MAK HILL Publications Research Journal of Medical Sciences

Research Article
doi: 10.59218/makrjms.2024.4.55.59

OPEN ACCESS

Key Words
Systolic blood pressures, diastolic blood pressure, mean arterial pressure, pulse pressure, chronic kidney disease

Corresponding Author
Nazia Farha,
Department of Physiology, Rangaraya Medical College, Kakinada, A.P., India
nazia.farha.md@gmail.com

Author Designation
[1]Assistant Professor
[2,3]Associate Professor

Received: 20 November 2023
Accepted: 31 December 2023
Published: 4 January 2024

Citation: Sharmila Nalli, M. Ratnadeepti and Nazia Farha, 2024. We a Comparative Study of Hemodynamic Parameters Between Urban and Rural Population. Res. J. Med. Sci., 18: 55-59, doi: 10.59218/makrjms.2024.4.55.59

Copy Right: MAK HILL Publications

A Comparative Study of Hemodynamic Parameters Between Urban and Rural Population

[1]Sharmila Nalli, [2]M. Ratnadeepti and [3]Nazia Farha
[1-3]Department of Physiology, Rangaraya Medical College, Kakinada, A.P., India

ABSTRACT
The aim of the present study was to assess systolic blood pressure, diastolic blood pressure, mean arterial pressure. pulse pressure between urban and rural population. The current investigation was carried out at the Department of Physiology, including a total of 150 participants from both urban and rural regions. Following the acquisition of ethical approval, participants within the age range of 20-60 years were chosen. A comparison was made between the systolic blood pressure of the rural and urban population using a F-test, resulting in a p-value of 0.46. The diastolic blood pressure of both rural and urban populations was compared and analyzed using a F-test, yielding a p-value of 0.0032. A comparison of the pulse pressure between the rural and urban populations was conducted using a F-test, yielding a p-value of 0.036. A comparison was made between the mean arterial pressure of the rural and urban population using a F-test, yielding a p-value of 0.0007. The prevalence of obesity and overweight is much higher in urban areas as compared to rural areas. The urban population exhibits markedly greater systolic blood pressure (S.B.P.) diastolic blood pressure (D.B.P.) mean arterial pressure (M.A.P.) and pulse pressure (P.P.) compared to the rural population. Urban men and girls have a higher prevalence of hypertension compared to their rural counterparts. These findings unequivocally demonstrate that urban inhabitants have a heightened susceptibility to cardiovascular disease. Systolic blood pressures, diastolic blood pressure, mean arterial pressure, pulse pressure, chronic kidney disease.

INTRODUCTION

The well-established link between either systolic blood pressure (SBP) or diastolic blood pressure (DBP) and the risk of cardiovascular disease (CVD) is positive[1]. Blood pressure is distinguished by its pulsatile and constant components[2-4]. The pulsatile component, as measured by pulse pressure (PP) reflects the fluctuation in blood pressure and is influenced by factors such as left ventricular ejection fraction, stiffness of large arteries, early pulse wave reduction and heart rate[5]. The constant element, determined by mean arterial pressure (MAP) is a result of the average values of left ventricular contractility, heart rate and vascular resistance and elasticity over a period of time[2-6].

Prior research has indicated that there are consistent and separate connections between various blood pressure (BP) elements and the likelihood of cardiovascular disease (CVD) and death. These studies also examined how well these elements predicted the occurrence of CVD and mortality. There is a lack of recent studies that examine the ability of systolic (SBP) diastolic (DBP) mean arterial pressure (MAP) and pulse pressure (PP) to predict outcomes. Some results reported that SBP is a stronger predictor of CVD than other BP components[9] or is similar to PP, defined as SBP minus DBP, for prediction of CVD or all-cause mortality[10], whereas several epidemiological studies showed that PP is stronger than SBP for prediction of CVD or mortality[11,12] apparently because of increased arterial stiffness, which increases by age and leads to elevated PP[11].

