Prevalence and Risk Factors of Hypertension in Urban: A Cross-Sectional Study

Ghazi Jamaan S Aldhafeeri[1], Sanad Khemais Alshammari[2], Tami Hlail Hazmi Aldhafeeri[3], Hamoud Mukhlid Aldhafeeri[4]

1-Internal Medicine Consultant
2-Internal Medicine Resident
3-Internal Medicine Resident
4-Internal Medicine Resident

Abstract:

Hypertension remains a significant public health concern and a critical area of investigation due to its high prevalence and status as a major risk factor for cardiovascular diseases and other health complications. This study aimed to assess the prevalence of hypertension and its associated factors, as well as to estimate the awareness, treatment, and control rates among the urban population . A community-based cross-sectional study with a multistage sampling design was conducted, involving 640 subjects aged 25–64 years. A modified WHO STEPS interview schedule was used for data collection. The findings revealed a hypertension prevalence of 32.9% (40.9% in males and 26.0% in females). Male gender, older age, marital status, higher socioeconomic status, lower education level, retirement status, tobacco and alcohol use, overweight, obesity, and abdominal obesity were identified as associated risk factors for hypertension. However, only 38.4% of hypertensive individuals were aware of their condition, with 70.4% of those seeking treatment and 35.08% achieving adequate blood pressure control. These results underscore the substantial burden of hypertension and highlight the low levels of awareness, treatment, and control within this population.

Introduction:

Hypertension poses a significant global public health challenge due to its widespread prevalence. Approximately 7.5 million deaths annually, accounting for 12.8% of total global deaths, are attributed to high blood pressure. This burden is projected to escalate, with an estimated 1.56 billion adults suffering from hypertension by 2025. Elevated blood pressure is a primary risk factor for chronic heart disease, stroke, and coronary artery disease, contributing substantially to the global burden of disease. The complications associated with hypertension encompass heart failure, peripheral vascular disease, renal impairment, retinal hemorrhage, and visual impairment. (Ahmed et al., 2014)

Hypertension, also known as high blood pressure (HTN), is characterized by abnormally high arterial blood pressure. According to the Joint National Committee 7 (JNC7) guidelines, normal blood pressure is defined as systolic BP < 120 mmHg and diastolic BP < 80 mm Hg. Hypertension is diagnosed when systolic BP levels reach ≥140 mmHg and/or diastolic BP levels reach ≥90 mmHg. The intermediate range of 120–139 mmHg systolic BP and 80–89 mmHg diastolic BP is classified as "prehypertension". Although prehypertension itself is not a medical condition, individuals with prehypertension are at increased risk of developing hypertension. (Mishra & Kumar, 2011)

Hypertension is often asymptomatic in its early stages, earning it the moniker "silent killer" as symptoms may not manifest until severe complications such as heart attack, stroke, or chronic kidney disease arise.

Risk Factors of Hypertension in Urban: A Cross-Sectional Study

Detection typically relies on blood pressure measurements since overt symptoms are rare. While many hypertensive patients remain asymptomatic, some may experience headaches, lightheadedness, vertigo, visual disturbances, or fainting episodes. (Abebe et al., 2015)

Various factors contribute to the predisposition to hypertension, and these factors can vary significantly between countries and even within urban and rural areas of the same region. The impact of urbanization on health is profound, leading the World Health Organization to designate "Urbanization and Health" as the theme for World Health Day 2010. Urbanization is recognized as a determinant of health, particularly in low- and middle-income countries (LMICs), where it is a driving force behind noncommunicable diseases (NCDs). Urban dwellers face a higher risk of NCDs compared to rural populations. For instance, the prevalence of hypertension, obesity, and elevated blood glucose levels in urban areas of Uttar Pradesh was notably higher than in rural areas, as indicated by the National Family Health Survey (NFHS-4). This disparity underscores the heightened risk factors present in urban settings, including rapid urbanization, an aging population, sedentary lifestyles, and dietary shifts. (Mendis, 2010)

In light of these considerations, this study aims to assess the prevalence of hypertension and its associated risk factors in the urban area. Additionally, it seeks to evaluate the awareness and management of hypertension among the study participants. (Tabrizi et al., 2016)

Materials and Methods:

Study Design and Sample Size:
A community-based cross-sectional study was conducted among individuals aged 25 to 64 years residing in the selected study area. The sample size was determined based on an estimated prevalence of hypertension of 50%, a permissible error of 5% with a 95% confidence interval. The minimum sample size was calculated as n = 384, accounting for a design effect and a non-response rate of 10%, resulting in a final sample size of 640 participants.

