Failure to achieve goal blood pressure and its associated factors among hypertensive patients registered in a primary health centre in South India

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Abstract

Introduction: Uncontrolled blood pressure (BP) among hypertensive patients leads to life-threatening complications, hospitalization, and premature mortality. Knowledge on the burden of uncontrolled BP and its correlates will help in devising strategies to achieve goal BP. We aimed to determine the proportion who have not achieved goal BP and its associated factors among hypertensive patients in a Primary Health Centre (PHC). **Materials and Methods:** A facility-based cross-sectional analytical study was conducted among the hypertensive patients attending chronic disease clinic of PHC at Ramanathapuram, Puducherry. BP was measured and goal BP was defined based on Joint National Committee-8 criteria. The interview was conducted using semi-structured questionnaire capturing sociodemographic details, behavioral characteristics, physical activity with the International Physical Activity Questionnaire (IPAQ), medication adherence with Morisky Medication adherence scale-8 (MMAS-8), and stress with perceived stress scale. The data were entered and analyzed using EpiData software. The proportion "not achieved goal BP" was expressed as percentage and association were measured using prevalence ratios (PRs) with 95% confidence interval (CI). **Results:** Of total 259 hypertensives studied, 140 (54.1%) were aged above 60 years, and 161 (62.2%) were females. Overall, 63 (24.3%) participants had not achieved goal BP. On univariate analysis, individuals aged 45–59 years (PR-2.1 [95% CI: 1.4–3.4]), being male (PR-1.6 [95% CI: 1.1–2.4]) and employed (PR-2.0 [95% CI: 1.1–3.5]) were associated with not achieving goal BP. **Conclusion:** One-fourth of patients treated for hypertension in PHC failed to achieve goal BP. Considering the consequences of uncontrolled BP, cost-effective, context-specific interventions at the primary health-care level are needed.

Keywords: Disease management, hypertension, Joint National Committee-8 guidelines, primary health care, uncontrolled blood pressure

Introduction

The World Health Organization in its Global Health Risks (2009) report, estimated high blood pressure (BP) to be the leading risk factor for mortality accounting for 9.4 million deaths every year.[1] Raised BP is the most prevalent and important treatable cardiovascular risk factor.[2] It contributes to 45% of deaths due to heart disease and 51% of deaths due to stroke.[1,3] Globally, about 45% of adults aged 25 years and above are estimated to be hypertensive. Over the years, the prevalence of hypertension has shown an upward trend as it rose from 600 million in 1980 to 1 billion in 2008.[4] India with an estimated prevalence of 29.8% among the adults, accounts for about 20% of the global burden of hypertension.[5]

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According to rule of halves, only 50% of the hypertensive patients are diagnosed, of the diagnosed only 50% are put on treatment and of this only 50% have their BP controlled. Achieving BP control is essential to avert the complications such as hemorrhagic stroke, kidney failure, hypertensive retinopathy, and cardiac failure.[6] The management of hypertension focus on reducing the untoward life-threatening complication through appropriate BP control. Well-controlled BP in hypertensive leads to 40% reduction in risk of stroke and 15% in risk of myocardial infarction.[3] In spite of these benefits, the studies have reported high prevalence (42%–89%) of uncontrolled BP among the treated hypertensive patients.[5,7] There is need to explore the burden of uncontrolled hypertension and also determine the factors contributing to failure in achieving the target BP.

National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular diseases and Stroke in India emphasize on managing individuals with hypertension at primary health-care (PHC) level. In India, the majority of the hypertensive patients are being currently managed at PHCs.[8] Only those with comorbid conditions requiring specialist care are referred and managed at higher levels. Knowledge on the burden and determinants of the not achieving target BP will help in devising the feasible strategies at PHC level. This would eventually reduce the untoward complications, the need for referral and financial burden on the patient. Hence, we conducted a study to determine the proportion who have not achieved goal BP and its associated factors among hypertensive patients in a Primary Health Centre (PHC).