In a study conducted on a representative sample of the population, it was found that PP was able to predict mortality related to cardiovascular diseases but not mortality related to cerebrovascular diseases[13]. In a recent study of the Medical Research Council Mild Hypertension Trial, sphygmomanometric PP was a predictor of coronary events and MAP was a stronger predictor of stroke than PP[14]. A study of 24 hrs BP monitoring also gave evidence that PP is the primary predictor of cardiac events MAP is the predominant independent predictor of cerebrovascular events[15] but data from certain epidemiological studies show that PP is a stronger predictor of fatal stroke than MAP[16].

The purpose of the current research was to examine systolic blood pressure, diastolic blood pressure, mean arterial pressure. Pulse pressure between urban and rural population.

MATERIALS AND METHODS

The current research was done at the Department of Physiology and 150 participants both from urban and rural regions were engaged. After gaining ethical approval the individuals were recruited in the age bracket of 20-60 years and the research was done in accordance to Joint National Committee rules[17].

Method: The individuals were intended to be healthy with no history of any other pertinent disorders and were not on any other treatment. The individuals that we have picked are non-smoking, non-alcoholic and non-hypertensive. Data on demographic parameters, medical history and habits was acquired with the use of standard questionnaire given by a professional technologist. The individuals were placed on a questionnaire on their living style, eating habits, salt intake alcohol, smoking, exercise, sleeping, drinking, education employment divorce was asked to each participant. The permission of the individuals was obtained.

The following parameters were measured Age, Height, Weight, SBP, DBP, M.A.P. and P.P. Measurements were done between 8-10 AM and the blood pressure was taken using Littman's stethoscope and mercury manometer in sitting position. Measurements were obtained three times. Care was made to offer five minutes respite to the participant before to the first measurement. The second measurement was collected after 30 min. The average of the three measurements was taken as the blood pressure of the subject. The PP is determined as the difference between SBP and DBP. The Mean Arterial Pressure (MAP) is determined by adding the Diastolic Blood Pressure (DBP) to one third of the Pulse Pressure (PP).

A statistical study was conducted to compare two groups, urban and rural, using a F test to analyse the gathered data.

RESULTS

The test parameters of all subjects are shown. The systolic blood pressure of both rural and urban population was compared using F test and a p value of 0.46 was obtained. The diastolic blood pressure of both rural and urban population was compared and analyzed by using F-test and we got a p-value of 0.0032. The pulse pressure of both rural and urban population was compared by F-test which shows a p-value of 0.036. The mean arterial pressure of both rural and urban population was compared by using F-test where we got a p-value of 0.0007.

DISCUSSIONS

The National high blood pressure education programme (NHBPEP) showed that high blood pressure was a major unsolved but solvable mass public health problem. According to the updated WHO-ISH classification[18], blood pressure readings ranging from 130/80-140/90 mm Hg are now classified as high blood pressure. An elevation in cardiac output leads to an elevation in systolic pressure, while an increase in peripheral resistance results in an elevation in diastolic pressure. The reduced elasticity of the arteries and the corresponding cardiac output contribute significantly

Table 1: The test parameters of all subjects

	Rural SBP	Urban SBP	Rural DBP	Urban DBP	Rural PP	Urban PP	Rural MAP	Urban MAP
N	75	75	75	75	75	75	75	75
Mean								
124.6	136.64	79.21	91.89	45.65	47.93	93.57	103.27	
S D	11.16	8.92	5.65	8.92	8.62	8.40	7.43	8.72
S E	1.36	0.990	0.72	0.78	1.16	0.82	0.80	0.972
MAX	143	182	91	132	71	71	104.4	145.5
MIN	101	111	61	81	31	32	74.4	74.3

Table 2: Systolic blood pressure of both rural and urban population

	Rural	Urban
Mean	121.0833333	136.69
Variance	102.450565	98.66050505
Observations	50	50
Df	59	99
F	1.037215168	
P(F<=f) one-tail	0.464004236	
F Critical one-tail	1.464002295	

