Global Journal of Medicine & Public Health

A Cross-sectional study on awareness and factors influencing use of Home Blood Pressure Monitoring

I.V.Sreevaishnavi[1], V.V. Durga Prasad[2], K.V. Phani Madhavi[3], Muddada Jhansilakshmi[4]

ABSTRACT

Background

Home blood pressure monitoring (HBPM), whether guided by patients or clinicians, is increasingly acknowledged as an effective method for improving blood pressure control in hypertension. Compared to clinic measurements, HBPM offers more reproducible readings and better predicts cardiovascular mortality. Additional benefits include convenience, the ability to take repeated readings over time, reduced white coat effect, and enhanced patient involvement in managing their condition.

Objective

To assess the awareness gap regarding home blood pressure monitoring interventions among hypertensive individuals and factors influencing it.

Methods

A cross-sectional study was conducted among 235 adults >18 years of age adult patients attending field practice area of tertiary care center for a period of 1 year amongst who are diagnosed as hypertensives on regular treatment for at least three months. Pré-designed, pre-tested, Pré-validated questionnaire was used. Data was collected on various parameters, including gender, education, socioeconomic status, cost of the blood pressure (BP) apparatus, awareness regarding home blood pressure monitoring (HBPM), and proficiency or lack of training in performing HBPM.The collected data were entered in excel and analyzed using Microsoft Office 365. Categorical variables were assessed for statistical significance using the chi-square test. Permission was taken from Institutional Ethics Committee.

Results

Among the 235 participants, 18.3% had been diagnosed with hypertension for less than six months, 16.2% for six months to one year, and the majority, 65.5%, for more than one year. In terms of healthcare preference, 30% opted for government facilities, while 70% chose private ones. Regarding home blood pressure monitoring (HBPM), 107 participants were aware of it, but only 59 reported actually using it. The most common reason for not using HBPM, cited by 38.3% was a lack of knowledge on how to operate the device. Additionally, 28.1% felt it was necessary, and 8.5% identified the cost of the equipment as a barrier.

Conclusion

Home blood pressure monitoring (HBPM) is an effective tool for managing hypertension, offering more reliable readings than clinic measurements and better predicting cardiovascular risk. It also provides convenience, minimizes white coat effect, allows repeated measurements, and promotes patient engagement.

Keywords: Home BP monitoring (HBPM), Hypertension, blood pressure measurement, cardiovascular diseases (CVDs)

GJMEDPH 2025; Vol. 14, issue 4 | OPEN ACCESS

3*Corresponding author K.V. Phani Madhavi, Associate Professor, Department of Community Medicine, Government Medical College, Rajamahendravaram, Andhra Pradesh; 1. I.V.Sreevaishnavi, M.B.B.S, Undergraduate student,6th semester, Government Medical College, Srikakulam, Andhra Pradesh; 2. V.V. Durga Prasad,Associate Professor, Department of Community Medicine, Government Medical College, Rajamahendravaram, Andhra Pradesh; 4. Muddada Jhansilakshmi, Post graduate, General Medicine, Andhra Medical College, Visakhapatnam, Andhra Pradesh.