Sampling Methodology:
A multistage sampling approach was employed. Five wards were randomly selected in the first stage. Within each selected ward, households were chosen using systematic random sampling and probability proportional to size. From each household, one member of the target age group was interviewed, selected randomly if multiple eligible individuals were present.

Selection of Study Subjects:
Inclusion criteria included individuals aged 25–64 years in the selected study area who provided consent for participation. Exclusion criteria encompassed individuals unable to respond due to severe physical or mental illness or for whom anthropometric measurements could not be performed.

Tools of the Study:
Data collection tools included a modified and pretested WHO stepwise approach to chronic disease risk factor surveillance (STEPS) interview schedule, Libra weighing machine, steel anthropometry rod, measuring tape, and Omron BP Machine.

Techniques of the Study:
Structured and pretested interview schedules were administered to collect sociodemographic data. Blood pressure was measured twice on the right arm using an automatic electronic device (OMRON HEM-7261), with the average of two readings recorded. Anthropometric measurements, including weight, height, waist circumference, hip circumference, and waist-to-hip circumference ratio (WHR), were also conducted using standardized techniques.

Ethical Consideration:
Ethical approval was obtained from the Institute Ethical Committee of the Institute of Medical Sciences, Banaras Hindu University Varanasi. Written informed consent was obtained from all participants, and identified hypertensive individuals were referred to nearby clinics for treatment.

Definitions Used:
The Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) classification was used for hypertension. Definitions for hypertension, awareness, treatment, and

Risk Factors of Hypertension in Urban: A Cross-Sectional Study

control were based on established criteria. Socioeconomic class categorization, lifestyle factors (smoking, tobacco use, alcohol consumption, physical activity), and BMI classification were also applied as per standardized guidelines.

Data Processing:

Data collected were entered into a database using SPSS 16.0 software. Descriptive statistics were computed for continuous variables, while frequencies and percentages summarized qualitative data. Statistical tests such as chi-square test, ANOVA, and logistic regression were applied as appropriate, with a significance level set at 0.05.

Results:

A total of 640 study subjects were interviewed, comprising 301 (47%) males and 339 (53%) females. The median age of the participants was 39.0 years, with males having a median age of 40.0 years and females 38.0 years. Most participants were married, and approximately one-third were from the upper socioeconomic class. The mean BMI of the subjects was 24.11 kg/m2, with a higher prevalence of overweight or obesity observed. Abdominal obesity, as indicated by waist circumference, was prevalent in 40% of the subjects.

The mean systolic and diastolic blood pressures were 124.2 mmHg and 83.4 mmHg, respectively, with significant variations based on age and gender. The prevalence of isolated systolic and diastolic blood pressures was notable, with higher rates in males and older age groups.

The overall prevalence of hypertension was 32.96%, with a higher prevalence among males (40.9%) compared to females (26.0%). Prehypertension was also prevalent, affecting 45.9% of males and 38.05% of females. Factors associated with hypertension and prehypertension included gender, age, marital status, occupation, education level, tobacco use, and physical activity. Logistic regression analysis revealed higher odds of hypertension among males, older individuals, married individuals, those with lower education levels, retired individuals, and those from higher socioeconomic status. Anthropometric factors such as overweight, obesity, and abdominal obesity were also associated with hypertension. Tobacco use, alcohol consumption, and nonvegetarian diet were identified as risk factors for hypertension.

Awareness of hypertension was limited, with only one-third of hypertensive individuals aware of their condition. Among those aware, 70% were seeking treatment, but only a third had their blood pressure adequately controlled.

These findings highlight the significant prevalence of hypertension in the study population and underscore the importance of awareness, early detection, and effective management strategies.

Table 1: Revised modified BG Prasad socioeconomic classification scale,.

Socioeconomic Class	Per Capita Monthly Income (1961)	Revised Income Categories (2014)
Upper Class	100 and above	5357 and above
Upper Middle Class	50–99	2652–5356
Middle Class	30–49	1570–2651
Lower Middle Class	15–29	812–1569
Lower Class	<15	<811

Table 2: Background characteristics of the study subjects (*N* 640).
study subjects (N=640):

Variables	N (640)	Proportion (%)
Age group		
25–34	204	31.9
35–44	179	28.0
45–54	133	20.8
55–64	124	19.4
Sex		