Materials and Methods

Study design and setting

During April 2016, a facility-based cross-sectional study was conducted among patients with hypertension seeking healthcare from chronic disease clinic, Rural Health Centre (RHC), Ramanathapuram. The RHC is a PHC located in Puducherry, India and is 16 kilometers away from the Puducherry main town. It is attached to a tertiary care research institute and involved in delivering PHC in close coordination with the Government of Puducherry. It caters to the health needs of 9852 individuals residing in four sociodemographically and economically similar villages, namely, Ramanathapuram, Thondamanatham, Thuthipet, and Pillayarkuppam. Majority of people are dependent on agriculture for living as is the scenario in most of the Indian villages. People here mainly depend on RHC for their health needs. RHC, Ramanathapuram provides round the clock health services which include outpatient department services from 9 am to 4.30 pm and emergency services in remaining hours. Special clinics for chronic diseases Antenatal care and Well Babycare are scheduled on Wednesday, Thursday, and Friday, respectively. The study was carried out among patients attending chronic disease clinic at RHC, Ramanathapuram. Patients with at least one chronic disease condition such as hypertension, diabetes mellitus, coronary heart disease, rheumatic heart disease, asthma, thyroid disorders, epilepsy, and psychiatric disorders are registered in chronic disease clinic. A total of 537 patients with

chronic diseases are divided into batches of around 130, and each batch visits RHC for consultation and follow-up once in a month. Consultation, drugs for 28 days and necessary laboratory services are provided free of cost during this monthly follow-up visits. Patients are reviewed every Wednesday by trainee doctors under the supervision of medical officer in charge of RHC. During each monthly visit, the details on management are updated in the comprehensive patient case sheets by attending medical doctor. The patients are advised regarding the need for regular follow-up visits and lifestyle modifications to combat noncommunicable disease. The pharmacist educates patients regarding dose and regimen of the prescribed medication to be followed during the next 4 weeks.

Study population

We included all the patients with hypertension who are registered and attending chronic disease clinic at RHC, Ramanathapuram during April 2016 and had received drugs for at least past 4 weeks. The patients were interviewed after obtaining an informed consent during their visit to chronic disease clinic.

Study tool and Study variables

Pretested, semi-structured interview schedule was used to collect information. The interview schedule had three components sociodemographic details, details of treatment received, comorbidities, adherence to medication, physical activity, and stress. The component of socio-demographic details included age, gender, education, occupation, marital status, family type, and also lifestyle behaviors such as added salt intake, alcohol use, and tobacco use. The treatment details had variables such as type of morbidity, duration of treatment, number and dosage of drugs received, and regularity in attending health facility. The details of treatment received were extracted from patient case sheets. Adherence to medication was captured with the eight-item Morisky MMAS-8 which has eight questions and was graded as low adherence, moderate adherence, and good adherence. MMAS-8 is validated in India and other parts of the world in different languages with reliability value (α) of 0.83.[9-11] Psychological stress was captured with perceived stress score (PSS) which has ten questions, and each question has score ranging from 0 to 4.[12] Physical activity was captured with the IPAQ short form which has seven questions and metabolic equivalent of task (MET)-minutes will be calculated using the formula given with IPAQ.[13,14]

The questions were translated and back-translated to Tamil and English respectively by two separate bi-linguistic persons for content verification. The interview schedule was administered by trained MBBS interns who were well versed in the local language (Tamil). BP was measured twice with a minimum gap of 2 min using sphygmomanometer and mean of two readings was recorded.

Operational definitions

Failure to achieve goal BP: This was defined as per Joint National Committee-8 (JNC-8) guidelines. The individuals aged >60 years

with BP ≥150/90 and individuals aged <60 years or with coexisting diabetes with BP ≥140/90 were considered to have failed to achieve goal BP.[15]

Adherence to medication: Patients having a score of 8 were considered to have good adherence. Patients with scores of 6–7 were considered to have moderate adherence. Patients with scores of <6 were considered to have low adherence.[16]

Number of drugs: Total number of different drugs that the patient has been prescribed by attending medical doctor to consume per day.

