



HYPERTENSION - PREVALENCE AND RISK FACTORS IN CENTRAL INDIA: AN ADULT RURAL EXPERIENCE.

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ABSTRACT

Introduction: Hypertension is a major public health challenge to population in socioeconomic and epidemiological transition, for eg the rural population of India. Therefore this study was conducted to study the prevalence of hypertension and associated risk factors amongst adult rural population in central India.

Methodology: This community based cross-sectional study was conducted amongst the adult residents (≥ 30 years) of selected villages under PHC Raipur which is the rural field practice area of IGGMC Nagpur, located in central India. Sample size was estimated to be 219. A total of 222 subjects were selected by systematic random sampling method. Predesigned questionnaire was used to assess socio-demographic characteristics and elicit history regarding various risk factors, followed by anthropometric measurements. Blood pressure was recorded and classified according to JNC VIII.

Results: The prevalence of hypertension in the rural area under study in central India is 19.82% (95% CI 19.77-19.87). Age >45 years and modifiable risk factors like habit of smoking, alcohol consumption, increase salt intake, physical inactivity and overweight/obesity are significantly associated with hypertension.

KEYWORDS : "Hypertension", "Prevalence", "Risk Factors", "central India"

Introduction:

Hypertension is a chronic condition of concern due to its role in the causation of coronary heart disease, stroke and other vascular complications. It is one of the major risk factors for CVD mortality, accounting for 20-50% of all deaths.⁽¹⁾ More than 9 million deaths worldwide are due to complications of hypertension.⁽²⁾ As per WHO report, hypertension ranks fourth among highly prevalent diseases in the world.⁽³⁾

India is facing a dual burden of communicable and non-communicable diseases. Hypertension exerts a substantial public health burden on cardiovascular health status and healthcare systems in India.⁽⁴⁾ HTN is responsible for 24% of all coronary heart disease deaths and 57% of stroke deaths in India.⁽⁵⁾ The prevalence of hypertension in India is 159.46 per 1000 population (15.9%).⁽⁶⁾ The prevalence of hypertension is increasing because of changing lifestyle and environment, industrialization, urbanization and also due to population ageing.⁽⁷⁾ Exposure to the four main behavioural risk factors that contribute to NCDs - tobacco use, physical inactivity, harmful use of alcohol and unhealthy diets - remains high worldwide and is increasing in majority of low- and middle-income countries.⁽⁸⁾

Community surveys have documented that in a period of 3 to 6 decades, prevalence of hypertension has increased by about 30 times among the urban dwellers and by about 10 times among the rural inhabitants.⁽⁹⁾ Due to the socioeconomic and epidemiological transition taking place in rural India, hypertension is emerging and increasing in rural areas too. Prevalence and risk factor studies on hypertension needs to be conducted focusing especially on rural areas to have better insight into its burden and causation. Therefore this study was conducted to study the prevalence of hypertension and associated risk factors amongst a rural population in central India.

Methodology:

This community based cross-sectional study was conducted at the rural field practice area of IGGMC Nagpur, amongst the adult residents (≥ 30 years) of the selected study villages. The area covered under the PHC Raipur, Higna taluka, Nagpur district, located in central India, was the study setting for this study. There were a total of 5 sub-centers under PHC Raipur. The nearest sub-center was selected for the study, from which 2 village were selected purposively due to the proximity to the center and as majority of patients of hypertension coming to the center belonged to these villages. The population of the selected villages was approximately 3700. Assuming the prevalence of hypertension amongst rural population to be 19.04% (Kokiwar et al⁽¹⁰⁾), power=95%, $\beta=20\%$, sample size was calculated as 219. List of all the households was available at PHC. Therefore, using systematic random sampling method, every 5th house was selected from selected villages until sample size was achieved. All the individuals aged ≥ 30 years from

selected houses were included in the study. Any guest or members who were not resident of the study villages, were excluded from study. In such manner, total of 222 subjects were included in study. Informed consent was taken from the eligible individuals after explaining them nature and purpose of study.

