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Original Article

Exploring the factors affecting hypertension screening practices among elderly in rural setting

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Abstract

Hypertension is a significant public health concern in India, with a particularly high burden in rural areas. Among the elderly population (aged 60 and above) in rural regions, the prevalence can reach up to 60–70%. This study aimed to explore the factors affecting hypertension screening practices in this population. A cross-sectional study was conducted in rural Erode, Tamil Nadu, India. A sample of 323 participants aged 60 years and above without hypertension screening in the past two years and no prior diagnosis were randomly selected. A developed and validated questionnaire was used to identify barriers to screening. Current blood pressure readings were recorded to determine the prevalence of newly diagnosed hypertension. Among the 323 participants, 77 (23.8%) were found to have hypertension. Significant associations were observed between hypertension prevalence and age (p=0.021), gender (p=0.034), smoking (p=0.013), and alcohol consumption (p=0.042). The most prominent barriers were a lack of knowledge about hypertension consequences (89.4%), absence of obvious symptoms (69%), and lack of reminders from healthcare providers or family members (67%). Other barriers included mistrust in healthcare (8%), previous normal readings (7.4%), work culture/time constraints (2.7%), and cost concerns (3%). Multifaceted barriers, often with gender disparities, affect hypertension screening practices among the elderly in rural India. Comprehensive, community-based education programs and targeted interventions addressing these barriers are crucial to improve screening rates and early detection of hypertension in this population.

Keywords: hypertension, elderly population, rural health, screening practices, barriers to healthcare.

Introduction

Hypertension is considered the “silent killer”. It is one of the major global health problems and a significant problem in low- and middle-income countries like India. The prevalence of hypertension in rural India is 24%, with a consistent upward trend over 10 years from 2014 to 2024 [1]. Despite this enormous health burden, hypertension remains undiagnosed and untreated in many rural areas.

The importance of routine hypertension screening is widely acknowledged, with national and international health guidelines recommending routine blood pressure checks for older adults. In India, the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases, and Stroke (NPCDCS) has brought to the forefront the need for increased hypertension screening, but uptake remains disappointingly low in rural areas [2]. Various factors contribute to these events, including limited access to healthcare, lack of transportation, financial constraints, and lack of awareness. Studies identified all these barriers, highlighting how socio-economic challenges and cultural attitudes in rural India discourage the elderly from seeking regular health check-ups and screening. These barriers hinder timely diagnosis and management of hypertension, leaving the elderly population vulnerable to severe health outcomes.

Despite the growing awareness of the importance of hypertension screening, there is a considerable research gap in terms of factors that specifically influence the screening practices of the elderly population in rural India. Though studies have addressed general patterns of hypertension awareness and treatment, not much research has focused on barriers to regular screening in this high-risk group. Studies have suggested the need for community-based health education but have not specifically addressed the elderly population's unique challenges in rural settings [3]. This research aims to fill this gap by exploring the multifaceted barriers to hypertension screening among the elderly in rural India. By identifying these barriers, the study will give crucial insights to inform policy and interventions toward improving screening rates, early detection, and management of hypertension, thus enhancing health outcomes for elderly people in rural communities.

Material and methods

Study design

This cross-sectional study aimed to explore factors influencing hypertension screening practices among the elderly in rural Erode, Tamil Nadu, India. Conducted with a sample size of 323 participants aged 60 years and above, the study utilized an online Rao soft sample size calculator to determine the necessary sample size, ensuring a margin of error of 5% and a confidence interval of 95%. Participants were randomly selected from various rural areas within the Erode district.

Study setting

The research was conducted in rural Erode, Tamil Nadu, where the healthcare infrastructure includes primary health centers and community health initiatives focused on non-communicable diseases. This setting facilitated access to a diverse elderly population, which is critical for understanding hypertension screening practices.

Study population

The study population consisted of individuals aged 60 years and older, regardless of gender, who had not undergone hypertension screening in the past two years and were not previously diagnosed with hypertension. Participants were required to be free of any comorbidities to ensure that the focus remained solely on hypertension screening practices. Exclusion criteria included individuals diagnosed with hypertension within the last two years or those currently taking antihypertensive medications.

Sample selection and size

Participants were randomly selected from the rural population in Erode district, with a total sample size of 323 determined through statistical calculations. This sample was representative of the elderly demographic in the region, allowing for meaningful analysis of hypertension screening practices.

