Original Article

Uncontrolled hypertension in a rural population of Jammu and Kashmir

Priyadarshini Arambam [a], Rishabh Khashoo [b], Dhruv Tewari [b], Zubair Saleem [c], Sudhir Shekhawat [d], Upendra Kaul [e, *]

[a] General Manager Academics & Research, Batra Hospital and Medical Research Centre, New Delhi, India
[b] MBBS Intern, UCMS and GTB Hospital, Dilshad Garden, New Delhi, India
[c] Geriatric Medicine, JLNM Hospital, Srinagar, J&K, India
[d] Independent Consultant, Biostatistics, India
[e] Gauri Kaul Foundation, New Delhi, India

ABSTRACT

Aim: Evaluation of the status of uncontrolled hypertension in diagnosed hypertensives who had been advised drug treatment in the rural areas of 6 districts in Jammu & Kashmir (J&K) and also the risk factors associated with it.
Methods: The study was a cross-sectional observational study conducted between August 2020 to July 2021 in the form of health camps in six government health centres in 6 different rural districts. The camps were focussed on patients with hypertension, diabetes with or without heart disease. The areas included Machil in Kupwara, Khan Sahib in Budgam, Rajpora and Hawal in Pulwama, Rainawari in the Srinagar, Banihal in Ramban, and Jagti in Jammu.
Enrolled patients were examined for body weight, blood pressure (BP), random blood sugar and serum lipid profile. The definition of hypertension was as per the eighth Joint National Committee (JNC-8) guidelines.
Results: A total of 600 patients (50.1% males) were evaluated. Of these 335 (55%) had history of being diagnosed hypertension and had been recommended drugs for BP control Male: Female ratio 1:0.8.211(63.5%) of these had un controlled blood pressures on measurement.
Two or more drugs had been prescribed in 65 (30.8%) patients, 34 (16%) were taking only single drug and 112(53%) were not on any drug. Uncontrolled hypertension was seen more often in age group of 40–60 years (49%), subjects more than 60 years had it in 40%.
The comparison of risk factors between patients with diagnosed hypertension with those without it revealed use of tobacco, consumption of salted tea, presence of diabetes, dyslipidaemia as significant factors for the presence of uncontrolled hypertension.
Conclusion: Uncontrolled hypertension in known patients prescribed drugs is highly prevalent in the rural population of J&K. Steps to mitigate this problem are needed on top priority.

1. Introduction

High blood pressure is a leading risk factor for morbidity and mortality globally.[1] It is directly responsible for 57% of all stroke deaths and 24% of coronary heart disease (CHD) deaths.[2] In 2017, hypertension was the leading risk factor for vascular disease accounting for 218 disability-adjusted life years (DALY's), followed by smoking.[1] It often has no early symptoms and is referred to as a "silent killer".[3]

India has hypertension in 29% of its population[4] and the ratio of adults diagnosed and treated adequately is low,[5] especially in resource-poor settings like rural and remote areas. The prevalence varies significantly between urban (33.8%) and rural (27.6%)

* Corresponding author. Cardiology and Dean Academics and Research, Batra Hospital and Medical Research Center, 1. M B Road, Tughlakabad Institutional Area, New Delhi, 110062, India.
E-mail address: kaul.upendra@gmail.com (U. Kaul).

regions. The limited disease awareness of hypertension in 25% of rural and 35% of urban populations is an additional problem. In the union territory of Jammu & Kashmir (J&K), hypertension was found in 24.9% of males and 12.3% of females[6] It was reportedly higher in tribal population as it was found that tribals had a prevalence of 41.4%.[7] It is estimated that 874 million people worldwide had a systolic blood pressure of 140 or higher in 2015,[8] and by 2025, this number will reach 1.56 billion.[9] The enormity of the problem behoves optimal management of hypertension which can directly affect the mortality and morbidity of the population. In a study conducted in Nigeria, gender, age, number of drugs used, educational level, and presence of co-morbidities did not affect compliance. Major contributors (60%) were related to both patient's attitudes and beliefs and consultation failure on the part of patients. Lack of finances and side effects of medications accounted for 23.8% and 16.2% of non-compliances respectively.[10]

Dietary and personal habits, geographical constraints related to the place of residence, and occupational factors create risk factors for hypertension[11,12] undermining the importance of studying undiagnosed and undermanaged hypertension. Recently published literature has described the absolute prevalence of hypertension in several parts of India, but studies on adequacy of management of hypertension are lacking. Our study aims to ascertain the prevalence of uncontrolled hypertension in a population residing in rural areas of J and K which had been prescribed medications and identification of risk factors associated with it.