Data was collected by interview technique using a predesigned proforma. The questionnaire assessed socio-demographic details and history pertaining to various risk factors like family history of hypertension, physical activity and unhealthy dietary habit exhibited by consumption of added salt. Status of smoking and alcohol was assessed as per the IDSP NCD risk factor survey classification.⁽¹¹⁾ If the subjects was indulging in atleast 30 minutes of moderate intensity activities, he/she was considered to be physically active.⁽¹²⁾ Weight and height was measured using standard guidelines⁽¹³⁾ to accuracy of 0.1 kg and 0.1 cm respectively. BMI was subsequently calculated and classified according to WHO International Classification of BMI into normal, overweight and obesity.⁽¹⁴⁾ Using an aneroid sphygmomanometer blood pressure was recorded, three readings were taken 5 minutes apart; final reading was the mean of second and third values. BP was classified according to JNC VIII criteria into normal, prehypertension and hypertension stage I and II.⁽¹⁵⁾

Statistical Analysis:

Data was entered and analyzed using statistical software EpiInfo 7.1.5.2. Descriptive statistics like mean (\pm SD), range, proportion, percentage and 95%CI was calculated. Odds Ratio & 95%CI was estimated and Chi square test of significance was applied to test the association of various risk factors with hypertension. P value < 0.05 was considered to be statistically significant.

Results:

Table 1: Socio-demographic characteristics of the subject

| Sr.No. | Characteristics | Proportion | Percent (%) |
|--------|------------------------|------------|-------------|
| 1 | Age (in years) | | |
| | 30-39 | 40 | 18.02 |
| | 40-49 | 70 | 31.53 |
| | 50-59 | 54 | 24.32 |
| | 60-69 | 37 | 16.67 |
| | >70 | 21 | 09.46 |
| 2 | Gender | | |
| | Male | 94 | 42.34 |
| | Female | 128 | 57.66 |
| 3 | Socio Economic Status* | | |
| | I | 14 | 06.31 |
| | II | 42 | 18.92 |
| | III | 109 | 49.01 |
| | IV | 57 | 25.67 |

*Modified Kuppuswamy classification of socio-economic status.

The socio-demographic characteristics of the subjects as depicted in Table 1. The mean age±SD (Range) was 50.16±12.47years (30–96) in subjects. Majority were females(57.66%) and belonging to SES class III.

Fig 1: Proportion of various risk factors in the subjects

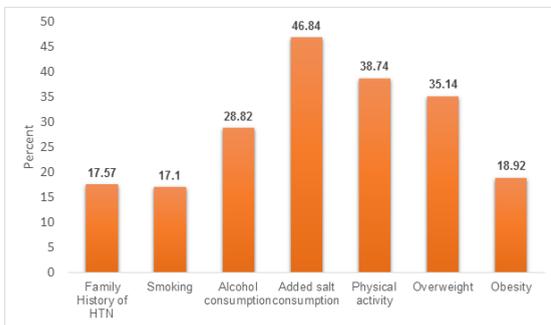


Figure 2 shows the magnitude of various risk factors present in subjects. Majority of subjects had habit of consuming added salt(46.84%), followed by low physical activity(38.74%), being overweight(35%), alcohol consumption(28.8%). Only 18-17% subjects had obesity, family history of HTN and smoking.

Table 2: Prevalence of hypertension according to JNC VIII.

| Blood Pressure Levels | Proportion | Percent (95% CI) |
|-----------------------|------------|------------------------------|
| Normal | 78 | 35.13 |
| Pre- Hypertension | 100 | 45.05 (45 - 45.10) |
| Hypertension | 44 | 19.82 (19.77 - 19.87) |
| Stage I | 22 | 9.91 |
| Stage II | 22 | 9.91 |

The mean systolic and diastolic BP + SD (Range) was 126.36 + 15.47 (90- 190)mmHg; and 82.13 + 9.59 (60- 120)mmHg respectively. Table 2 shows the prevalence of hypertension to be 19.82% with 95%CI to be 19.77 - 19.87. Prevalence of prehypertension is also high,45.05%. There were 9.91% subjects with each stage I and II hypertension.