Table 3: Diastolic blood pressure of both rural and urban population

	Rural	Urban
Mean	77.18333333	88.84
Variance	32.2539548	63.91353535
Observations	50	50
Df	59	99
F	0.504649831	
P(F<=f) one-tail	0.003211128	
F Critical one-tail	0.672974585	

Table 4: Pulse pressure of both rural and urban population

	Rural	Urban
Mean	43.66666667	47.79
Variance	74.15819209	69.19787879
Observations	50	50
Df	59	99
F	1.071683025	
P(F<=f) one-tail	0.0364452940	
F Critical one-tail	1.454002295	

Table 5: Mean arterial pressure of both rural and urban population

	Rural	Urban
Mean	91.52166667	105.2547
Variance	41.14511582	94.57648173
Observations	50	50
Df	59	99
F	0.435045955	
P(F<=f) one-tail	0.000755224	
F Critical one-tail	0.672974585	

to the increase in systolic pressure. The well-established factor is the positive correlation between systolic and diastolic pressure[19] and the risk of cardiovascular disease. The pulse pressure represents the blood pressure variation and is effect by large artery stiffness and left ventricular ejection which is estimated by mean arterial pressure[20]. Twenty An evident correlation exists between obesity and hypertension[21]. Engaging in popular but short-lived diets can result in the development of obesity[22,23]. Men with a waist circumference exceeding 102 cm have a high probability of developing various disorders, such as hypertension[24]. Plasma insulin and leptin concentrations rise in individuals who are obese and insulin plays a role in the development of hypertension[25].

The systolic blood pressure of both rural and urban population was compared using F-test and a p-value of 0.46 was obtained. The diastolic blood pressure of both rural and urban population was compared and analyzed by using F-test and we got a p-value of 0.0032. The pulse pressure of both rural and urban population was compared by F-test which shows a p-value of 0.036. The mean arterial pressure of both rural and urban population was compared by using F-test where we got a p-value of 0.0007. Higher SBP levels may reflect the progressive stiffening of the arterial wall, changes in the vascular structure and the development of atherosclerosis[26]. Decreased DBP may indicate poor coronary flow reserve and coronary perfusion of the myocardium[27]. Increases in PP reflect the stiffening of the conduit vessels. Such arterial stiffening raises pulse-wave velocity, which eventually increases systemic load while lowering coronary perfusion pressure[28].

Physiologically, many processes may explain the main prognostic influence of the stable component of BP (ie, mean BP) on the following cerebrovascular episodes. The tiny penetrating end arteries, which feed the medial and basal regions of the brain and brainstem, appear to be especially sensitive to the deleterious effects of high BP in as much as these arteries emerge directly from the major artery trunks[29]. However the use of MAP as a proxy of peripheral vascular resistance seems to become less trustworthy with age. Because mean BP is twice as sensitive to diastolic than to systolic BP the leveling off and the eventual reduction in diastolic BP with age, as opposed to the ongoing increase in systolic BP, lead to a gradual underestimating of peripheral vascular resistance by the mean BP equation. According to the WHO and ISH lifestyle measures for reducing hypertension include stopping of smoking[30], limiting alcohol consumption, reducing salt intake, eating healthier food, taking more exercise, and maintaining normal bodyweight as larger weight losses are associated with larger blood pressure reductions and learning to cope with stress. Smoking cessation is the most potent lifestyle intervention for the prevention of cardiovascular problems in hypertensive people. Maintaining mental and functional capacities into older age is substantially aided by good habits. Active ageing means retaining both health and creativity throughout the lifetime and particularly into older years. Early identification and treatment will lead to a reduction in morbidity and mortality linked with hypertension[31].