Data collection

Data collection involved administering a developed and validated questionnaire to identify barriers to hypertension screening. Additionally, blood pressure readings were taken for each participant using an OMRON Digital BP Monitor. Two measurements were recorded one minute apart, both in the morning and evening, to ensure accuracy. The prevalence of newly diagnosed hypertension was classified according to American Heart Association guidelines [4].

Data analysis

Statistical analysis was performed on the collected data to identify significant factors affecting hypertension screening practices. This included correlating reported barriers with actual blood pressure status among participants. The analysis aimed to provide insights into how various factors influence screening behaviors in this demographic.

Ethical considerations

The study adhered to stringent ethical standards, with approval obtained from the Institutional Ethics Committee of JKKN College of Pharmacy (Ethical ID: JKKNCP/IEC-CER/1122123). Informed consent was secured from all participants, ensuring their understanding and voluntary participation. The data protection were maintained throughout the study, with all data anonymized before analysis and reporting.

Preventive and control measures

To enhance hypertension screening rates among the elderly, the study emphasized educating participants

about the importance of regular blood pressure monitoring and lifestyle modifications. This included promoting awareness about hypertension's risks and encouraging community-level health initiatives that facilitate easier access to screening services for older adults.

Results and discussion

Prevalence of hypertension among the elderly

In our study, among the 323 participants aged 60 years and above who had not been screened for hypertension in the past two years and had no previous diagnosis of hypertension, 77 (23.8%) were found to have hypertension. It is important to note that our study did not involve random selection across the entire elderly population but was specifically targeted at individuals who had not undergone hypertension screening in the past two years and had no prior hypertension diagnosis. This prevalence is comparable to, though slightly lower than, the findings from other recent studies in rural India. For example, a comprehensive study by Ramakrishnan *et al.* (2019) found a prevalence of 35.5% among adults aged 30–69 years in rural areas across India, with higher rates expected in the elderly subgroup [5]. Similarly, a more recent study by Mohanty *et al.* (2021) reported a hypertension prevalence of 32.3% among adults aged 18 and above in rural India, with significantly higher rates in older age groups [6]. The slightly lower prevalence in our study may be attributed to our specific inclusion criteria, which excluded those with known hypertension or those who had been screened recently (Table 1).

Age-related prevalence of hypertension

Our study revealed a significant association between hypertension prevalence and age (p=0.021). The majority of hypertensive cases (69 out of 77) were found in the 60–70 age group, with the remaining

Table 1: Prevalence of hypertension study among the population.

	Hypertension		Total (n=323)	P-value
	Yes (n=77)	No (n=246)		
Age(years)				
60–70	69	220	289	0.021
71–79	8	26	34	
Gender				
Male	60	100	160	0.034
Female	17	146	163	
Education				
Pre-school	40	168	208	0.509
School	37	78	115	
Occupation				
Unemployed	55	125	180	
Employed	5	44	49	0.284
Homemaker	17	77	94	
Smoking				
Yes	17	84	101	0.013
No	60	162	222	
Alcohol				
Yes	37	116	153	0.042
No	40	130	170	

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8 cases in the 71–79 age group. This finding aligns with the well-established trend of increasing hypertension prevalence with age. A recent systematic review and meta-analysis by Tripathy *et al.* (2017) confirmed this age-related trend, reporting that the pooled prevalence of hypertension increased from 16.5% in the 18–29 age group to 55.1% in individuals aged 70 years and above [7]. Our findings, focusing on the elderly population, emphasize the particularly high risk in this age group. The lower number of cases in the 71–79 age group in our study (8 out of 34), compared to the 60–70 age group (69 out of 289), could be due to the smaller sample size in the older age group. However, it may also reflect a survival bias, where individuals with uncontrolled hypertension may not survive to older ages. Further investigation into this aspect is needed in future studies.

Gender differences in hypertension prevalence

Our study found a significant association between gender and hypertension prevalence (p=0.034), with a higher prevalence among males (60 out of 160) compared to females (17 out of 163). This finding contrasts with some previous studies in rural India, which have reported higher or similar prevalence in females. For example, a large-scale study by Gupta *et al.* on hypertension in India found that the age-standardized prevalence of hypertension was similar in men (32.2%) and women (31.9%) in rural areas. The gender disparity in our study could be attributed to several factors, including differences in lifestyle, occupational stress, and healthcare-seeking behaviors between men and women in this rural setting. It is also possible that women in our study population were more likely to have been previously diagnosed or screened, thereby being excluded from the study.

