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Research Article

Elevated blood pressure and obesity in young adults of hypertensive parent versus normotensive parents

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ABSTRACT

Background: Hypertension has become one of the leading cause of morbidity and mortality throughout the world. Family history of hypertension increases the risk of occurrence of elevated blood pressure and hypertension in their offspring. Simple measures like blood pressure measurements and anthropometric measures can used easily for screening them. So, this study was aimed to assess the association of elevated blood pressure and obesity in young adults of one parent hypertensive versus normotensive parents.
Methods: This is a case control study. Subjects were selected based on the inclusion and exclusion criteria with a sample size of 82, using a pretest proforma. Weight, height, heart rate and blood pressure were measured for each participant using standard methods. Then the data obtained was analyzed using mean±SD and unpaired t- test.
Results: BMI and systolic blood pressure were found to have significant difference when compared between group-I and group-II, with p-value of 0.0003 (<0.05) and 0.0145 (<0.05) respectively. Whereas other parameters like heart rate, diastolic pressure and mean arterial pressure did not show any significant difference between group-I and group-II.
Conclusions: Elevated blood pressure and increased BMI in young adults of single parent hypertensive, is stressing upon the need to screen them at their first and second decades of life to prevent complications in the future.

Keywords: Family history of hypertension, Obesity, Blood pressure, Young adults

INTRODUCTION

Hypertension, a non-communicable cardiovascular disease has become one of the leading cause of morbidity and mortality throughout the world. Hypertension increases the risk of cerebrovascular accidents, ischemic heart disease and renal failure. Obesity, genetic factors, sedentary life style and other systemic disorders are the most common causes of hypertension and other cardiovascular disorders. Family history of hypertension increases the risk of occurrence of hypertension in their offspring. Many studies have proven the influence of single or both parents having hypertension and obesity on their off springs.[1] Therefore, it is important to screen the young adults, who are at the risk of developing essential hypertension in future.

Blood pressure measurement is a non-invasive method, which is a vital part of physical examination. Prevalence of elevated blood pressure is associated with the presence of obesity in adolescents and young adults.[2] Studies have proven the genetic susceptibility to complex traits and

disorders including blood pressure levels, essential hypertension and obesity are transmitted in recessive manners.[3] Thus, this study was aimed to compare the association of blood pressure and obesity in young adults of single hypertensive parent and normotensive parents.

METHODS

This is a case control study conducted at Mahatma Gandhi Medical College and Research Institute, Pillaiyarkuppam, Pondicherry, India. Institutional ethical clearance was obtained for the study. An informed written consent was taken from the participants who had willingness to participate in the study. Subjects were volunteers including employees, students and attendants of patients.

All the participants of the study were interviewed by using pre-test proforma and a thorough clinical examination was done. And the subjects were selected according to the inclusion and the exclusion criteria of the study.

Inclusion criteria

Healthy young adults inclusive of both the genders, between the age group of 18-25 years with family history of hypertension in single parent (either father or mother) were included in group-I and normotensive parents were included in group-II respectively.

Exclusion criteria

Subjects with the history of smoking and alcohol intake, intake of drugs which influences lipid metabolism, metabolic syndrome, cardiovascular disorders, kidney disease, endocrinological disorders and athletes were excluded from the study.

82 subjects were included in the study. And they were divided into two groups based on their parental history of hypertension.

- Group I (offspring of one-parent hypertensive (either father or mother), n = 39)
- Group II (offspring of normotensive parents, n = 43)

Blood pressure measurement

Following which blood pressure and heart rate was measured by using the Omron (HEM-7111 Model), semi-automatic blood pressure monitor using the following procedures. The subject were asked to seat upright with back straight on a chair keeping one forearm on a wooden table kept in front and close to the subject. The height of the table was such that the middle of the arm placed on the table approximately coincided with the level of the heart. The subject was asked to keep the other forearm on the side hand rest of the chair. The BP cuff was tied just tight (neither too tight nor loose) on the arm approximately one inch above the cubital fossa. It was ensured that the BP cuff was at the level of the heart. After five-minute rest in the same sitting posture, the 'start' button of Omron was pressed that automatically inflated and deflated the cuff and SBP, DBP and basal heart rate (BHR) were noted from the display screen of the equipment. For each subject, SBP, DBP, and BHR were recorded 3 times and the average of second and third reading was taken as the final value for basal heart rate, systolic and diastolic blood pressure.[4]

Anthropometric measures

Height was measured to the nearest 0.1 cm, while the subject was standing in erect position with bare feet on flat floor against a vertical scale and with heels touching the wall and head straight. Body Weight was measured using Bathroom weighing scale, while the subject was minimally clothed and without shoes, standing motionless on a weighting scale and it was recorded nearest to 0.1. Kg.[5]

Body mass index

BMI was calculated using the Quetlet's index. Revised WHO Criteria for Asian Indians was used for the categorization of BMI.[6]

The statistical analysis was done using unpaired t-test in MS-excel. They were analyzed using the p-value obtained and 'p' value of <0.05 was considered as significant.