CONCLUSION

The prevalence of obesity and overweight is much higher in urban areas as compared to rural areas. The urban population exhibits markedly greater systolic

blood pressure (S.B.P.) diastolic blood pressure (D.B.P.) mean arterial pressure (M.A.P.) and pulse pressure (P.P.) compared to the rural population. The prevalence of hypertension is higher in urban men and females compared to their rural counterparts. These findings unequivocally demonstrate that urban inhabitants have a heightened susceptibility to cardiovascular disease. This demonstrates the impact of adopting Western food habits and lifestyle on people's blood pressure.

REFERENCES

1. JNC., 1997. Joint National Committee on the Detection, Evaluation, and Treatment of High Blood Pressure. The sixth report of the Joint National Committee on prevention, detection, evaluation and treatment of high blood pressure. Arch. Intern. Med., 157: 2413-2446.
2. Safar, M.E., 1989. Pulse pressure in essential hypertension: Clinical and therapeutical implications. J. Hypertens., 7: 769-776.
3. Darne, B., X. Girerd, M. Safar, F. Cambien and L. Guize, 1989. Pulsatile versus steady component of blood pressure: A cross-sectional analysis and a prospective analysis on cardiovascular mortality. Hypertension., 13: 392-400.
4. O'Rourke, M., 1995. Mechanical principles in arterial disease. Hypertension., 26: 2-9.
5. Franklin, S.S., W. Gustin, N.D. Wong, M.G. Larson, M.A. Weber, W.B. Kannel and D. Levy, 1997. Hemodynamic patterns of age-related changes in blood pressure. Circulation, 96: 308-315.
6. Benetos, A., F. Cambien, S. Gautier, S. Ricard and M. Safar et al., 1996. Influence of the angiotensin ii type 1 receptor gene polymorphism on the effects of perindopril and nitrendipine on arterial stiffness in hypertensive individuals. Hypertension, 28: 1081-1084.
7. Lawes, C.M., S.V. Hoorn, M.R. Law, P. Elliott, S. MacMahon and A. Rodgers, 2006. Blood pressure and the global burden of disease 2000. part ii: Estimates of attributable burden. J. Hypertens., 24: 423-430.
8. Lopez, A.D., C.D. Mathers, M. Ezzati, D.T. Jamison and C.J. Murray, 2006. Global and regional burden of disease and risk factors, 2001: Systematic analysis of population health data. Lancet., 367: 1747-1757.
9. Mason, P.J., J.E. Manson, H.D. Sesso, C.M. Albert and M.J. Chown *et al*., 2004. Blood pressure and risk of secondary cardiovascular events in women. Circulation, 109: 1623-1629.
10. Mattace-Raso, F.U.S., T.J.M.V.D. Cammen, N.M.V. Popele, D.A.M.V.D. Kuip and M.A.D.H. Schalekamp et al., 2004. Blood pressure components and cardiovascular events in older adults: The rotterdam study. J. Am. Geriatrics Soc., 52: 1538-1542.
11. Franklin, S.S., S.A. Khan, N.D. Wong, M.G. Larson and D. Levy, 1999. Is pulse pressure useful in predicting risk for coronary heart disease? Circulation, 100: 354-360.
12. Assmann, G., P. Cullen, T. Evers, D. Petzinna and H. Schulte, 2005. Importance of arterial pulse pressure as a predictor of coronary heart disease risk in procam. Eur. Heart J., 26: 2120-2126.
13. Benetos, A., M. Safar, A. Rudnichi, H. Smulyan, J.L. Richard, P. Ducimetie`re and L. Guize, 1997. Pulse pressure. Hypertension, 30: 1410-1415.
14. Millar, J.A., A.F. Lever and V. Burke, 1999. Pulse pressure as a risk factor for cardiovascular events in the mrc mild hypertension trial. J. Hypertens., 17: 1065-1072.
15. Verdecchia, P., G. Schillaci, G. Reboldi, S.S. Franklin and C. Porcellati, 2001. Different prognostic impact of 24-hour mean blood pressure and pulse pressure on stroke and coronary artery disease in essential hypertension. Circulation, 103: 2579-2584.
16. Mazza, A., A.C. Pessina, P. Gianluca, V. Tikhonoff, A. Pavei and E. Casiglia, 2001. Pulse pressure: An independent predictor of coronary and stroke mortality in elderly females from the general population. Blood Pressure, 10: 205-211.
17. SR., 2018. Seventh Report of the joint National Committee on prevention, detection evaluation and treatment of high blood pressure. Making sense of the US Hypertension Guideline in., https://www.ncbi.nlm.nih.gov/books/NBK9630/
18. Fisher, C.M., 1985. The ascendancy of diastolic blood pressure over systolic. Lancet., 326: 1349-1350.
19. Kurth, T., C.H. Hennekens, T. Stürmer, H.D. Sesso, R.J. Glynn, J.E. Buring and J.M. Gaziano, 2005. Analgesic use and risk of subsequent hypertension in apparently healthy men. Arch. Internal Med., Vol. 165. 10.1001/archinte.165.16.1903.
20. Stamler, R., 1978. Weight and blood pressure. findings in hypertension screening of 1 million Americans. JAMA. J. Am. Med. Assoc., 240: 1607-1610.
21. Reddy, B.N., 1998. Blood pressure and adiposity: A comparative study of socioeconomically diverse groups of andhra pradesh, India. Am. J. Hum. Biol., 10: 5-21.
22. Doll, S., F. Paccaud, P. Bovet, M. Burnier and V. Wietlisbach, 2002. Body mass index, abdominal adiposity and blood pressure: Consistency of their association across developing and developed countries. Int. J. Obesity, 26: 48-57.
23. Lean, M., T. Han and J. Seidell, 1998. Impairment of health and quality of life in people with large waist circumference. Lancet., 351: 853-856.

