Normotensive parents	32 (88.9)	4 (11.1)	21 (91.3)	2 (8.7)	59 (59)
Total	56 (56)	17 (17)	39 (39)	8 (8)	120
p- value	< 0.01* (significant).				

Table 3: Distribution of Waist-hip ratio in relation to family history of hypertensive parents.

	Male		Female		Total
	Hypertensive parents	Normotensive parents	Hypertensive parents	Normotensive parents	
Waist-hip ratio < cut-off1	14 (37.8)	32 (88.9)	10 (41.7)	19 (82.6)	75 (75)
Waist-hip ratio > cut-off2	23 (62.2)	4 (11.1)	14 (58.3)	4 (17.4)	45 (45)
Total	37 (37)	36 (36)	24 (24)	23 (23)	120
p- value	< 0.01* (significant).				

RESULTS

Among the 100 participants studied, 73 (73%) were males and 47 (47%) were females. (Figure 1). The average age was 19.76 years (SD \pm 2.01) with a median of 20 years, varying from 18 to 24 years. The mean systolic blood pressure in males with history of hypertensive parents was 130.9 \pm 16.2 as against 124.7 \pm 11.3 in females with history of hypertensive parents. The difference was statistically significant (p=0.002). (Table 1) The mean diastolic

blood pressure was also significantly higher in males with history of hypertensive parents than females with history of hypertensive parents (92.7 \pm 12.1 in males versus 90.6 \pm 18.4 in females).

Table 2 shows that males with BMI of 25 or more were 35.1% with history of Hypertensive parents, while only 11.1% of males were having BMI of 25 or more with history of normotensive parents. Females with BMI of 25 or more were 25% with history of

Hypertensive parents, while only 8.7% of females were having BMI of 25 or more with history of normotensive parents (Table 2). It is evident from table 3 that male subjects, 22 (34.92%) had a waist-hip ratio of more than 0.9. While 58.06% of the males with history of hypertensive parents had a waist-hip ratio equal to or more than 0.9. Among the male subjects, 12.51% with history of normotensive parents had a waist-hip ratio equal to or more than 0.9. In females 52.63% with history of hypertensive parents had a waist-hip ratio equal to or more than 0.8. Among the female subjects, 16.66% with history of normotensive parents had a waist-hip ratio equal to or more than 0.8 (Table 3).

DISCUSSION

Studies have suggested that high blood pressure is one of the lethal causes of mortality and morbidity in human.^{1,2} Various cardiovascular diseases like heart failure, stroke etc results from long term hypertension.⁵

Findings of the present study have shown SBP, DBP and MABP were significantly high in children both male and female of hypertensive parents in comparison of either sex children of normotensive parents. These findings are consistent with previous study of Brandao et al²⁰ in which they recorded a significant correlation between SBP and children having hypertensive patients. Similarly, Clarke et al²¹ observed both the SBP and DBP were strongly associated with labile high blood pressure families than in the families with low or middle blood pressure.

Burke et al⁷ in his study recorded that young adults with parental hypertension history had higher systolic and diastolic blood pressure levels. Risk of myocardial infarction and atherosclerosis is increased due to prevalence of some factors one of them is parental history of hypertension. It has been suggested in the study that prevention of hypertension should be start in childhood.²²

In contrast to the present study, Holland and Beresford recorded an insignificant association between SBP and hypertension family history.²³

On the other hand, Glowinska et al¹⁴ conducted the study in which children with positive family history of cardiovascular diseases have significantly higher body mass index. Bruke et al¹¹ observed a significantly high blood pressure in children with both parents hypertensive in comparison of one parents hypertensive of both parents normotensive subjects.

Higher BMI has been found positively correlated to blood pressure. ⁵ Findings of the current study have shown that male having BMI of 25 or more in 35.1% subjects with history of Hypertensive parents, while only 11.1% of males having BMI of 25 or more with history of normotensive parents. Females with BMI of 25 or more were 25% with history of Hypertensive parents, while only 8.7% of females were having BMI of 25 or more with history of normotensive parents.