Table 3: Association between hypertension and various risk factors.

| Sr. No | Variables | Hypertension | | OR (95%CI) | P value |
|--------|-----------------------|----------------|---------------|---------------|---------|
| | | Present No.(%) | Absent No.(%) | | |
| 1 | Age > 45 years | 91 (71.09) | 37 (28.91) | 1.901 | 0.023* |
| | ≤ 45years | 53 (56.38) | 41 (43.62) | (1.08 - 3.32) | |
| 2 | Gender | | | 1.28 | 0.38 |
| | Male | 64 (68.09) | 30 (31.91) | (0.73 - 2.24) | |
| | Female | 80 (62.50) | 48 (37.50) | | |
| 3 | Family/History | | | 1.00 | 0.85 |
| | Present | 24 (64.86) | 13 (35.14) | (0.47 - 2.09) | |
| | Absent | 120 (64.86) | 75 (35.14) | | |
| 4 | Smoking | | | 2.78 | 0.017* |
| | Yes | 31(81.58) | 7 (18.42) | (1.16 - 6.05) | |
| | No | 113 (61.41) | 71 (38.59) | | |
| 5 | Alcoholism | | | 1.93 | 0.04* |
| | Yes | 48 (75.00) | 16 (25.00) | (1.11-3.71) | |
| | No | 96 (60.76) | 62 (39.24) | | |
| 6 | Added Salt | | | 2.57 | 0.001* |
| | Yes | 79 (75.96) | 25 (24.04) | (1.44 - 4.59) | |
| | No | 65 (55.08) | 53 (44.92) | | |
| 7 | Low Physical Activity | | | 2.23 | 0.01* |
| | Yes | 65 (75.58) | 21 (24.42) | (1.22- 4.06) | |
| | No | 79 (58.09) | 57 (41.91) | | |
| 8 | BMI | | | 2.08 | 0.009* |
| | Overweight/Obese | 87 (72.50) | 33(27.50) | (1.18-3.64) | |
| | Normal | 57(55.88) | 45(44.12) | | |

*Significant

Table 3 shows association between hypertension and various risk factors. All factors under study except gender and family history was found to be statistically associated with hypertension. Overall, there is 2-3 times higher risk of having hypertension in presence of any of these risk factors, highest risk associated with smoking followed by consumption of added salt.

Discussion:

The present community based cross sectional study was conducted in a rural population, among adults resident of ≥30 years to determine the prevalence and risk factors for hypertension in this area. The study estimated the prevalence of hypertension as 19.82% (95%CI=19.77-19.87) and prehypertension 45.05% (95%CI=45-45.10) in the present rural area in central India. Similar prevalence of hypertension,19.04% was noted by Kokiwar etal⁽¹⁰⁾ in Nagpur,central India. IDSP-NCD risk factor survey 2007-2008 reported prevalence of hypertension as 26% and 45% for pre-hypertension in rural Maharashtra.⁽¹¹⁾ Various other similar studies conducted across India found prevalence of hypertension as 41.5%⁽¹⁶⁾(Uttarakhand), 33.3%⁽¹⁷⁾(Assam), 14.8%⁽¹⁸⁾(MP) 12.5%⁽¹⁹⁾(TN) & 4.5%⁽²⁰⁾(Haryana). When we conducted another study in urban area of Nagpur⁽²¹⁾, we found prevalence of prehypertension to be 52.6% which is slightly higher than the present study which studied prevalence in rural area of Nagpur.