Conflict of Interest—none | Funding—none

Ethics: Permission was taken from Institutional Ethics Committee

INTRODUCTION

The World Health Organization (WHO) reports that approximately 63% of total deaths in India are caused by non-communicable diseases (NCDs), with 27% attributed to cardiovascular diseases (CVDs), which predominantly affect individuals aged 40 to 69 years. Elevated blood pressure is a major risk factor for CVDs.[1] Hypertension is a prevalent global NCD that significantly contributes to cardiovascular morbidity and mortality. Its global prevalence is estimated at 26%, while in India, it stands at 29.8%.[2] On average, one in three adults in developing countries is hypertensive. Often termed the "silent killer," hypertension increases the risk of heart, brain, and kidney diseases. However, it remains poorly controlled due to low awareness, inadequate primary care, and insufficient follow-up, imposing a significant financial burden on society. As a modifiable risk factor, accurate blood pressure (BP) measurement is crucial to mitigate the cardiovascular risks associated with hypertension.[3] Traditionally, BP has been measured using in-office methods, which are considered the gold standard. However, in-office measurements are limited by their inability to provide 24-hour BP monitoring. White coat hypertension, where BP readings are elevated in a clinical setting, affects 15–30% of individuals,[4] with an average BP increase of 10 mmHg due to the white coat effect. Self-measured BP monitoring, conducted by individuals at home, is a validated approach for out-of-office BP assessment. This method offers several advantages, including more reliable BP readings away from clinical settings, which help in detecting conditions like masked hypertension and ruling out white coat hypertension and "white coat" effect on blood pressure. Home BP monitoring (HBPM) allows for assessment at specific times over an extended period, quantifying BP variability factor increasingly recognized as significant in cardiovascular risk. Evidence suggests that HBPM predicts cardiovascular risk better than office-based measurements (Class IIa; Level of Evidence A).[5] Meta-analyses of randomized trials have demonstrated that self-measured BP monitoring is associated with BP reduction and improved BP control. The benefits are maximized when HBPM is used in conjunction with in-office measurements. HBPM has also been shown to enhance long-term hypertension management and treatment adherence, reducing the risk of cardiovascular diseases while alleviating the burden on healthcare systems. Additionally, combining HBPM with office BP monitoring is cost-effective compared to office monitoring or usual care alone for individuals with elevated BP.[6,7,8]

If left untreated or poorly managed, hypertension leads to increased cardiovascular morbidity and mortality, higher healthcare resource utilization, and substantial financial and societal costs. Rapid urbanization and lifestyle changes further elevate the risk of hypertension and associated cardiovascular conditions, emphasizing the need for regular BP monitoring. HBPM has emerged as an effective tool for this purpose. This study aims to assess the awareness gap regarding home blood pressure monitoring interventions among hypertensive individuals and factors influencing it.

Methodology

- **Study type:** Cross Sectional study
- **Study setting:** Field practice area of Department of Community Medicine, Andhra Medical College, Visakhapatnam.
- **Study duration:** One year (March 2023 -February 2024)
- **Study population:** Adult patients who are diagnosed as hypertensives, on regular treatment for at least three months.
- **Sample size:** With confidence level of 95%, and margin of error of 6%, and prevalence being 29.8%; The sample size calculated according to the Cochran formula is 232 which is rounded off to 235.

Inclusion criteria:

- Patient of age >18 years (adults)
- Diagnosed as hypertensive on regular treatment for at least three months.

Exclusion criteria:

- Patients who didn't give consent
- Having hypertension with less than three months duration.

Sampling technique: Systematic random sampling

Data collection procedure: Subjects meeting the

inclusion and exclusion criteria were identified and recruited using systematic random sampling. The purpose of the study was clearly explained to all participants and informed consent was taken. Pre-designed, pre-tested, pre-validated questionnaire was used. Data was collected on various parameters, including gender, education, socioeconomic status, cost of the blood pressure (BP) apparatus, awareness regarding home blood pressure monitoring (HBPM), and proficiency or lack of training in performing HBPM.

Statistical Analysis:

The collected data were entered in excel and analyzed using Microsoft Office 365. Categorical variables were assessed for statistical significance using the chi-square test.

Results:

A total of 235 participants were included in the study. **Table 1** presents the demographic characteristics of the study participants. About 52.3% were males and 47.7% were females. Around 9.36% were illiterates, 33.6% studied up to primary school,14.04% up to high school, 5.1% studied up to intermediate and 37.9% completed graduation.

Table 1: Demographic status of the study participants

Parameter	n	n%
Sex		
Male	123	**52.3**
Female	112	**47.7**
Total	**235**	**100**
Education		
Illiterate	22	9.36
Primary school	79	33.6
High School	33	14.04
Intermediate	12	5.1
Graduate and above	89	37.9
Total	**235**	**100**

Table 2 illustrates the duration of hypertension among the study subjects. Of the 235 participants,18.3% had hypertension for less than 6 months (43 participants), 16.2% had it for 6 months to 1 year (38 participants), and 65.5% had been hypertensive for more than 1 year (154 participants).