Male	301	47.0
Female	339	53.0
Caste		
Gen	313	48.9
OBC	305	47.7
SC/ST	22	3.4
Education		
Illiterate	64	10.0
Primary	85	13.3
Secondary	182	28.4
Graduate & above	309	48.3
Marital status		
Unmarried	60	9.4
Married	545	85.2
Others	35	5.5
Occupation		
Government	86	13.4
Private	155	24.2
Self-employed	109	17.0
Retired	27	4.2
Homemaker	229	35.8
Others	34	5.3
Family type		
Nuclear	311	48.6
Joint	329	51.4
Number of family members		
1–5	401	62.7
≥6	239	37.3
Socioeconomic status		
Lower class	41	6.4
Lower middle class	105	16.4
Middle class	120	18.8
Upper middle class	140	21.9
Upper class	234	36.6
BMI (kg/m2)		
Overweight	186	29.1
Obese	59	9.2
Waist circumference (cm)		
Abdominal obesity	258	40.3

Table 3: Mean systolic and diastolic blood pressure (mm hg) and prevalence (%) of isolated systolic hypertensive and isolated diastolic hypertensive by age and gender.

Age groups (years)	N (640)	Systolic BP (mean ± SD)	Diastolic BP (mean ± SD)	Isolated systolic HTN (N = 59)	Isolated diastolic HTN (N = 110)
		Male	Female	Total	Male
25–34	204	122.17 ± 9.54	114.81 ± 9.99	117.84 ± 10.44	82.92 ± 9.0
35–44	179	124.10 ± 10.77	121.71 ± 15.13	122.90 ± 13.07	85.70 ± 7.66
45–54	133	132.36 ± 13.21	127.16 ± 18.04	129.66 ± 16.05	89.23 ± 8.16
55–64	124	134.66 ± 19.53	127.27 ± 15.74	130.97 ± 18.05	86.42 ± 12.15

| Total | 640 | 127.49 ± 14.19 | 121.39 ± 15.26 | 124.25 ± 15.05 | 85.82 ± 9.43 |

Discussion:
The study conducted in urban areas, revealed a significant prevalence of prehypertension and hypertension, highlighting the escalating burden of these conditions. The prevalence rates observed in this study were higher compared to some previous studies but in line with others, indicating variations that could be attributed to social, cultural, dietary, lifestyle, and methodological differences. (Kumar et al., 2016)

Gender differences were evident, with men exhibiting higher rates of hypertension and prehypertension than women. This could partly be due to biological and behavioral factors such as smoking, alcohol consumption, and physical activity. Women's higher utilization of healthcare services and reporting of health issues may also contribute to their better health outcomes. (Prabakaran et al., 2013)

Age was identified as a significant risk factor for hypertension, consistent with findings from other studies. Advancing age is associated with arterial stiffness, contributing to hypertension prevalence in older age groups. (Rani et al., 2015)

Several socioeconomic factors were associated with hypertension, including marital status, education level, occupation, and socioeconomic status. Higher education levels were negatively correlated with hypertension, possibly due to better knowledge and lifestyle choices among more educated individuals. However, the insignificant association in logistic regression analysis could be due to the small sample size in certain education categories. (Mangal et al., 2015)

Anthropometric measurements such as BMI and waist circumference were crucial indicators of hypertension risk. Overweight and obesity were major modifiable risk factors, highlighting the importance of weight management in hypertension prevention and management. (Gao et al., 2013)

Physical activity showed an unexpected inverse association with hypertension in this study, possibly due to subjects starting physical activity after hypertension diagnosis or other risk factors were identified. (Singh et al., 2013)

Alcohol and tobacco use were positively associated with hypertension, consistent with numerous studies. Nonvegetarian diets also showed a trend towards higher hypertension risk, while vegetarian diets were protective, aligning with existing research. (Costa et al., 2007)

The study's findings regarding hypertension awareness, treatment, and control rates underscore the need for improved healthcare interventions and public health strategies to address hypertension's growing burden. Awareness and treatment rates were relatively higher in this study compared to some rural populations but still fall short of optimal levels, indicating room for improvement in hypertension management programs. (Dhungana et al., 2016)

Overall, the study contributes valuable insights into the prevalence, risk factors, and management status of hypertension in urban areas , highlighting the multifactorial nature of this public health concern and the importance of targeted interventions for effective control and prevention. (Galav et al., 2015)

Conclusion:
The study highlights the alarmingly high prevalence of prehypertension and hypertension in urban , posing significant health risks to the population. Men are particularly vulnerable, and advancing age further increases the risk of hypertension. The low awareness of hypertension status among affected individuals necessitates urgent improvements in health literacy and awareness campaigns.

