ORIGINAL ARTICLE

Prevalence and Factors Associated with Hypertension among the Below Poverty Line Population (BPL): A Community-Based Cross-Sectional Study in Karnataka State, South India

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ABSTRACT

Background: Hypertension is one of the major concerns in public health, largely among the marginalized. People of the below the poverty line (BPL) category face different challenges in socio-economic conditions that usually aggravate health problems. **Materials and Methods:** A cross-sectional, community-based study was conducted in four districts of Karnataka—Mysore, Chamarajanagar, Hassan, and Davangere . The study targeted 386 individuals aged 25 years and older from BPL households. Participants were selected using a purposive sampling method to ensure a representative sample from the target population. **Results:** The study revealed an important connection between hypertension and various socio-demographic and lifestyle factors. Age, educational level, economic status, caste, occupation, tobacco usage, sedentary lifestyle, alcoholic, obese, and intake of junk food were reported to contribute to the risk factors. Especially, older age, less than secondary education, and an underprivileged economic background were very significantly associated with the presence of hypertension. **Conclusion:** A number of lifestyle and socio-demographic factors contribute to hypertension in a Karnataka Below the Poverty Line (BPL) group including age, education, socioeconomic position, kind of employment, use of alcohol and tobacco, lack of physical activity, being overweight, and bad eating habits. Public health initiatives that focus on enhancing healthcare accessibility and reducing socioeconomic determinants are necessary to reduce these health disparities.

KEY WORDS: Hypertension, Below Poverty Line, Socioeconomic Status, Public Health, Lifestyle Factors, Culture, Medicine.

Introduction

Hypertension is sometimes referred to as the ”silent killer” in the medical world. It is also an emerging health issue across the globe. Hypertension is characterized by its asymptomatic nature in the early stages of the disease, and it may lead to life-threatening complications if left untreated.[1]

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Today millions of people worldwide is affected from hypertension, with more cases reported from underdeveloped regions of the world. Many of them remain undiagnosed and lack proper treatment due to multiple socio-economic reasons, making hypertension one of the greatest causes of preventable diseases and deaths, as experts opine. India has around 220 million patients, and the prevalence of hypertension has increased dramatically among disadvantaged groups, with higher rates in urban areas (33.8% vs. 27.6%) than in rural areas.[2] Regional variations are also very noticeable. The more urbanized states like Kerala (36%) and Punjab (35%) have a greater prevalence rate than the less urbanized states like Bihar (25%) and Jharkhand (21%) in india.[1] The differences in prevalence rates may be due to lifestyle variations and other issues. Women from Goa have a

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very high prevalence rate of obesity at 38.2%, while for men it is 36.6%, as found in a study.[3] Nonetheless, it was found that while hypertension rates rose to 31.5% in low- and middle-income nations, they fell to 28.5% in several high-income nations.[2,4] Additionally, a study found that only 9% of adults with hypertension had their condition under control, compared to roughly 28.5% of people in wealthier nations.[4] According to The Lancet, the prevalence of high blood pressure has doubled in developing countries over the past four decades, and half of adults from disadvantaged sections with hypertension live in Asia. In developing nations, socio-economic disparities have a major influence on the prevalence and management of hypertension.[5] Individuals from low-income groups experience issues like unavailability of quality healthcare, health inequality, deprivation, poor dietary patterns, chronic stress, and poor health literacy. In low-income countries, the use of medications for hypertension, diabetes (anti-diabetic drugs), and cholesterol (statins) was relatively high across all poverty levels.[6] Interestingly, in lower-middle-income countries, individuals living in extreme poverty were more likely to use these medications compared to those who were better off.[3] However, this pattern was less pronounced in upper-middle-income countries, where the correlation between poverty status and medication use appeared weaker.[4]

Studies show that the prevalence of health disparity is higher among those living below the poverty line (BPL), which is the most predominant subgroup due to social and economic vulnerability and poor access to healthcare facilities.[2,5] The determination of Below Poverty Line (BPL) status in India largely depends on income levels, with each state applying its own criteria and methods for assessment.[1] These thresholds differ across states to account for regional variations in the cost of living. In developed countries, lower socioeconomic status is closely associated with hypertension, especially in women, who also face additional barriers such as gender stereotyping, health disparity, and less effective treatment management.[7] Lifestyle factors like sedentary behaviour, high-fat diets, and life stress increase the prevalence of hypertension among urban populations.[3,8] It has been found that healthcare awareness and access also vary according to socioeconomic status. Health literacy among people is also very vital. While in Tamil Nadu, 63% of hypertensive individuals are aware of their condition, in states like Uttar Pradesh, it is only 45%, where access to healthcare and health literacy is very limited.[9] Hypertension disproportionately affects people living below the poverty line due to chronic stressors such as social exclusion, low schooling, low income, unemployment, food insecurity, inadequate housing, etc.[4] These poverty-related stressors, combined with limited access to healthcare, unhealthy diets, and substance abuse, elevate the risk.[8,10] Chronic stress, more common in lower SES households due to survival problems, causes hypertension as activation of the HPA axis and the sympathetic nervous system results in sustained elevations in blood pressure.[4,7] These biological processes highlight how important it is to address broader social determinants of health to successfully prevent and treat hypertension.[11] Focusing on the below-poverty-line (BPL) population, this current study attempts to investigate the incidence and contributing factors of hypertension in selected districts of Karnataka.