RESULTS

Table 1: Comparison of mean+SD of age, height and weight of group-I and group-II individuals.

Parameters	HT Parent		Control	
	Mean	SD	Mean	SD
Age	19.18	2.58	19.21	2.76
Height	157.28	7.85	160.47	8.91
weight	58.26	12.63	52.74	9.87

Table 2: Comparison of mean+SD and p-values of parameters between group-I and group-II individuals.

t-test	Group-I		Group-II		t-stat	p-value
	Mean	SD	Mean	SD		
BMI	23.47	4.42	20.41	2.86	3.7622	0.0003
HR	84.21	10.31	83.00	10.61	0.5204	0.6042
SBP	119.05	10.54	113.37	10.03	2.4990	0.0145
DBP	69.56	8.31	69.44	7.98	0.0680	0.9460
MAP	86.06	7.29	84.09	7.98	1.1661	0.2470

In the present study, total of 82 subjects were included. Of which group I (offspring of single hypertensive

parent) consist of 39 subjects and group II (offspring of normotensive parents) consists of 43 subjects.

Mean+SD of age, height and weight are given in Table 1, which shows difference in the mean+SD of height and weight. But, there was no difference in the mean+SD of age between group-I and group-II, which proves that there is no bias due to difference in age.

BMI and systolic blood pressure were found to have significant difference when compared between group-I and group-II, with p-value of 0.0003 (<0.05) and 0.0145 (<0.05) respectively.

Even though difference exists in Mean+SD for heart rate, diastolic blood pressure and mean arterial pressure, they did not show any significant association between group-I and group-II with p-value of (0.6042>0.05), (0.9460>0.05), (0.2470>0.05) and (0.0923>0.05) respectively.

DISCUSSION

Our study result has proved the influence of parental hypertension on the elevated blood pressure and increased adiposity on their offspring by showing significant difference in BMI and systolic blood pressure between offspring (young adults between the age group of 18-25 years) of single parent hypertensive(either father or mother) and normotensive parents.

BMI of group-I individuals was found to be significant higher when compared with Group II individuals with a p-value of 0.0003 (<0.05). Increased BMI either overweight or obesity induces physiological changes which promotes vasoconstriction and sodium retention resulting in elevated blood pressure. Increased levels of leptin, free fatty acids and insulin in obesity augments the sympathetic activity in a mutual way resulting in vasoconstriction, which is magnified by obesity-induced insulin resistance and endothelial dysfunction .Increased renal tubular reabsorption of sodium occurs by an enhanced renal sympathetic nerve activity, the direct effect of insulin, hyperactivity of the renin-angiotensin system and probably by an alteration of intrarenal physical forces.[7]

Polymorphisms of the angiotensin converting enzyme (ACE) and the angiotensinogen and other genes have been linked to hypertension in several studies.[8,9] All these factors act together resulting in vasoconstriction and sodium retention consequently leading to elevated blood pressure. A study conducted in Brazil has also reported higher BP levels and altered lipid profiles among the offspring of hypertensive parents, when compared to those of normotensive parents.[10]

Systolic blood pressure was also found to significant difference between group-I and group-II with a p-value of 0.0145 (<0.05). This may be due to augmented sympathetic activity and vagal withdrawal which facilitates the onset of hypertension. This is similar to the finding from a study conducted by GK pal et al, in which they demonstrated the effect of sympathovagal imbalance in off springs of single and both parent hypertensive. As suggested by the same researcher, both of these findings suggests the influence of increased sympathetic activity, vagal withdrawal and adiposity on the development of hypertension in the offspring of single or both parent hypertensive.[4]

Similar findings of significant increase in systolic blood pressure and BMI in off springs of hypertensive parents were found by Syed et al and Uehara Y et al in their study.[3,11]

Influence of familial hypertension on blood pressure reactivity and BMI may be attributed to the concept of the variability gene and it could also be due to interactions between different genes directly influencing the regulation of blood pressure response to various physical and psychological stimuli.[12]

Diastolic pressure and mean arterial pressure did not have significant difference, both in Mean+SD and p-value. But, it is contradictory to the findings reported by Syed et al, where significant difference was also observed for diastolic blood pressure and mean arterial pressure between off springs of hypertensive and normotensive parents. And the same study also exhibited the fact, that genetic effects underlying an individual's genetic susceptibility to complex traits and disorders including elevated blood pressure levels and obesity are transmitted in recessive manners.[3] Hassan et al has also reported the significant increase in diastolic pressure in offspring of hypertensive parents.[13]

Even though p-value is not significant for heart rate between group-I and group-II, mean+SD is higher among individuals of group-I. Increased resting heart rate in offspring of single or both parent hypertensive has been associated with increase in cardiovascular morbidities. This finding was supported by many researchers who have performed the study on the same aim.[2,14]

Researchers have found significant rise in blood pressure and BMI of children of hypertensive when compared with normotensive parents.[2,15] These studies shows the influence of parental hypertension on blood pressure and BMI, and its occurrence even in the first decade of life. According to Framingham heart study, influence of both paternal and maternal BP levels significantly gets correlated with those of their offspring.[16]

Hypertension is a known cardiovascular risk factor for the occurrence of complications like cerebrovascular accidents, ischemic heart disease and renal failure. As offspring of hypertensive patients are at increased risk of developing hypertension, screening blood pressure and

anthropometric measures of young adults with family history of hypertension has become vital nowadays.