Table 2: Duration of hypertension among study subjects

Duration	n	n%
<6 months	43	18.3
6m-1year	38	16.2
>1 year	154	65.5
Total	**235**	**100**

Fig1 depicts the choice of facilities with 30% opting for Government and 70% opting for Private facilities.

Fig 1: Choice of facility among the study participants

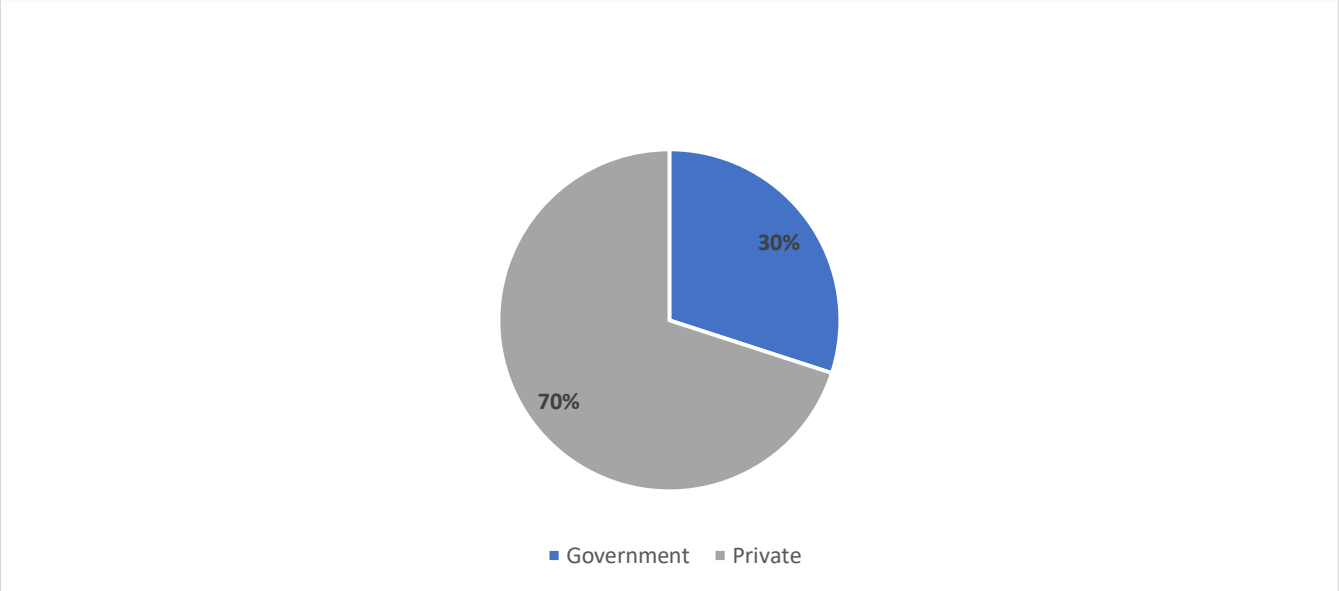
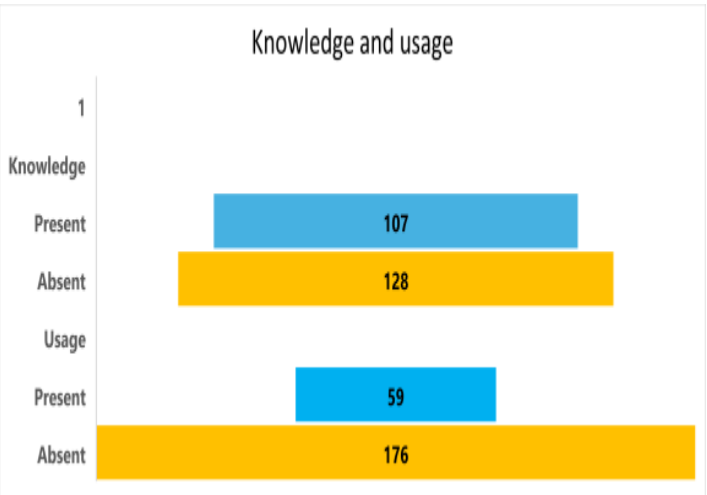


Fig2 shows the participants' knowledge and use of High Blood Pressure Monitoring (HBPM), while 107 out of 235 had knowledge, only 59 out of 235 reported using it.