2. Material and Methods

Data was collected from 6 rural locations spread over the union territory of J &K). The areas included Machil and outskirts of Kupwara district, Khan Sahib in Budgam district, Rajpora and Hawal in Pulwama district, Rainawari in the Srinagar district, Banihal in Ramban district, Jagti township near Katra in Jammu. Medical camps were conducted over 1–2 days at these locations between August 2020 to July 2021.

The study had a cross-sectional design with data collection in pre-designed proforma developed by the medical research unit of our foundation. The analysis proforma had eight sections taking note of patient demographics, income, vital parameters, risk factors for cardiovascular diseases, current medications, lifestyle habits, previous investigations, and overall impression. All patients were examined for weight, blood pressure (B.P.), and random blood glucose (RBG). People of all age groups and both genders presenting to the PHC satisfying the eligibility criteria were enrolled. Each camp aimed at enrolling at least 100 eligible patients.

Inclusion Criteria:

1 Patients being treated for hypertension from govt health centers
2. Patients being treated for diabetes
3. Patients being treated for heart diseases.

Patients meeting any two of the three inclusion criteria were included in the study.

Exclusion criteria:

1. Patients with incomplete data of the main variables
2. Patients with decompensated heart failure
3. Patients on renal replacement therapy

Six hundred patients were enrolled through these six medical camps.

3. Definitions Used

Bodyweight was recorded on a digital weighing scale. Body mass index was calculated (in kg/m2). A BMI of 25–29.9 was taken as overweight, and BMI ≥30 kg/m2 was defined as obese.[13] History of tobacco was defined as cigarettes or chewing tobacco or both. Salted tea consumption was defined as noon chai more than 2 cups a day. All patients were allowed to rest for at least 5 min, and B.P. was recorded in the right arm in the sitting position. Blood pressure was measured using a table-top digital non-invasive blood pressure (NIBP) instrument. Circa Microlife Premier Exclusion. It is a reliable and clinically validated digital self-calibrating machine that calculates the average of three readings for accurate B.P. measurements. Blood pressure was categorized as normotensive, pre-hypertension, and hypertension as per the eighth joint national committee on prevention, detection, evaluation, and management of hypertension (JNC-8).[14] Random blood glucose was measured using a glucometer on a finger-prick blood sample. All patients also had a venous blood sample collected for lipid profile determination. Dyslipidaemia was defined as having total cholesterol >200 mg/dl, LDL >130 mg/dl), HDL<35 mg/dl, triglycerides >150 mg/dl according to the American Heart Association classification.[15]

4. Statistical Analysis

Descriptive analysis was performed on the collected data. Discrete variables were presented as numbers and percentages. The association of risk factors with a history of hypertension and increased blood pressure was evaluated using the Chi-square test or Fisher's exact test, whichever was applicable. A p-value of <0.05 was considered significant. All statistical data analysed were performed using IBM SPSS Statistics software version 22.

5. Results

Our study reveals that of the 600 patients whose data was complete 335 (55.8%) were diagnosed with hypertension who had been prescribed medicines. The district wise percentages of hypertensive subjects seen ranged from 58.9% to 69% and it was comparable in both Jammu and Kashmir areas respectively. From Kashmir valley, Kupwara (50, 60%), Pulwama (81,64%), Rainawari (29,62%), Budgam (62,67.8%). From Jammu area, Banihal (34,58.9%), Jagti (79,69%). The sex distribution was Male: Female ratio of 1.2 : 1.

The comparison of risk factors between patients with diagnosed hypertension with those without it revealed consumption of tobacco (25.3% vs 14.9%; P = 0.002) salted tea (Noon Chai) (12% vs 11%; p = 0.001), presence of diabetes (25% vs 15.3; p = 0.004), dyslipidaemia (36.4% vs 10.8%; p = 0.001) and presence of a stroke or a TIA (3.6% vs 0.4%; p = 0.013) had a significant corelation with the presence of uncontrolled hypertension. On the other hand, obesity (26.1% vs 24.1%), consumption of non-vegetarian diet (47.0% vs 55.6%), low physical activities (47% vs 53.4%) had no correlation. Alcohol consumption and chronic kidney disease was present in very small numbers in the studied population.