Physical activity: Physical activity was considered as adequate if MET-minute >3000 and inadequate if MET-minute is ≤3000.[14]

Stress: If PSS score >20, it considered as "patient having stress" and if <20 then it considered has not having stress.[12]

High salt intake: Any added salt intake in the form of pickle, papad, or table salt.

Regularity: Patient was irregular who missed chronic disease clinic for 2 or more times in the last 6 months.

Statistical methods

Data were entered into EpiData version 3.1 and was analyzed using EpiData analysis version 2.2.2.182. Continuous data such as age, duration of disease, number of drugs received and scores of MMAS, PSS, and IPAQ were converted into categorical data. All the categorical data were presented as percentages. Association between BP control and categorical variables such as age group, gender, education status, occupation, duration of disease, dosage and number of drugs, physical activity, stress, salt intake, and medication adherence was tested using prevalence ratios (PRs) with 95% confidence interval (CI).[17]

Results

There were 302 hypertensive patients registered in chronic disease clinic. Of these, 32 patients had not attended the clinic for >6 months, and information of 11 patients was incomplete. Hence, 259 patients were included for analysis. Among 259 patients, 140 (54.1%) were aged >60 years and mean (standard deviation) age was 60 (12) years. Of the total, 161 (62.2%) were women, 146 (56.4%) participants had no formal education, and 97 (37.5%) were employed. Sociodemographic characteristics of study participants are described in Table 1.

The median duration of hypertension was 4 (IQR–2–7) years, and 87 (33.6%) patients had hypertension for >5 years. Of the 259 participants, 109 (41.2%) had concurrent diabetes. Of the total, 139 (53.7%) patients were on single-drug therapy. Of the total participants, 163 (62.9%) had good adherence to treatment, and 73 (28.2%) were attending clinic irregularly. Around 120 (46.3%) had stress, and 80 (30.9%) reported adequate

Table 1: Sociodemographic and clinical characteristics of hypertensive patients registered at a rural primary health centre, south India, 2016 (*n*=259)	
Characteristics	**Frequency (%)**
Age (years)	
30-44	29 (11.2)
45-59	90 (34.7)
≥60	140 (54.1)
Gender	
Male	98 (37.8)
Female	161 (62.2)
Education (years of schooling)	
No formal education	146 (56.4)
1-8	75 (29.0)
≥8	38 (14.6)
Occupation	
Unemployed	80 (30.9)
Employed	97 (37.5)
Home maker	82 (31.7)
Duration of hypertension (years)	
<1	40 (14.4)
1-5	132 (51.0)
>5	87 (33.6)
Presence of diabetes	
Yes	109 (42.1)
No	150 (57.9)
Regularity in clinic visit*	
Regular	186 (71.8)
Irregular	73 (28.2)

*Patient was considered as irregular if he/she has missed chronic disease clinic visit for 2 or more times in last 6 months

physical activity. The participant's lifestyle characteristics and medication adherence are described in Table 2.

Overall, 63 (24.3%. 95% CI = 19.3%–30.1%) participants had not achieved goal BP. On univariate analysis, individuals aged 45–59 years (PR-2.1 [95% CI: 1.4–3.4]), being male (PR-1.6 [95% CI: 1.1–2.4]) and employed (PR-2.0 [95% CI: 1.1–3.5]) were associated with not achieving goal BP. The association between the individual characteristics and not achieving target BP is depicted in Tables 3 and 4.

Discussion

The current study conducted among hypertensive patients registered in chronic disease clinic of PHC showed that one out of four had failed to achieve goal BP. Male gender, age between 45 and 59 years and being employed were found to be associated with not achieving target BP.