Methods

This study was conducted with a total of 386 individuals aged 25 years and above from Below Poverty Line (BPL) households in four districts of the Karnataka state including Mysore, Chamarajnagar, Hassan, and Bangalore. In India BPL refers to people having annual income less than (about) Indian Rupees 125,000 ($1751) per year. The participants from the BPL group were selected through purposive sampling with the help of the local health workers. The sample size was based on an approximation of the prevalence of hypertension among the BPL segment, adjusted for potential margins of error, confidence levels, design effects, and possible non-response rates. Data collection was carried out systematically through a questionnaire to note demographic details, socioeconomic status, and lifestyle habits, including tobacco use, alcohol consumption, dietary patterns, and medical history. Anthropometric measurements, such as height and weight, were also included. Blood pressure was measured for each participant using a digital sphygmomanometer (OMRON HEM-7121J model) according to established clinical procedures. Each participant was measured twice, five minutes apart, while in a resting position in the left arm. Hypertension was determined using national guidelines and WHO standards, where systolic BP was $\geq$ 140 mmHg and/or diastolic BP was $\geq$ 90 mmHg, or if the participant was on antihypertensive medication. Trained healthcare providers guided the participants during the

readings. The questionnaire was used to acquire SES information. Data was analysed using version 21 of the statistical package for social sciences, IBM SPSS. Regression models were applied to identify significant factors associated with hypertension. Patients suffering from drug induced hypertension with patients with white coat hypertension were excluded. Help from the local health workers was also taken in the field. The research team educated the study samples about hypertension and its related issues and other health tips. Medicines prescribed by the doctors were also cross-checked with the help of the physicians. IEC Taken (UOM-IHEC/Res-01/2025-26(dated 26/04/2025). Oral consent was taken from the study samples explaining the study objectives and the benefits to the society. Participation was voluntary.

Result

The current study aims to trace the socio-demographic and lifestyle factors associated with the hypertension problem among a population of 386 individuals. The socio-demographic profile of the study participants is presented in Table 1. Most of the respondents were predominantly female (52.00%), with a significant proportion in the age groups of 31–45 years (30.10%) and 46–60 years (25.15%). A considerable proportion of individuals had attained at least secondary education (64.83%), and 44.8% were from Other Backward Classes. The majority of participants (59.92%) belonged to the poorest group, and 39.89% were engaged in the unorganised sector. Furthermore, tobacco use (64.76%), sedentary lifestyle (67.8%), and frequent consumption of junk food (62.6%) were common among participants. More than 20% were not aware of their BP problem.

Next, logistic regression analysis was conducted to reveal factors associated with hypertension (Table 2). Here, key associations were found across several socio-demographic and lifestyle variables. Regarding age, individuals in the 31–45 years (OR = 1.57), 46–60 years (OR = 1.82), and >60 years (OR = 2.46) age groups had considerably higher odds of having BP ($p < 0.05$ for all groups) when compared to the 18–30 years age group. Secondary-level education was significantly associated with an increased BP risk ($p < 0.05$). Primary education level (OR = 1.35) was also positively associated with hypertension, but the association was weaker ($p < 0.05$). Participants from the OBC section had significantly higher odds of BP (OR = 1.49, $p < 0.05$), while the association with the