These findings are in agreement with findings of previous study of Wang et al²⁴ as they recorded BMI was positively correlated to SBP and DBP in adolescent. Similarly, Glowinska et al⁸ observed significantly positive correlation of SBP and DBP with BMI. Moreover, they recorded children with history of hypertension had higher BMI.

In male subjects, 34.92% had a waist-hip ratio of more than 0.9. Among them 58.06% of the males had history of hypertensive parents and 12.51% of the male subjects had history of

normotensive parents. In females 52.63% with history of hypertensive parents had a waist-hip ratio equal to or more than 0.8. While, 16.66% of the female having history of normotensive parents had a waist-hip ratio equal to or more than 0.8.

Findings of the current study are consistent with the findings of the previous studies of Deshmukh et al²⁵ as they observed a significant relation between BMI and Blood pressure. Moreover, they showed that 38.5% individuals having hypertension of their study population had waist hip ratio more than 0.9 in males and 0.8 in females. Similarly, Maria et al²⁶ and Wang et al²⁴ also recorded a significant positive correlation between BMI and waist hip ratio with blood pressure.

CONCLUSION

Findings of the present study suggest that children of hypertensive patients have a great possibility of developing future hypertension in comparison of individual having normotensive parents. Therefore, we strongly suggest that subjects having history of parental hypertension should be educated about the possibility of future hypertension to prevent hypertension in such population.

REFERENCES

1. Park K (2009) Text Book of P.S.M., M/s Banarsidas Bhanot Publishers, 20th edn. pp: 323-327.
2. Kulkarni AT (1998) Hypertension- A silent killer. Indian Medical gazette. 32 (3), 73-77.
3. Corvol P. Can the genetic factors influence the treatment of systemic hypertension? The case of the renin-angiotensinaldosterone system. American Journal of Cardiology. 1992;70: 14D-20D.
4. Williams RR. Genetic basis of familial dyslipidemia and hypertension: 15-year results from Utah. American Journal of Hypertension. 1993; 6:319S-327S.
5. Mohan B, Kumar N, Aslam N, Rangbulla A, Kumbkarni S, Sood NK, Wander GS. Prevalence of sustained hypertension and obesity in urban and rural school going children in Ludhiana. Indian Heart J. 2004 Jul-Aug;56(4):310-4.
6. Barker DJP, Bull AR and Osmond C (1990) Fetal and Placental size and risk of hypertension in adult life. BMJ. 301, 259-264.
7. Bush PJ and Zuckerman AE and Taggart VS (1989) Cardiovascular risk factor prevention in black school children: The "Know Your Body" evaluation project. Health Edu. Q. 16, 215-219.
8. Glowinska B, Urban M and Koput A (2002) Correlation between body mass index, lipoprotein (a) level and positive family history of cardiovascular diseases in children and adolescents with obesity, hypertension and diabetes Pol. Merkur Lekarski. 12(68), 108-114.
9. Midha T, Idris MZ, Saran RK, Srivastav AK, Singh SK. Prevalence and determinants of hypertension in the urban and rural population of a north Indian district. East Afr JPublic Health 2009; 6: 268-273.
10. Blonde CV, Webber LS, Foster TA, Berenson GS. Parental history and cardiovascular disease risk factor variables in children. Prev Med. 1981;10:25-37.
11. Burke GL, Savage PJ, Sprafka JM, Selby JV, Jacobs DR, Perkins LL, Roseman JM, Hughes GH, Fabsitz RR. Relation of risk factor levels in young adulthood to parental history of disease: the CARDIA Study. Circulation. 1991;84:1176-1187.
12. Munger RG, Prineas RJ, Gomez-Marín O: Persistent elevation of blood pressure among children with a family history of

hypertension: The Minneapolis Children's Blood Pressure Study. *J Hypertens* 1988;6:647–653.