References
1. Erem, C., Hacihasanoglu, A., Kocak, M., Deger, O., & Topbas, M. (2009). Prevalence of prehypertension and hypertension and associated risk factors among Turkish adults: trabzon hypertension study. Journal of Public Health, vol. 31, no. 1, pp. 47–58, 2009.
2. Ahmed, A., Rahman, M., Hasan et al. (2014). Hypertension and associated risk factors in some selected rural areas of Bangladesh. International Journal of Research in Medical Sciences, vol. 2, no. 3, p. 925, 2014.

Risk Factors of Hypertension in Urban: A Cross-Sectional Study

3. Mishra, C. P., & Kumar, S. (2011). Risk factors of hypertension in a rural area of Varanasi. Indian Journal of Preventive and Social Medicine, vol. 42, no. 1, pp. 101–111, 2011.
4. Abebe, S. M., Berhane, Y., Worku, A., & Getachew, A. (2015). Prevalence and associated factors of hypertension: a crossectional community based study in Northwest Ethiopia. PLoS ONE, vol. 10, no. 4, Article ID e0125210, 2015.
5. Mendis, S. (2010). Global status report on non-communicable diseases 2010. Tech. Rep., World Health Organisation, 2010, http://www.who.int/nmh/publications/ncd report2010/en/.
6. Tabrizi, J. S., Sadeghi-Bazargani, H., Farahbakhsh, M., Nikniaz, L., & Nikniaz, Z. (2016). Prevalence and associated factors of prehypertension and hypertension in Iranian population: the lifestyle promotion project (LPP). PLoS ONE, vol. 11, no. 10, Article ID e0165264, 2016.
7. Kumar, M. R., Shankar, R., & Singh, S. (2016). Hypertension among the adults in rural Varanasi: a cross-sectional study on prevalence and health seeking behavior. Indian Journal of Preventive and Social Medicine, vol. 47, no. 1-2, pp. 78–83, 2016.
8. Chobanian, A. V., Bakris, G. L., Black, H. R. et al. (2003). Seventh report of the Joint National Committee on prevention, detection, evaluation, and treatment of high blood pressure. Hypertension, vol. 42, no. 6, pp. 1206–1252, 2003.
9. Wikipedia. Hypertension. https://en.wikipedia.org/wiki/Hypertension.
10. Prabakaran, J., Vijayalakshmi, N., & VenkataRao, E. (2013). Prevalence of hypertension among urban adult population (25–64 years) of Nellore. International Journal of Research & Development of Health, vol. 1, no. 2, pp. 42–49, 2013.
11. Fisher, N. D., & Williams, G. H. (2005). Hypertensive vascular disease. In Harrison's Principles of Internal Medicine, D. L. Kasper, E. Braunwald, A. S. Fauci et al., Eds., pp. 1463–1481, McGraw-Hill, New York, NY, USA, 16th edition, 2005.
12. Rani, R., Mengi, V., Gupta, R. K., & Sharma, H. K. (2015). Hypertension and its risk factors—a cross sectional study in an urban population of a North Indian District. Public Health Research, vol. 5, no. 3, pp. 67–72, 2015.
13. World Health Organization. Urbanization and health. Bulletin of the World Health Organization, vol. 88, no. 4, pp. 245-246, 2010.
14. Angkurawaranon, C., Wattanatchariya, N., Doyle, P., & Nitsch, D. (2013). Urbanization and Non-communicable disease mortality in Thailand: an ecological correlation study. Tropical Medicine & International Health, vol. 18, no. 2, pp. 130–140, 2013.
15. International Institute for Population Sciences. Ministry of Health and Family Welfare, Government of India. National family Health Survey (NFHS-4) 2015-16 Factsheet, India. http://rchiips.org/NFHS/pdf/NFHS4/India.pdf.
16. World Health Organization (WHO). Obesity: preventing and managing the global epidemic. WHO Technical Report Series 894, World Health Organization, Geneva, Switzerland, 1998.
17. World Health Organization. WHO STEPS surveillance manual: the WHO STEP wise approach to chronic disease risk factor surveillance. Tech. Rep., World Health Organization, Geneva, Switzerland, 2005.
18. Mangal, A., Kumar, V., Panesar, S., Talwar, R., Raut, D., & Singh, S. (2015). Updated BG Prasad socioeconomic classification, 2014: a commentary. Indian Journal of Public Health, vol. 59, no. 1, pp. 42–44, 2015.
19. Reddy, S. S., & Prabhu, G. R. (2005). Prevalence and risk factors of hypertension in adults in an Urban Slum, Tirupati, A. P. Indian Journal of Community Medicine, vol. 30, no. 3, pp. 84–86, 2005.
20. Singh, R., Sinha, R. K., Mani, C., Singh, R., & Pal, R. (2013). Burden and vulnerability of hypertension in a rural population of Patna, Bihar, India. South East Asia Journal of Public Health, vol. 1, no. 1, 2013.
21. Costa et al., "Hypertension prevalence and its associated risk factors in adults: a population-based study in Pelotas," Arq Bras Cardiol, vol. 88, no. 1, pp. 54–59, 2007.
22. Y. Gao, G. Chen, H. Tian et al., "Prevalence of hypertension in China: a cross-sectional study," PLoS ONE, vol. 8, no. 6, Article ID e65938, 2013.