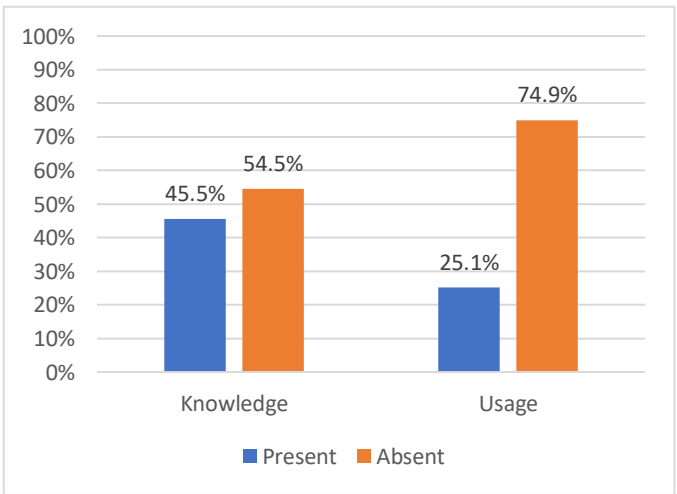


Figure 2: shows the participants' knowledge and Use of High Blood Pressure Monitoring (HBPM).

Table 3 summarizes the reasons for non-use of HBPM among the 176 participants who did not use it. The most common reason, reported by 38.3% of these participants (90 individuals), was that, they did not know how to use the device. Another 28.1% (66 participants) felt it was required, while 8.5% (20 participants) cited the cost of the equipment as a barrier.

Table 3: Reasons for non-use of HBPM

Reason	n (176)	n %
Don't know how to use	90	1.1%
Do not feel required	66	37,5%
Cost of the equipment	20	11.4%

Table 4 explores the factors influencing the use of HBPM among the participants. Regarding the duration of hypertension, 9.3% of participants with hypertension for less than 6 months (3 participants) used HBPM, while 90.7% (29 participants) did not. Among those with hypertension for 6 months to 1 year, 45.4% (5 participants) used HBPM, while 54.6% (6 participants) did not. For participants with hypertension lasting more than 1 year, 26.5% (51 participants) used HBPM, while 73.5% (141 participants) did not. When analyzing education levels, 9% of illiterate participants used HBPM, while 91% did not. Among primary school-educated participants, 15.2% used HBPM, while 84.8%did not. For high school- educated participants, 12.1% used HBPM, while 87.9% did not. None of the intermediate level educated participants used HBPM,. Among graduates or those with higher education, only 46% used HBPM,. Overall, 25.1% used HBPM.Both duration of hypertension and education played a significant role in influencing usage of HBPM.

Table 4: Factors influencing use of HBPM

	Use		p-value
Duration of HTN	**Present**	**Absent**	
<6m	3(1.3)	29(12.3)	**0.03**
6m-1y	5(2.1)	6(2.5)	
>1y	51(21.7)	141(60)	
Education			
Illiterate	2(0.8)	20(8.5)	
Primary school	12(5.1)	67(28.5)	

High School	4(1.7)	29(12.3)	**<0.001**
Intermediate	0(0)	12(5.1)	
Graduate and above	41(17.4)	48(20.4)	
Total	**59(25.1)**	**176(74.9)**	