13. Curro V, De Luca F, Giusti D, Bracaglia G, Buffetti A, Pelargonio S, Polidori G. Correlations between blood pressure values, familial hypertension and anthropometric parameters in a sample of 3-year-old children. *Pediatr Med Chir.* 1988 May-Jun;10(3):273–6.

14. Glowinska B, Urban M, Koput A. Correlation between body mass index, lipoprotein (a) level and positive family history of cardiovascular diseases in children and adolescents with obesity, hypertension and diabetes *Pol Merkur Lekarski.* 2002 Feb;12(68):108–14.

15. Bastion M, Poirier P, Lemieux I, Després JP. Overview of epidemiology and contribution of obesity to cardiovascular disease. *Prog Cardiovasc Dis* 2014; 56: 369–381.

16. Deshmukh PR, Maliye C, Gupta SS, Bharambe MS, Dongre AR, Kaur S, Garg BS. Does Waist-Hip Ratio Matter? – A Study in Rural India. *Regional Health Forum – Volume 9, Number 2, 2005.*

17. Smith George Davey: IS 109: The influence of developmental indices and blood pressure in young adults on risk of stroke and coronary heart disease in late adulthood, Feb 2007, *Cardiovascular Disease and stroke.*

18. WHO (2000) Obesity, report of a WHO consultation on obesity: WHO 2000 obesity preventing and managing the global epidemic.

19. Welborn TA, Dhaliwal SS, Bennett SA. Waist-hip ratio is the dominant risk factor predicting cardiovascular death in Australia. *MJA* 2003; 179: 580–5.

20. Brandao AP, Brandao AA, Araujo EM. The significance of physical development on the blood pressure curve of children between 6 and 9 years of age and its relationship with familial aggregation. *J Hypertens* 1989; 7: 537.

21. Clarke WR, Schrott HG, Bums TL. Aggregation of blood pressure in the families of children with labile high systolic blood pressure. The Muscatine Study. *Am J Epidemiol* 1986; 123:67–71.

22. Kelishadi R, Hashemipour M, Sarraf-Zadegan N, Amiri M. Trend of atherosclerosis' risk factors in children of Isfahan. *Asian Cardiovascular Thoracic Ann* 2001; 9: 36–40.

23. Holland WW, Beresford SAA. Factors influencing the blood pressure in children. In: *Epidemiology and Control of Hypertension*, Paul O, Ed. New York, Grone & Stralton, 1975; 375.

24. Wang WJ, Wang KA, Chen CM, Cao RX, Bai YM, Ma LM, Ren ZY, Niu ZH, Gao Q. The study on relationship of body mass index and blood pressure in children and adolescents of Beijing. *Zhonghua Liu Xing Bing Xue Za Zhi.* 2004 Feb;25(2):109–12.

25. Deshmukh PR, Maliye C, Gupta SS, Bharambe MS, Dongre AR, Kaur S and Garg BS (2005) Does Waist-Hip Ratio Matter? – A Study in Rural India. *Regional Health Forum.* 9(2).

26. Maria C, Kuschnir C and Gulnar AS (2007) Mendonça. Risk factors associated with arterial hypertension in adolescents. *J. Pediatr (Rio J).* 83(4):335-342.

Source of Support: Nil.

Conflict of Interest: None Declared.

Copyright: © the author(s) and publisher. IJMRP is an official publication of Ibn Sina Academy of Medieval Medicine & Sciences, registered in 2001 under Indian Trusts Act, 1882.

This is an open access article distributed under the terms of the Creative Commons Attribution Non-commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

Cite this article as: Sanket Jheetay, Gurdeep Singh Jheetay. Anthropometric Parameters and Its Relation with Hypertension in Young Healthy Subjects with Parental Hypertension History: A Cross Sectional Study. *Int J Med Res Prof.* 2018 Mar; 4(2):185-89. DOI:10.21276/ijmrp.2018.4.2.041