Previous studies from different settings have reported the proportion of uncontrolled hypertension ranging from 42% to 89%.[8,16,18-20] However, in the current study, we found relatively lower proportion (23.4%) of hypertensive patients with uncontrolled BP. The difference in the estimate from the previous studies may be due to the difference in study

Table 2: Lifestyle characteristics and medication adherence among hypertensive patients registered at a rural primary health centre, south India, 2016 (*n*=259)	
Characteristics	n (%)
Number of antihypertensive drugs	
One	139 (53.7)
Two	110 (42.5)
Three or more	10 (3.9)
Alcohol use in past 1 month	
Yes	17 (6.6)
No	242 (93.4)
Tobacco use in past 1 month	
Yes	14 (5.4)
No	245 (94.6)
Physical activity (IPAQ* scale)	
Adequate PA (METs >3000)	80 (30.9)
Inadequate PA (METs <3000)	179 (69.1)
High salt intake†	
Yes	101 (39.0)
No	158 (61.0)
Psychological stress‡	
Yes (PSS score >20)	120 (46.3)
No (PSS score <20)	139 (53.7)
Medication adherence (MMAS§ scale)	
Good (score 8)	163 (62.9)
Moderate (score 6-8)	62 (23.9)
Poor (score <6)	34 (13.2)

*Physical activity was considered as adequate if MET-minute more than 3000, †Any added salt intake in form of pickle, papad, or table salt, ‡Patient was considered to be psychologically stressed if (PSS) score was more than 20, §Adherence to medication was classified according to MMAS-8 user guidelines. IPAQ: International Physical Activity Questionnaire; PSS: Perceived Stress Scale; MMAS-8: Morisky Medication Adherence Scale; PA: Physical activity; MET: Metabolic equivalent of task

Table 3: Association of sociodemographic and clinical characteristics with uncontrolled blood pressure status among hypertensive patients registered at a rural primary health centre, south India, 2016 (*n*=259)			
Characteristics	Total, *n*=259	Uncontrolled BP*, (*n*=63)	Unadjusted PR (95% CI)
Age (years)			
30-44	29	6 (20.7)	1.2 (0.5-2.6)
45-59	90	33 (36.7)	2.1 (1.4-3.4)
≥60	140	24 (17.1)	1
Gender			
Male	98	31 (31.6)	1.6 (1.1-2.4)
Female	161	32 (19.9)	1
Education (years)			
No formal education	146	31 (21.2)	1
1-8	75	22 (29.3)	1.4 (0.9-2.2)
≥8	38	10 (26.3)	1.2 (0.7-2.3)
Occupation			
Unemployed	80	13 (16.3)	1
Employed	97	31 (32.0)	2.0 (1.1-3.5)
Home maker	82	19 (23.2)	1.4 (0.8-2.7)
Duration (years)			
<1	40	12 (30.0)	1.5 (0.8-2.7)
1-5	132	33 (25.0)	1.2 (0.7-2.0)
>5	87	18 (20.6)	1
Presence of diabetes			
Yes	109	32 (29.4)	1.4 (0.9-2.2)
No	150	31 (20.7)	1
Regularity in clinic visit			
Regular	186	45 (24.2)	1
Irregular	73	18 (24.6)	1.0 (0.6-1.6)

*Uncontrolled blood pressure-individuals aged more than 60 years with BP ≥150/90 and individuals aged<60 years or with coexisting diabetes with BP ≥140/90 were considered to have uncontrolled BP. PR: Prevalence ratio; CI: Confidence interval; BP: Blood pressure

settings. All the previous studies were either community based or conducted among hypertensive patients seeking care from tertiary healthcare facilities. While community-based studies may include hypertensive patients seeking care from different healthcare providers, tertiary care hospitals mainly cater to patients with complications and other comorbidities. In both these scenarios, the proportion of uncontrolled hypertensive may turn out to be high. In contrast, the current study setting is one of the well-performing PHCs functioning under a teaching medical institute. The patients receive individualized care from doctors trained in standard operating procedures developed as per contemporary JNC guidelines. Furthermore, the majority of the patients seek care regularly and are adherent to medications as assessed in the current study.