Table 1: Socio-demographic factors of the BP Patients

Particulars	Count (n)	Percentage (%)
Total Population	386	100.00%
Age Group		
18-30 years	97	25.15%
31-45 years	116	30.10%
46-60 years	97	25.15%
> 60 years	76	19.67%
Gender		
Male	185	48.00%
Female	201	52.00%
Education Level		
No formal education	50	12.95%
Primary education	100	25.97%
Secondary education	150	38.86%
Higher education	86	22.27%
Caste		
Scheduled Castes (SC)	76	19.6
Scheduled Tribes (ST)	37	9.5
Other Backward Classes (OBC)	173	44.8
General Category	100	26.0
Wealth status		
Poorest	231	59.92%
Poor	116	30.10%
Middle	39	10.11%
Occupation		
Unorganised	154	39.89%
Organised	100	25.97%
Others	86	22.27%
No job	46	11.92%
Tobacco usage		
Yes	250	64.76%
No	136	35.24%
Lifestyle Factors		
Sedentary lifestyle	262	67.8%
Active lifestyle	124	32.0%
Alcohol		
Yes	231	59.92%
No	155	40.08%
BMI		
Normal	77	19.87%
Overweight	309	80.13%
Dietary Habits		
More junk food	242	62.6%
Low junk food	144	37.3%
Under Medication		
Yes	310	80.3%
No	76	19.6%

Table 2: Logistic Regression Result of Factors Associated with Blood Pressure

Variable	Category	Coefficient (β)	SE	95% CI Odds Ratio	p-value
Age Group	25-45 years	0.45	0.12	1.57	0.001
	46-60 years	0.60	0.13	1.82	0.000
	> 60 years	0.90	0.15	2.46	0.000
Gender	Male	-0.10	0.12	0.90	0.400
Education Level	Primary education	0.30	0.11	1.35	0.025
	Secondary education	0.60	0.10	1.82	0.000
Caste	Scheduled Castes	0.20	0.15	1.22	0.200
	Other Backward Classes	0.40	0.14	1.49	0.012
Wealth Status	Poor	0.50	0.13	1.65	0.003
	Middle	0.70	0.15	2.01	0.000
Occupation	Unorganised	0.40	0.12	1.49	0.010
Tobacco Use	Yes	0.70	0.10	2.01	0.000
Lifestyle Factors	Sedentary lifestyle	0.80	0.11	2.22	0.000
Alcohol Use	Yes	0.50	0.12	1.65	0.003
BMI	Overweight	0.90	0.10	2.46	0.000
Dietary Habits	More junk food	0.60	0.13	1.82	0.001
Occupation	Unorganised	0.40	0.12	1.49	0.010

Source: Primary Survey, **1% level**: highly significant, **5% level**: significant

SC community was not significant ($p = 0.200$).

Regarding wealth status, individuals from poorer and middle wealth groups had significantly higher odds of having hypertension compared to the poorest group ($p < 0.05$). Employment in the unorganised sector was significantly associated with higher odds of BP (OR = 1.49, $p < 0.05$). Tobacco consumption was strongly associated with BP (OR = 2.01, $p < 0.05$). Additionally, a sedentary lifestyle (OR = 2.22, $p < 0.05$) and alcohol use (OR = 1.65, $p < 0.05$) were both significantly associated with increased BP. Overweight individuals had significantly higher odds of having BP (OR = 2.46, $p < 0.05$). More frequent consumption of junk food was positively associated with BP (OR = 1.82, $p < 0.05$).

Discussions

This study focuses on the socio-demographic trends and key lifestyle factors influencing high blood pressure among the Below Poverty Line (BPL) population in Karnataka. Important hypertension determinants include age, educational level, economic situation, tobacco consumption, lack of physical activity, alcohol consumption, body mass index (BMI), and especially junk food consumption.[2,5] A significant association was found between age and education level with high blood pressure, confirming that these are critical risk factors for hypertension. The results also show how low socioeconomic status, compounded by caste and social stratification, is associated with unhealthy lifestyles.[12,13] Similar studies found that limited access to healthcare, poor food options, and economic uncertainty are common among low-income groups, especially those in the unorganised sector, and contribute to the prevalence of hypertension.[8,12] Stress is also a significant factor in hypertension among the poor. Chronic stress in low-income populations may lead to hemodynamic changes, but this association remains controversial and additional evidence is needed.[10] Low socio-economic status is closely connected with exposure to multiple sources of stress in the home and community. A low level of socio-economic status lowers the individual's stress coping capacity.

One study found that poverty, rather than traditional risk factors, is accountable for 60–70% of the excess BP-related heart disease among low-income Americans.[12] The strong association between tobacco use, which is more common among poor people, and hypertension corroborates prior research, highlighting the destructive effects of smoking on blood

vessels.[5,11]

Similarly, alcohol consumption, more widespread among disadvantaged sections, raises heart rate and constricts blood vessels, exacerbating hypertension in the future, as some studies found.[6,13] Moreover, a sedentary lifestyle, which may lead to overweight, obesity, and insulin resistance, is another noteworthy contributor. People living in poverty don't always have the time or money to access fitness programs or even outdoor activities. They often work long hours and low-paying jobs, leaving them with little time to exercise. As a result, an inactive lifestyle becomes more prevalent.[8,10] It is noted that societal action against childhood poverty would have a more significant counter-hypertension outcome in women than in men. Diets high in salt and harmful fats, commonly consumed by low-income groups, further worsen hypertension risks, and these findings are consistent with other studies.[4,10,12]However, this requires further exploration, as stress, low income, and inadequate healthcare access also predispose these groups to hypertension.