Limitations of the study includes smaller sample size, unequal gender distribution and lack of comparison with both parent hypertensives, which can be ruled out by conducting a study with the same aim in a larger population without gender bias and comparing it with off springs of both parents hypertensives. Then the results obtained will be more confirmatory than a smaller sample size.

CONCLUSION

Our study has proved the influence of parental history of hypertension on their offsprings. Thus screening young adults with family history of hypertension has become essential nowadays. This will helps in early detection and prevention of hypertension. When genetic factors are associated with environmental factors, the result could be an alarming increase in the health burden of hypertension. So, lifestyle modifications and avoiding other aggravating environmental factors can prevent or delay the occurrence of hypertension.

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REFERENCES

1. Mo R, Omvik P, Lund-Johansen P. The Bergen blood pressure study: offspring of two hypertensive parents have significantly higher blood pressures than offspring of one hypertensive and one normotensive parent. J Hypertens. 1995;13(12 Pt 2):1614-7.
2. Singhal V, Agal P, Nutan Kamat. The prevalence of elevated blood pressure and the association of obesity in asymptomatic female adolescent offsprings of hypertensive and normotensive parents. J Clin Diagn Res. 2012;Suppl 6(7):1158-61.
3. Kazim, S, Salman, M, Zubairi, A, Afzal, A, Ahmad, U, Frossard P. Offsprings of hypertensive parents have higher blood pressure and BMI. J Coll Physicians Surg Pak. 2008;18(1):64-5.
4. Pal GK, Pal P, Nanda N, Lalitha V, Dutta TK, Adithan G. Sympathovagal imbalance in prehypertensive offspring of two parents versus one parent hypertensive. Int J Hypertension. 2011:1-8.
5. Ramya K, Mukundan A. Assessment of pulmonary functions in overweight adults- a case control study. Int J Pharm Bio Sci. 2015;6(4):238-43.
6. Physical status: the use and interpretation of anthropometry. Technical report series no. 854, World Health organisation expert committee. Geneva.1995;427-38.
7. Ramya K, Ganesh KJ, Mukundan A. A study of anthropometric indices between hypertensive and normotensive adults. Int J Cur Res Rev. 2014;06(06):36-43.
8. Tiret L. Gene polymorphisms of the renin-angiotensin system in relation to hypertension and parental history of myocardial infarction and stroke: the PEGASE study. J Hypertens. 1998;16:37-44.
9. Caulfield M. Linkage of the angiotensinogen gene to essential hypertension. N Engl J Med. 1994;330: 1629-33.
10. Elias MC, Bolivar MS, Fonseca FA, Martinez TL, Angelini J, Ferreira C, et al. Comparison of the lipid profile, blood pressure, and dietary habits of adolescents and children descended from hypertensive and normotensive individuals. Arq Bras Cardiol. 2004;82:143-6.
11. Uehara Y, Shin WS, Watanabe T, Osanai T, Miyazaki M, Kanase H. A hypertensive father, but not hypertensive mother, determines blood pressure in normotensive male offspring through body mass index. Journal of Human Hypertension. 1998;12:441-5.
12. Berg K. Gene-environment interaction; variability gene concept. In: Goldbourt U, de Faire U, Berg K eds. Genetic factors in coronary heart disease. Dortrecht Kluwer Academic Publishers. 1994:153-77.
13. Hassan MO, Al Kharusi W, Ziada A. Blood pressure and its reactivity in the offspring of first cousin hypertensive and first cousin normotensive parents: a preliminary report. J Hum Hypertens. 2001;15:869-72.
14. Jensen MT, Suadicani P, Hein HO, Gyntelberg F. Elevated resting heart rate, physical fitness and all-cause mortality: a 16-year follow-up in the Copenhagen Male Study. Heart. 2013;99:882-7.
15. Kelishadi R, Hashemipour M, Bashardoost N. Blood pressure in children of hypertensive and normotensive parents. Indian pediatrics. 2004(41): 73-7.
16. Havlik RJ, Garrison RJ, Feinleib M, Kannel WB, Castelli WP, McNamara PM. Blood pressure aggregation in families. Am J Epidemiol. 1979;110: 304-12.

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