24. Fournier, A.M., M.T. Gadia, D.B. Kubrusly, J.S. Skyler and J.M. Sosenko, 1986. Blood pressure, insulin, and glycemia in nondiabetic subjects. Am. J. Med., 80: 861-864.
25. Carethers, M. and P.L. Blanchette, 1989. Pathophysiology of hypertension. Clin. Geriatric Med., 5: 657-674.
26. Cruickshank, J.M., 1988. Coronary flow reserve and the j curve relation between diastolic blood pressure and myocardial infarction. BMJ, 297: 1227-1230.
27. Mitchell, G.F., L.A. Moye´, E. Braunwald, J.L. Rouleau and V. Bernstein *et al*., 1997. Sphygmomanometrically determined pulse pressure is a powerful independent predictor of recurrent events after myocardial infarction in patients with impaired left ventricular function. Circulation, 96: 4254-4260.
28. Pistoia, F., S. Sacco, D. Degan, C. Tiseo, R. Ornello and A. Carolei, 2015. Hypertension and stroke: Epidemiological aspects and clinical evaluation. High. Blood. Pressure. Cardiovasc. Prev., 23: 9-18.
29. Wang, J., W. Sun, G.A. Wells, Z. Li and T. Li *et al*., 2018. Differences in prevalence of hypertension and associated risk factors in urban and rural residents of the northeastern region of the people's republic of China: A cross-sectional study. PLOS ONE, Vol. 13 .10.1371/journal.pone.0195340
30. Lisón, J.F., G. Palomar, M.S. Mensorio, R.M. Baños and A. Cebolla-Martí et al., 2020. Impact of a web-based exercise and nutritional education intervention in patients who are obese with hypertension: Randomized wait-list controlled trial. J. Med. Internet Res., 22: 177-181.
31. Saxena, T. and R.K. H, 2017. Prevalence of hypertension in a rural community of coastal karnataka: A cross sectional study. Int. J. Of Community Med. And Public Health, 4: 2774-2777.