Uncontrolled hypertension was seen more often in ages of 40–60 years (49%), subjects more than 60 years had it in 40%. Of the patients prescribed 2 or more drugs, only 65 (30.8%) were taking it, while only one drug was being taken by 34 (16.1%) of them. 112 patients (53.1%) were not on any drugs despite being recommended drug treatment (Table 1).

There were 76 patients with proven coronary artery disease with or without heart failure. Of these 61% had hypertension. On the other hand, of the 18 patients with valvular heart disease only 33% had hypertension (Table 1).

Table 1
Hypertension details in the enrolled patients.

Hypertension details	Numbers (N)	Percentage (%)
Past history of hypertension	335/600	55.3
Raised office BP noted	211/335	63.6
Two or more Anti-hypertensives	65/211	30.8
Single oral antihypertensive drug	34/211	16.1
No oral antihypertensive drug	112/211	53.1
Age group of patients with Raised office BP		
• >60 years	86/211	40.7
• 40—60 years	104/211	49.2
• < 40 years	21/211	10.1
Hypertension and other cardiac disease		
• Coronary heart disease	45/73	61.7
• Valvular heart disease	6/18	33.3

Abbreviations: BP=Blood pressure.

6. Discussion & Conclusion

Our study evaluated a rural population of 6 districts of J&K. The prevalence of uncontrolled hypertension was seen in 63% of this population. The highest incidence of raised office B.P. was seen in the age group of 40—60 (49%), followed by the participants above the age group of 60 (40%). Of the patients prescribed 2 or more drugs, only 65 (30.8%) were taking it, while only one drug was being taken by 34 (16.1%) of them while 112 (53.1%) were not on any drugs despite being recommended drug treatment.

The high prevalence of uncontrolled hypertension suggests that a number of cardiovascular complications can be prevented by improved blood pressure control. Hypertension control reduces the risk of stroke by 30%, coronary heart disease by 10%—20% congestive heart failure by 40—50% and total mortality by 10%.[16] According to the latest AHA guidelines, all patients with a systolic blood pressure $\geq$160 mmHg or diastolic blood pressure $\geq$100 mmHg should be treated with a combination of at least 2 antihypertensive agents.[17]

The comparison of risk factors between patients with diagnosed hypertension with those without it revealed tobacco use and consumption of salted tea, presence of diabetes, dyslipidaemia had a significant corelation with the presence of uncontrolled hypertension.

Consumption of tobacco was seen in 25% of the population and it was strongly associated with un controlled hypertension in the studied population (p = 0.002). Heavy smoking, especially in older men, is associated with elevated SBP.[18] These results are compatible with effects expected in chronic atherogenesis of large capacitance vessels with which smoking is associated and produces isolated systolic hypertension.[19]

Obesity, which was present in almost one quarter of our population, is a well-established risk factor for hypertension but it being present in almost same proportion in non-hypertensives did not attain a statistical significance. According to the Framingham study, people with the highest body mass quartile had a 16 mmHg higher systolic blood pressure and a 9 mmHg higher diastolic blood pressure than persons with the lowest BMI quartile.[19] The Nurses' health study suggests that obesity may be responsible for about 40% of hypertension.[20]

Dyslipidaemia, which represents 36% is a known and robust predictor of cardiovascular disease.[21] It is responsible for endothelial dysfunction,[22] which may manifest as increased blood pressure. Our study is in agreement with this. Prevalence of diabetes mellitus was seen in a significantly higher population in the hypertension group 83 (25%) as compared to the non-hypertension group 41(14%). This is an accepted association with hypertension being reported in 20%—40% of diabetics.[23]

We observed that nearly 50% of the population consume non-vegetarian diet in J& K is significant. Red meat is associated with an increased risk of developing hypertension.[24] This association did not assume significance possibly because of high meat consumption in 64% of the population which also included persons without hypertension and belonged to the valley. Banihal and Jagti township were the only areas from Jammu region in our study which has lower consumption of meat.

This study can considerably impact the optimization of the management of pre-diagnosed hypertensives in rural milieu of India. According to studies, the prevalence of hypertension was found to be around 24.9% in males and 12.3% in females.[25] Treating hypertension can be an arduous task in a rural or tribal population where people generally consider taking medications only when they have symptoms which could also be a possible explanation as to why tribals had higher prevalence of hypertension in the valley.[26] Clinical hypertension, which can remain asymptomatic for years, can be challenging to follow up in such a population. A recent study from North India has also highlighted the prevalence of uncontrolled hypertension in 46.2% with several risk factors which have many things common with our observations.[27] Our study in rural areas of J&K had an even higher prevalence of 63.5%.