This study also assessed presence of various non-modifiable and modifiable risk factors in subjects to check their association with hypertension. This study found risk factors like age >45 years, smoking, alcohol consumption, habit of using added salt, low physical activity and being overweight/obese to be associated with hypertension. Prevalence of hypertension was higher and significantly associated with age >45 years as compared to ≤ 45 years, consistent with many other studies.^(10,16,18) Age probably represents an accumulation of environmental influences and the effects of genetically programmed senescence in body systems.⁽²²⁾

There was no significant association between gender and hypertension in the current study, similar to the findings of Bansal SK etal⁽²³⁾, Pawar A etal⁽²⁴⁾. Family history of hypertension was not significant risk factor in this study, similar to findings of Bhadoria et al⁽¹⁵⁾; on the contrary, Saxena etal⁽²⁵⁾, Rajasekar etal⁽²⁰⁾ found significant association.

Significant association was seen between hypertension and habit of smoking and alcohol. This finding was supported by many authors^(18,25,26). Also increased salt intake in the form of added salt was found significantly associated with hypertension, similar to other studies.^(16,18,25) Association between hypertension and physical activity was found significant in current study, in concordance with result of Gupta SK etal⁽²⁷⁾ and Madhu B⁽²⁸⁾ etal. Physical activity reduces the risk of hypertension by not only controlling weight, but also by decreasing HDL cholesterol and maintaining glycaemic control.⁽²⁹⁾ Significant association was seen between hypertension and overweight/obesity, alike many others.^(10,16,18) Obesity causes hypertension by increasing systemic resistance by activating sympathetic nervous system; increasing insulin resistance and vascular dysfunction.⁽²⁹⁾

Conclusion:

The prevalence of hypertension in the rural area under study in central India is 19.82% (95%CI=19.77-19.87). Overall, 46.84% consumed extra salt, 38.74% were physically inactive, 35.14% were overweight and 18.92% obese, 28.82% consumed alcohol, 17.57% had family history of hypertension and 17.1% had habit of smoking. Age >45 years and modifiable risk factors like habit of smoking, alcohol consumption, increase salt intake, physical inactivity and overweight/obesity are significantly associated with hypertension.

Reference:

1. K. Park. Hypertension. In: K. Park, Park's textbook of Preventive and Social Medicine 23th edn. Jabalpur:Bhanot Publishers; 2014: 383
2. Revised draft: Global action plan for the prevention and control of non-communicable diseases: 2013-2020. World Health Organization. Geneva. 2008
3. The World Health Report 1998 - WHO Geneva, 1998.
4. Hypertension in India: A systematic review and meta-analysis of prevalence, awareness, and control of hypertension. Raghupathy A, Nanda KK, Hira P, Hassan K, Oscar HF, Emanuele DiA, Dorairaj P. Journal of Hypertension.2014; 32(6):1170-1177
5. Gupta R. Trends in hypertension epidemiology in India. J Hum Hypertens 2004; 18:73-78.
6. NPCDCS operational Guidelines. Ministry of Health & Family welfare. New Delhi,2011
7. Hypertension fact sheet, WHO Regional Office for South East Asia.
8. Noncommunicable Diseases Country Profiles. World Health Organization. Geneva,2011
9. Gupta R. Meta-analysis of prevalence of hypertension in India. Indian Heart J