23. R. R. Dhungana, A. R. Pandey, B. Bista, S. Joshi, and S. Devkota, "Prevalence and associated factors of hypertension: a community-based cross-sectional study in municipalities of Kathmandu, Nepal," International Journal of Hypertension, vol. 2016, Article ID 1656938, 2016.

24. A. Galav, R. Bhatanagar, S. Meghwal, and M. Jain, "Prevalence of hypertension among rural and urban population in Southern Rajasthan," Indian Journal of Community Medicine, vol. 6, no. 2, pp. 41–45, 2015.

25. World Health Organization, "Global Health Observatory data repository 2015," Tech. Rep., 2015, http://apps.who.int/gho/data/view.main.2464EST?lang=en.

26. K. Thankappan, G. Mini, M. Daivadanam, G. Vijayakumar, P. Sarma, and M. Nichter, "Smoking cessation among diabetes patients: results of a pilot randomized controlled trial in Kerala, India," BMC Public Health, vol. 13, no. 1, 2013.

27. A. Krishnan, B. Shah, V. Lal, D. K. Shukla, E. Paul, and S. K. Kapoor, "Prevalence of risk factors for non-communicable disease in a rural area of Faridabad district of Haryana.," Indian Journal of Public Health, vol. 52, no. 3, pp. 117–124, 2008.

28. A. Bhagyalaxmi, T. Atul, and J. Shikha, "Prevalence of risk factors of non-communicable diseases in a district of Gujarat, India," Journal of Health, Population and Nutrition, vol. 31, no. 1, pp. 78–85, 2013.

29. J. Prabakaran, N. Vijayalakshmi, and N. Ananthaiah Chetty, "Risk Factors of Non-Communicable Diseases in an Urban Locality of Andhra Pradesh," National Journal of Research in Community Medicine, vol. 2, no. 1, p. 28, 2013.

30. B. Everett and A. Zajacova, "Gender differences in hypertension and hypertension awareness among young adults," Biodemography and Social Biology, vol. 61, no. 1, pp. 1–17, 2015.

31. M. Priya and C. Mishra, "Prevalence of hypertension in an area of urban Varanasi, India and its association with selected demographic factors," International Journal of Community Medicine and Public Health, pp. 1600–1605, 2016.

32. J. F. Wamala, Z. Karyabakabo, D. Ndungutse, and D. Guwatudde, "Prevalence factors associated with hypertension in Rukungiri District, Uganda—a community-based study," African Health Sciences, vol. 9, no. 3, pp. 153–160, 2009.

33. A. Vimala, S. A. Ranji, M. T. Jyosna, V. Chandran, S. R. Matthews, and J. M. Pappachan, "The prevalence, risk factors and awareness of hypertension in an urban population of Kerala (South India)," Saudi Journal of Kidney Diseases and Transplantation, vol. 20, no. 4, pp. 685–689, 2009.

34. A. S. Ingale and J. V. Dixit, "Prevalence of hypertension, awareness & health seeking behaviour among adults residing in field practice area of urban health training centre, government medical college Aurangabad," National Journal of Community Medicine, vol. 8, no. 1, pp. 31–36, 2017.

35. S. S. Todkar, V. V. Gujarathi, and V. S. Tapare, "Period prevalence and sociodemographic factors of hypertension in rural Maharashtra: a cross-sectional study," Indian Journal of Community Medicine, vol. 34, no. 3, pp. 183–187, 2009.

36. J. Kishore, N. Gupta, C. Kohli, and N. Kumar, "Prevalence of hypertension and determination of its risk factors in rural Delhi," International Journal of Hypertension, vol. 2016, Article ID 7962595, 6 pages, 2016.