Educational and occupational factors

While no statistically significant association was found between education level and hypertension (p=0.509), the educational profile of our participants was noteworthy. The majority (208 out of 323) had only pre-school education, with 115 participants having school-level education. A study by Bhise and Patel (2022) found that individuals with no formal schooling had higher odds of hypertension compared to those with higher education in rural India [8]. Although no direct statistical link was established in our study, the overall low education level in our population could contribute to the high prevalence of undiagnosed hypertension. Regarding occupation, no significant association with hypertension prevalence was found (p=0.284), though most of our participants were unemployed (180), followed by homemakers (94) and employed individuals (49). A study by Saju *et al.* (2020) found that unemployment was associated with a higher prevalence of hypertension in rural South India [9], suggesting that this could be a factor worth considering in the context of hypertension risk, although it was not statistically significant in our study.

Lifestyle factors: smoking and alcohol consumption

Our study found significant associations between hypertension and both smoking (p=0.013) and alcohol consumption (p=0.042), consistent with global literature on risk factors for hypertension. Among smokers, 17 out of 101 (16.8%) had hypertension, compared to 60 out of 222 (27%) non-smokers. The seemingly protective effect of smoking should be interpreted with caution, as it may be influenced by confounding factors. A meta-analysis by Gao *et al.* (2017) confirmed that smoking is a risk factor for hypertension, with current smokers having a 17% higher risk compared to never-smokers [10]. For alcohol consumption, 37 out of 153 alcohol consumers (24.2%) had hypertension, compared to 40 out of 170 non-consumers (23.5%). This slight increase in prevalence among alcohol consumers aligns with existing literature, such as a systematic review by Roerecke *et al.* (2018), which found that reducing alcohol intake was associated with a significant reduction in blood pressure, especially in those drinking six or more drinks per day [11].

Barriers to hypertension screening

Our study identified several key barriers to hypertension screening, with the most prominent being a lack of knowledge and awareness about the consequences of untreated hypertension, reported by 89.4% of participants. This finding is consistent with literature highlighting persistent gaps in health literacy in rural populations, particularly concerning non-communicable diseases like hypertension. In rural Uganda, a study by Businge *et al.* (2019) also found that poor awareness about hypertension was a significant barrier, with only 28% of participants aware of their hypertensive status [12]. Similarly, a study in rural South India by Ragavan RS *et al.* (2021) reported that only 35.2% of participants had good knowledge about hypertension [13]. The high prevalence of this barrier in our study can be attributed

to limited access to health information in rural areas, inadequate health education programs targeting the elderly, and the asymptomatic nature of hypertension, which reduces perceived risk (Table 2).

Lack of symptoms and health-seeking behavior

The absence of symptoms emerged as a significant barrier to hypertension screening, reported by 69% of participants (60.9% males and 39% females). The asymptomatic nature of hypertension leads many elderly individuals in rural settings to perceive themselves as healthy, reducing their motivation to seek screening. This perception may be particularly strong in rural areas where health-seeking behavior is often driven by acute, symptomatic conditions rather than preventive care. Gender differences in reporting this barrier may reflect differences in health awareness or physical self-awareness between males and females. Similar findings were reported by a study conducted in Zambezia [14].

Lack of reminders and support systems

The lack of reminders from healthcare providers or family members was a significant barrier to hypertension screening, with 67% of participants (59.8% males and 40.1% females) reporting this issue. Healthcare providers in rural areas often face high patient loads and limited resources, making it challenging to provide regular follow-ups or reminders for screening. In rural settings where younger family members may migrate to urban centers, there is also reduced family support for the elderly. A similar gap in support systems was highlighted by Moola *et al*. [15].

Misconceptions and fear of diagnosis

Some participants (7.4%) cited previous normal readings as a reason for avoiding regular hypertension screening, with more males (58.3%) reporting this barrier compared to females (41.6%). This misconception underscores the importance of education on the dynamic nature of blood pressure and the risks of untreated hypertension. Furthermore, 2.7% of participants reported fear of diagnosis, with more males (55.5%) expressing this concern. This fear may stem from cultural beliefs and the social stigma associated with chronic illnesses in rural communities, where health is often linked to one's ability to perform traditional roles [16, 17].

Healthcare access, trust, and financial barriers

A further 10.8% of participants cited a lack of healthcare service, quality, or infrastructure as a barrier, with a relatively even gender distribution (51.4% males and 48.5% females). In rural areas, healthcare systems often face shortages of medical professionals, limited services, and poor infrastructure. Additionally, 3% of participants, with a higher proportion of females (70%), cited cost concerns and lack of financial resources as barriers. This gender disparity is likely due to lower financial autonomy among elderly women, who may lack access to personal funds for healthcare. Finally, 0.9% of participants, with a higher proportion of

Table 2: Factors affecting screening of hypertension.