Discussion

In the present study, the majority of participants were male (52.3%), while females accounted for 47.7%. This aligns partially with a survey by Wander et al.,[9] which reported a male preponderance (83%) among their participants. In contrast, Grover et al.[10] observed a female preponderance (53.6%), suggesting variations in gender representation across different settings. Interestingly, a gender disparity where women exhibit higher awareness levels than men has been documented in countries such as the USA and Bangladesh. [11,12] This highlights potential socio-cultural and educational factors influencing awareness levels. Regarding educational status, the largest proportion of participants in the present study were graduates or above (37.9%), followed by those with primary education (33.6%). Intermediate-level education was the least represented (5.1%). Comparatively, the Grover et al. [10] study showed a different distribution, with the majority having secondary education (49.17%), followed by illiterates (26.06%), primary (12.64%), and higher education (12%). These findings underscore regional and demographic differences in educational level among hypertensive individuals. In a similar study, the majority of participants had primary or below educational status (61.6%), while only a small proportion had university-level education or above.[14] The duration of hypertension revealed that 65.5% of participants had been hypertensive for more than one year. A smaller proportion (16.2%) reported a duration of 6 months to 1 year, while 18.3% had hypertension for less than 6 months. This indicates that most participants had an established history of hypertension, which may influence their knowledge and management practices. Although duration plays a major role most of the studies did not study this aspect. In the present study, 45.5% of participants were aware of HBPM, but only 25.1% reported using it. The low use aligns with findings from other studies indicating lower hypertension awareness in India compared to developed countries such as the USA (81%), Canada (83%), and England (65%).[15] Additionally, Grover et al. [10] reported higher awareness among women than men. These differences underscore the importance of targeted educational initiatives to improve HBPM use across diverse populations. The most common reason for non-use of HBPM was a lack of knowledge about how to use the device (38.3%). Other barriers included perceptions such as HBPM being unnecessary (28.1%) and concerns on cost (8.5%). Similar findings were noted by Singhania et al., [16] where lack of knowledge (36.1%) was the primary barrier in rural areas, while urban populations predominantly viewed HBPM as unnecessary (41.1%). Grover et al. [10] also reported variation in awareness levels by region, ranging from 29.6% in Chhattisgarh to 75.6% in Tamil Nadu, suggesting regional disparities in HBPM knowledge and adoption. The findings were found to be significant with both duration of hypertension (p=0.03) and educational status (p<0.001). These findings emphasize that factors such as duration of hypertension, level of education, and healthcare facility preference significantly influence HBPM knowledge and use, aligning with trends observed in similar studies. These findings align with Grover et al., [10] where the odds of hypertension awareness increased with higher education levels, from primary (OR 0.66; 95% CI: 0.51–0.85) to secondary (OR 0.69; 95% CI: 0.54–0.89). This highlights the role of education in empowering individuals to adopt better health practices, including HBPM. Fu et al supported that, participants with Group-intervention focused on HBPM knowledge and technique had better awareness and practice.[14]

Wander et al.[9] reported that the barriers for usage were lack of understanding (60.9%), cost of the equipment (11.9%), patients' concern on reliability of the equipment (31.7%) and education (54.5%).

Limitations

Although systematic random sampling is a strength, participants were selected from the field practice area of a tertiary care center, which may not represent broader populations, especially rural or underserved regions. The study's cross-sectional nature limits its ability to establish causality between factors influencing HBPM use and outcomes. A longitudinal approach like cohort studies would provide a better understanding of how awareness and use evolve over time. Awareness was self-reported, which might be influenced by recall or response biases. A standardized, validated tool to assess awareness would have strengthened the findings.

Conclusion

The study highlights that knowledge and use of home blood pressure monitoring (HBPM) among hypertensive individuals are influenced by gender, education, and healthcare preferences. It suggests that improving awareness through targeted education and addressing misconceptions about HBPM can enhance its adoption. Regional and educational differences observed in other studies underscore the importance of localized, population-specific interventions.