In the current study, we attempted to identify the factors associated with not achieving goal BP. Previous studies had reported male gender, elderly age group, employed, coexisting diabetes, tobacco use, and poor adherence to treatment to be associated with uncontrolled BP.[5,21-23] Similar associations were found in the current study with respect to gender and employment status. In the current study, age between 45 and 59 years was associated with uncontrolled BP in contrast to previous studies. This difference may be due to confounding by employment status and gender. There was no association between coexisting diabetes, tobacco use, and poor adherence to treatment. Although the proportion of people with uncontrolled BP was relatively higher among those with poor adherence and those having diabetes, it was not statistically significant. This may be due to lower sample size in the current study.

This study has few strengths: First, the study had high response rate (93%). Second, we used standard guidelines for assessing BP and also defined the failure to achieve goal BP as per JNC-8 guidelines. Third, we included all the independent variables with relevance to BP control and followed standard definitions and instruments (IPAQ 7, MMAS-8, PSS scale) to define these variables. Finally, quality-assured data entry was done using the EpiData software. The study had few limitations. The study had a low sample size because of which multivariate analysis could not be carried out. Quantitative measurement of salt intake which is an important factor in BP control was not done. As this study was carried out in a PHC functioning under a tertiary medical hospital and college, the results may not be generalized to the other PHCs.

Since the proportion of hypertensive patients without adequate BP control may differ based on the treatment setting, the

Table 4: Association lifestyle characteristics and medication adherence with uncontrolled BP status among hypertensive patients registered at a rural primary health centre, south India, 2016 (*n*=259)

Characteristics	Total, (*n*=259)	Uncontrolled BP, (*n*=63)	Unadjusted PR (95% CI)
No of antihypertensive drugs taking			
One	139	30 (21.6)	1
Two	110	29 (26.4)	1.2 (0.7-1.9)
Three or more	10	4 (40)	1.8 (0.8-4.2)
Alcohol use			
Yes	17	4 (23.5)	1.0 (0.4-2.3)
No	242	59 (24.3)	1
Tobacco use			
Yes	14	3 (21.4)	0.9 (0.3-2.4)
No	245	60 (24.4)	1
Physical activity*			
Adequate PA (METs >3000)	179	43 (24.0)	1.0 (0.6-1.4)
Inadequate PA (METs <3000)	80	20 (25)	1
Added salt intake†			
Yes	101	20 (19.8)	0.7 (0.5-1.2)
No	158	43 (27.2)	1
Presence of stress‡			
Yes (PSS score >20)	120	28 (23.3)	0.9 (0.6-1.4)
No (PSS score <20)	139	35 (25.2)	1
Medication adherence§			
Good (score 8)	163	48 (25.8)	1
Moderate (score 6-8)	62	12 (19.4)	0.8 (0.4-1.3)
Poor (score <6)	34	9 (26.5)	1.0 (0.6-1.9)

*Physical activity was considered as adequate if MET-minute more than 3000, †Any added salt intake in form of pickle, papad, or table salt, ‡Patient was considered to be psychologically stressed if (PSS) score was more than 20, §Adherence to medication was classified according to MMAS-8 user guidelines. PSS: Perceived Stress Scale; PR: Prevalence ratio; CI: Confidence interval; BP: Blood pressure; MMAS-8: Morisky Medication Adherence Scale; PA: Physical activity; MET: Metabolic equivalent of task

proportion of patients with poor BP control should be included as an indicator to monitor the performance of chronic disease clinics. This will help in identifying specific groups at risk of uncontrolled BP and providing specific interventions to them. This study also highlights the need to explore the reasons due to which the male gender was predisposed to poor BP control. Higher proportion of employed individuals had uncontrolled BP in this study; it is imperative to target this group through workplace interventions such as stress reduction activities, healthy workplace environment, periodic health camps, and health education sessions.

Conclusion

One-fourth of patients treated for hypertension in PHC failed to achieve goal BP. Considering the consequences of uncontrolled BP, cost-effective, context-specific interventions at PHC level are needed.

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Conflicts of interest

There are no conflicts of interest.

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