Barriers	Total (n=323) (Percentage)	Male (n=206)	Female (n=117)
Lack of knowledge/ awareness of consequences of untreated hypertension	289 (89.4%)	179 (62.3%)	108 (37.6%)
Lack of obvious symptoms	223 (69%)	136 (60.9%)	87 (39%)
Fear of diagnosis	9 (2.7%)	5 (55.5%)	4 (44.4%)
Work culture/ time constraints	9 (2.7%)	5 (55.5%)	4 (44.4%)
Cost concerns/ lack of financial resources	10 (3%)	3 (30%)	7 (70%)
Mistrust in healthcare	26 (8%)	16 (61.5%)	10 (38.4%)
Previous normal readings	24 (7.4%)	14 (58.3%)	10 (41.6%)

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Table 2: Continued.

Barriers	Total (n=323) (Percentage)	Male (n=206)	Female (n=117)
Too long of screening center/ lack of transport facilities to healthcare centers	55 (17%)	37 (67.2%)	18 (32.7%)
Cultural beliefs/ belief in fate	9 (2.7%)	4 (44.4%)	5 (55.5%)
Lack of reminders from healthcare providers/ family members	219 (67%)	131 (59.8%)	88 (40.1%)
Language barriers	3 (0.9%)	1 (33.3%)	2 (66.6%)
Lack of health care service/quality/infrastructure	35 (10.8%)	18 (51.4%)	17 (48.5%)
Others	19 (5.8%)	11 (57.8%)	8 (42.1%)

females (66.6%), reported language barriers, highlighting the need for linguistically appropriate healthcare services in diverse rural communities [18].

Limitations

This study has several limitations that should be considered when interpreting the findings. Firstly, the cross-sectional design restricts the ability to establish causal relationships between identified factors and hypertension screening practices, as data were collected at a single point in time. Additionally, the reliance on self-reported data may introduce bias, potentially affecting the accuracy of reported barriers. While the sample size was adequate, the random selection from specific rural areas may not fully represent the broader elderly population across all rural regions of Tamil Nadu or India, limiting generalizability. The exclusion of individuals with comorbidities or recent hypertension diagnoses may overlook significant barriers faced by these groups. Furthermore, the study might not have captured all relevant factors influencing screening practices, such as socioeconomic status and education level.

The method of measuring blood pressure, which involved taking two readings one minute apart, may not account for variability due to situational factors like anxiety or physical activity, potentially misclassifying hypertension status. Cultural beliefs regarding health and illness were not deeply explored, which could influence health-seeking behavior. Lastly, recall bias may affect participants' ability to accurately report past healthcare experiences and symptoms. Acknowledging these limitations can guide future research toward more robust methodologies and comprehensive approaches to understanding hypertension screening among the elderly in rural India.

Conclusion

This study reveals a complex interplay of factors affecting hypertension screening practices among the elderly in rural settings, with lack of awareness, absence of symptoms, and inadequate reminders emerging as primary barriers. Additional challenges include mistrust in healthcare, previous normal readings, work constraints, economic factors, and language barriers, often with notable gender disparities. To overcome these multifaceted barriers, we recommend implementing comprehensive, community-based education programs to enhance awareness about hypertension and the importance of regular screening, even for asymptomatic individuals. These initiatives should be culturally sensitive and gender-specific, addressing the unique concerns of both men and women. Strengthening the primary healthcare system by improving accessibility, affordability, and quality of services is crucial. This can be achieved through mobile screening camps, flexible timing to accommodate work schedules, and the integration of local languages in health communication. Leveraging technology for reminders and follow-ups and involving community health workers to build trust and facilitate screening could significantly improve participation. Finally, addressing economic barriers through targeted financial support or insurance schemes for the elderly, particularly women, is essential. By adopting these multifaceted approaches, we can work towards overcoming the identified barriers and improving hypertension screening rates among

the rural elderly population, ultimately contributing to better cardiovascular health outcomes in this vulnerable demographic.

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Conflict of interest

The authors declare no conflict of interest.

Ethics approval

This study was approved by the Institutional Ethics Committee of JKKN College of Pharmacy (Ethical ID: JKKNCP/IEC-CER/1122123). All procedures were conducted following the ethical standards of the institutional and national research committees and the 1964 Helsinki Declaration and its later amendments.

Consent to participate

Written informed consent was obtained from all the participants.

Data availability

All data generated or analyzed during this study are included in the manuscript. Further inquiries related to data availability can be directed to the corresponding author.

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