References

1. Therapeutic adherence in hypertension: Current evidence and expert opinion from India - PubMed [Internet]. [cited 2024 Nov 22]. Available from: https://pubmed.ncbi.nlm.nih.gov/34861979/
2. Anchala R, Kannuri NK, Pant H, Khan H, Franco OH, Di Angelantonio E, et al. Hypertension in India: a systematic review and meta-analysis of prevalence, awareness, and control of hypertension. J Hypertens. 2014 Jun;32(6):1170–7.
3. Kario K, Shin J, Chen C, Buranakitjaroen P, Chia Y, Divinagracia R, et al. Expert panel consensus recommendations for ambulatory blood pressure monitoring in Asia: The HOPE Asia Network. J Clin Hypertens (Greenwich). 2019 Sep 18;21(9):1250–83.
4. Campbell PT, White WB. Utility of ambulatory blood pressure monitoring for the management of hypertension. Curr Opin Cardiol. 2017 Jul;32(4):365–72.
5. Call to action on use and reimbursement for home blood pressure monitoring: executive summary: a joint scientific statement from the American Heart Association, American Society Of Hypertension, and Preventive Cardiovascular Nurses Association - PubMed [Internet]. [cited 2024 Nov 22]. Available from: https://pubmed.ncbi.nlm.nih.gov/18497371/
6. Self-monitoring of Blood Pressure in Patients With Hypertension-Related Multi- morbidity: Systematic Review and Individual Patient Data Meta-analysis - PubMed [Internet]. [cited 2024 Nov 22]. Available from: https://pubmed.ncbi.nlm.nih.gov/31730171/
7. Asian management of hypertension: Current status, home blood pressure, and specific concerns in India - PubMed [Internet]. [cited 2024 Nov 22]. Available from: https://pubmed.ncbi.nlm.nih.gov/31955516/
8. McBain H, Shipley M, Newman S. The impact of self-monitoring in chronic illness on healthcare utilisation: a systematic review of reviews. BMC Health Serv Res. 2015 Dec 18;15:565.
9. Wander GS, Salman E, Matsushita N, Verma N. Awareness and recommendation of home blood pressure measurement among physicians in India: Results from Asia HBPM survey 2020. Indian Heart Journal. 2023 May 1;75(3):169–76.
10. Grover A, Venkatesh U, Ghai G, Babu V, Aggarwal S, Singh R, et al. Prevalence and associated factors for awareness of hypertension in India: Findings from national survey-4. J Family Med Prim Care. 2022 Sep;11(9):5766–75.
11. Rahman M, Williams G, Al Mamun A. Gender differences in hypertension awareness, antihypertensive use and blood pressure control in Bangladeshi adults: findings from a national cross-sectional survey. J Health Popul Nutr. 2017 May 25;36(1):23.
12. EVERETT B, ZAJACOVA A. Gender Differences in Hypertension and Hypertension Awareness Among Young Adults. Biodemography Soc Biol. 2015;61(1):1–17.
13. (PDF) Prevalence and associated factors for awareness of hypertension in India: Findings from national survey-4. ResearchGate [Internet]. 2024 Oct 22 [cited 2024 Nov23]; Available from: https://www.researchgate.net/publication/366015813_Prevalence_and_associated_factors_for_awareness_of_hypertension_in_India_Findings_from_national_survey-4
14. FU SN, Dao MC, Wong CKH, Cheung BMY. Knowledge and practice of home blood pressure monitoring 6 months after the risk and assessment management programme: does health literacy matter? Postgrad Med J. 2022 Aug;98(1162):610– 6.
15. Hypertension prevalence, awareness, treatment and control in national surveys from England, the USA and Canada, and correlation with stroke and ischaemic heart disease mortality: a cross-sectional study - PubMed [Internet]. [cited 2024 Nov 23]. Available from: https://pubmed.ncbi.nlm.nih.gov/23996822/
16. Singhania A, Singla A, Kalsi H, Mahendru D, Singh S, Goyal I, et al. Abstract 16560: Home Blood Pressure Monitoring Among Hypertensive Patients and Their Caregivers in a North Indian Population. Circulation. 2023 Nov 7;148(Suppl_1):A16560–A16560.