- 1997;49:43-8.
10. Kokiwar PR, Gupta SS, Durge PM. Prevalence of hypertension in a rural community of central India. *J Assoc Physicians India*. 2012 Jun;60:26-9. PubMed PMID: 23409417.
 11. National Institute of Medical Statistics, Indian Council of Medical Research (ICMR). IDSP Non-Communicable Disease Risk Factors Survey, Phase-I States of India, 2007-08. Ministry of health and family welfare. New Delhi, India: National Institute of Medical Statistics and Division of Non-Communicable Diseases, Indian Council of Medical Research; 2009.
 12. WHO. Global Recommendations on Physical Activity for Health. Switzerland:WHO Press.WHO;2010.
 13. World Health Organization. WHO STEPS Surveillance. Part 3: Training and Practical Guides. Section 3: Guide to Physical Measurements (Step 2) [Internet]. 2008. Available from: http://www.who.int/chp/steps/Part3_Section3.pdf
 14. World Health Organization. WHO Global Database on Body Mass Index [Internet]. Available from: http://apps.who.int/bmi/index.jsp?introPage=intro_3.html
 15. James PA, Oparil S, Carter BL, Cushman WC, Dennison-Himmelfarb C, Handler J, et al. 2014 Evidence-Based Guideline for the Management of High Blood Pressure in Adults. Report from the panel members appointed to the Eight Joint National Committee (JNC 8). *JAMA*. 2013;EI-14.
 16. Bartwal J, Awasthi S, Rawat CM, Singh RK. Prevalence of hypertension and its risk factors among individuals attending outpatient department of rural health training centre, Haldwani. *JCH*. 2014;26(1):76-81
 17. Hazarika NC, Narain K, Biswas D, Kalita HC, Mahanta J. Hypertension in the native rural population of Assam. *Natl Med J India* 2004;17:300-4.15.
 18. Bhadoria AS, Kasar PK, Topo NA, Bhadoria P, Pradhan S, Kabirpanthi V. Prevalence of hypertension and associated cardiovascular risk factors in Central India. *Journal of Family and Community Medicine* 2014;21(1):29-38.
 19. Gilberts EC, Arnold MJ, Grobbee DE. Hypertension and determinants of blood pressure with special reference to socioeconomic status in a rural south Indian community. *J Epidemiol Community Health*. 1994;48:258-61.
 20. Malhotra P, Kumari S, Kumar R, Jain S, Sharma BK. Prevalence and determinants of hypertension in an un-industrialised rural population of North India. *J Hum Hypertens*. 1999;13:467-72.
 21. Nimiya J, Patil CR, Pedireddy AM. Prevalence And Associated Risk Factors For Pre-Hypertension Amongst Young Adults In Nagpur: A Community Based Cross-Sectional Study. *International Journal Of Scientific Research*. 2017;6(10):299-301
 22. National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents. The Fourth Report on the diagnosis, evaluation and treatment of high blood pressure in children & adolescents. *Pediatrics* 2004;114:555-75.
 23. Bansal SK, Saxena V, Kandpal SD, Gray WK, Walker RW, Goel D. The prevalence of hypertension and hypertension risk factors in a rural Indian community: A prospective door-to-door study. *J Cardiovasc Dis Res*. 2012;3(2):117-23.
 24. Pawar A, Shinde P, Annie J. Study Of Prevalence Of Hypertension In Rural Population Of Kerala. *Journal Of Evolution Of Medical And Dental Sciences*. 2014;1(6):1234-37
 25. Saxena P, Saxena V, Saxena Y. Bio-social Factors associated with Hypertension in Hilly population of Tehri Garhwal. *Indian J Community Health*. 2011;23(2):81-3.
 26. Rajasekar VD, Krishnagopal L, Mittal A, Singh Z, Purty AJ, Binu VS. Prevalence and risk factors for Hypertension in a rural area of Tamil Nadu, South India. *Indian J Med Specialties* 2012;3(1):12-7.
 27. Gupta SK, Dixit S, Singh AK, Nagaonkar S, Malik N. Prevalence and Predictors of Hypertension: A cross-sectional study among people coming to a tertiary health care facility in Garhwal-Uttarakhand. *Indian J Community Health*. 2012;24(4):274-9.
 28. Madhu B, Srinath KM, Ashok NC. Hypertension: Prevalence and its Associated Factors in Rural South Indian Population. *Indian J Public Health Res & Development*. 2012;3(4):105-9
 29. Torrance B, McGuire KA, Lewanczuk R, McGavock J. Overweight, physical activity and high blood pressure in children: a review of the literature. *Vascular Health and Risk Management* 2007;3(1):139-49.