Prevalence of participants consuming salted tea more than 2 cups daily was seen much higher in hypertension group 277(83%) as compared to the non-hypertension group 192(71%). The local dietary practice of people of the Kashmir valley of non-vegetarian diet and consuming salted tea, which has high content of sodium in each cup, further contributes to hypertension. In addition to the well-accepted fact that dietary sodium leads to increased B.P., it is also independently associated with an increased risk of CVD[28] and stroke.[29] Nearly 83% of study participants having history of hypertension consumed salted tea each day. Educating patients to limit the consumption of salted tea as a part of dietary modification, increasing dietary fibre intake, and lowering the intake of red meat, trans fatty acids and saturated fats can significantly lower blood pressure.[28]

Out of 73 participants with coronary heart disease with or without heart failure, 45(61%) had hypertension, and 6(33%) out of 18 patients with valvular heart diseases had hypertension. Hypertensive heart disease is responsible for roughly one-fourth of all causes of heart failure. According to the Framingham Heart Study, hypertension has a 2-fold increase in the development of heart disease leading to heart failure in men and a 3-fold increase for women when adjusted for specific risk factors and age. The SPRINT trial also demonstrated a reduced risk of progression to heart failure in patients with more intensive blood pressure control with a target systolic blood pressure of 120 mmHg (1.3%) compared with 140 mmHg (2.1%). Proper management of hypertension correlates with a 64% reduction in the development of heart failure.[30]

We conclude that uncontrolled hypertension in known patients prescribed drugs is highly prevalent in the rural population of J & K. This seems to be an important cause of the reportedly increasing vascular events, heart failure and chronic kidney disease. Reasons could be several including lack of motivation, non-affordability, side effects and non -availability of drugs. Authorities need to take cognition of this phenomenon and take steps to improve management strategies.

7. Strengths and limitations of the study

All the patients included were diagnosed subjects with hypertension and had been prescribed drugs for treatment in the government health centres and were visiting PHC's only for follow up. This gives us the information that in spite of being advised treatment more than 60% had uncontrolled hypertension. There was no

gender bias since females constituted 45% of the population of hypertensives.

A limitation of our study is that we cannot rule out the effect of white coat hypertension. Since measurements were done on a single day though taking all the precautions including taking a mean of 3 readings. White coat hypertension is defined as elevated blood pressure readings in a clinical setting as compared to home BP measurement. It has been reported in up to 12% subjects even with measurements on two different days.[31] Similar reports are there in the literature with 10—15% of the population having it and can be a potential confounder.[32]

References

1. Stanaway JD, Afshin A, Gakidou E, et al. Global, regional, and national comparative risk assessment of 84 behavioral, environmental and occupational, and metabolic risks or clusters of risks for 195 countries and territories, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet*. 2018;392(10159):1923—1994.
2. Gupta R. Trends in hypertension epidemiology in India. Journal of human hypertension. *J Hum Hypertens*. 2004;18(2):73—78.
3. Sawicka K, Szczyrek M, Jastrzębska I, et al. Hypertension — the silent killer. *J Pre Clin Clin Res*. 2011;5(2):43—46.
4. Anchala R, Kannuri NK, Pant H, et al. Hypertension in India: a systematic review and meta-analysis of prevalence, awareness, and control of hypertension. *J Hypertens*. 2014;32(6):1170—1177.
5. Prenissl J, Manne-Goehler J, Jaacks LM, et al. Hypertension screening, awareness, treatment, and control in India: a nationally representative cross-sectional study among individuals aged 15 to 49 years. *PLoS Med*. 2019;16(5), e1002801.
6. Bhat RA, Laway BA, Zargar AH. Prevalence of metabolic syndrome in Kashmir valley of the Indian subcontinent. *Indian J Med Sci*. 2010;64(6):259—264.
7. Ganie MA, Parvez T, Viswanath SA, et al. Prevalence, pattern & correlates of hypertension among tribal population of Kashmir, India: a cross-sectional study. *Indian J Med Res*. 2021;154(3):467—475.
8. Stanaway JD, Afshin A, Gakidou E, et al. Global, regional, and national comparative risk assessment of 84 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990-2016: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet*. 2017;390(10100): 1345—1422.
9. Bell K, Candidate P, Olin BR. *Hypertension: The Silent Killer: Updated JNC-8 Guideline Recommendations*. Alabama Pharmacy Association; 2015:1—8.
10. Amira CO, Okubadejo NU. Factors influencing non-compliance with anti-hypertensive drug therapy in Nigerians. *Niger Postgrad Med J*. 2007;14(4): 325—329.
11. Grillo A, Salvi L, Coruzzi P, et al. Sodium intake and hypertension. *Nutrients*. 2019;11(9):1970.
12. Lee KW, Loh HC, Ching SM, et al. Effects of vegetarian diets on blood pressure lowering: a systematic review with meta-analysis and trial sequential analysis. *Nutrients*. 2020;12(6):1604.
13. Cornier MA, Després JP, Davis N, et al. *Assessing Adiposity. Circulation*. 2011;124(18):1996—2019.
14. James PA, Oparil S, Carter BL, et al. Evidence-based guideline for the management of high blood pressure in adults: report from the panel members appointed to the eighth joint national committee (JNC 8). *JAMA*. 2014;311(5): 507—520, 2014.
15. Kavey R-EW, Daniels SR, Lauer RM, et al. American Heart Association guidelines for primary prevention of atherosclerotic cardiovascular disease beginning in childhood. *Circulation*. 2003;107(11):1562—1566.
16. Psaty BM, Lumley T, Furberg CD, et al. Health outcomes associated with various antihypertensive therapies used as first-line AgentsA network meta-analysis. *JAMA*. 2003;289(19):2534—2544.
17. Unger T, Borghi C, Charchar F, et al. International society of hypertension global hypertension practice guidelines. *Hypertension*. 2020;75(6):1334—1357, 2020.
18. Primatesta P, Falaschetti E, Gupta S, et al. Association between smoking and blood pressure: evidence from the health survey for england. *Hypertension*. 2001;37(2):187—193.
19. Higgins M, Kannel W, Garrison R, et al. Hazards of obesity-the Framingham experience. *Acta Med Scand Suppl*. 1988;723:23—36.
20. Huang Z, Willett WC, Manson JE, et al. Body weight, weight change, and risk for hypertension in women. *Ann Intern Med*. 1998;128:81—88.
21. Anderson KM, Castelli WP, Levy D. Cholesterol and mortality: 30 Years of follow-up from the Framingham study. *JAMA*. 1987;257:2176—2180.
22. Nickenig G, Harrison DG. The AT1-type angiotensin receptor in oxidative stress and atherogenesis. *Circulation*. 2002;105:530—536.
23. Abdissa D, Kene K. Prevalence and determinants of hypertension among diabetic patients in jimma university medical center, southwest Ethiopia, 2019. *Diabetes Metab Syndr Obes*. 2020;13:2317—2325.
24. Schwingshackl L, Schwedhelm C, Hoffmann G, et al. Food groups and risk of hypertension: a systematic review and dose-response meta-analysis of prospective studies. *Adv Nutr*. 2017;8:793—803.
25. Bhat RA, Laway BA, Zargar AH. Prevalence of metabolic syndrome in Kashmir valley of Indian subcontinent. *Indian J Med Sci*. 2010 Jun 1;64(6):259—264.
26. Ganie MA, Parvez T, Viswanath SA, et al. Prevalence, pattern & correlates of hypertension among tribal population of Kashmir, India: a cross-sectional study. *Indian J Med Res*. 2021 Sep 1;154(3):467—475.
27. Kapoor Mayank, Dhar Minakshi, et al. Factors responsible for uncontrolled hypertension in the adults over 50 years of age: a pilot study from northern India. *Indian Heart J*. 2021;73:644—646.
28. Moore TJ, Conlin PR, Ard J, et al. DASH (dietary approaches to stop hypertension) diet is effective treatment for stage 1 isolated systolic hypertension. *Hypertension*. 2001;38:155—158.
29. Strazzullo P, D'Elia L, Kandala NB, et al. Salt intake, stroke, and cardiovascular disease: meta-analysis of prospective studies. *BMJ*. 2009;339:b4567.
30. Fuchs FD, Whelton PK. High blood pressure and cardiovascular disease. *Hypertension*. 2020;75:285—292.
31. Kaul U, Omboni S, Arambam P, et al. Blood pressure related to age: the India ABPM study. *J Clin Hypertens*. 2019;21:1784—1794.
32. Huang Y, Huang W, Mai W, et al. White-coat hypertension is a risk factor for cardiovascular diseases and total mortality. *J Hypertens*. 2017;35:677—688.