It is also pointed out that there is a complex interface between income inequalities and the regulation of blood pressure, as well as hypertension outcomes.[14] It underscores that extending the treatment of hypertension might not be enough to thwart these inequalities. Consequently, additional research is necessary to examine the mechanisms behind these inequalities and how they interact with each other.[15] However, a few studies have shown that people from poorer families may have a lower prevalence of hypertension, which may be due to differences in diet, activity levels, and stress.[5,12] Furthermore, food insecurity among those below the poverty line is a vital issue and is closely associated with increased stress levels and unhealthy dietary habits. Lack of quality food not only leads to chronic psychological stress but also negatively affects the regulation of blood pressure among low-income groups.[8,11] Poor dietary habits, commonly a dependence on calorie-dense yet nutrient-poor foods, are normally connected with overweight/obesity, insulin resistance, and increased arterial stiffness, all of which can increase blood pressure.[16]

Studies found that food insecurity may lead to unusual variations in electrolytes too, which further complicates the management of hypertension.[11,13] Also, exposure to pollution, high workloads, or physically hard jobs frequently encountered by the BPL population might be key contributing factors.[3] The rural-urban disparities within Karnataka state itself also contribute to health discrimination.[6]

People who are suffering from undiagnosed hypertension need more attention. It has been observed that some patients are not taking their BP tablets regularly, and a few have permanently discontinued taking their BP medication once BP has come down, which is a dangerous sign. People need more awareness here. Further, obesity, family history, diabetes, or kidney disease can develop early and remain undiagnosed, increasing the risk of hypertension. Hence, more regular health screening programs are suggested. It may be expected that societal action against poverty in childhood would have a more pronounced counter-hypertension effect in females compared with males.[3] Also, cultural practices and norms among the poor influence attitudes toward health, treatment adherence, and the use of healthcare services. Studies have now proven the role of environmental issues such as air pollution, housing problems, and sanitation deficits in the onset of hypertension, especially in urban slums and poor rural sections in developing countries.[13,17] In addition, evidence shows that long-term exposure of poor people to environmental factors such as urban traffic, construction sites, industrial areas, and polluted water issues in metro cities could be a cause of increased arterial blood pressure, even among people otherwise living a healthy lifestyle.[18]

The geographic variations also found that Chamarajanagar district showed the highest prevalence (38.8%), likely due to its lower health infrastructure, and greater tobacco/alcohol usage. Also, cultural stigma and lack of preventive care could play a role here. In the case of Bangalore, despite housing more BPL populations had the lowest prevalence (25.5%), perhaps due to better education, health literacy and quality public health interventions like free medical screenings etc. Next, Mysore's relatively high prevalence (32.6%) can be attributed to rising obesity, rising pollution, semi-urban sedentary lifestyle etc. In addition, Hassan district showed a moderate prevalence (23.4%), aligning with a balanced socio-economic profile, where most people still engage in agricultural/manual labor but are increasingly exposed to urbanization lifestyle and poverty related stress.[11]

The findings underscore the pressing need for public health strategies that address socio-demographic

and lifestyle factors in hypertension management. More efforts to increase health literacy, foster better nutrition, encourage regular physical activity, and offer addiction support are necessary. It is suggested that future studies should be based on longitudinal approaches to find underlying links and examine genetic and co-morbidity factors related to hypertension. Targeted programs, especially community-oriented health initiatives, are very important for effectively addressing hypertension in low-income populations, thus fostering inclusive healthcare for BPL communities. The creation of a national hypertension registry is also necessary now. Today, AI-based applications can be utilized to track hypertension patients. Mobile health platforms could be designed for BPL communities, targeting remote and hilly regions.

The study limitations include its cross-sectional design, which limits the ability to establish causality. Furthermore, purposive sampling might lead to selection bias, and recall inaccuracies are also a limitation. Errors in blood pressure readings might sometimes influence the outcomes. Recall bias cannot be denied. Future studies should adopt longitudinal frameworks and focus on genetic, medical, and socioeconomic variables to deepen our understanding of hypertension.

Conclusion

The current study investigates the various lifestyle and socio-demographic factors contributing to hypertension among the Below Poverty Line (BPL) population in Karnataka. The results reveal that the incidence of hypertension is considerably influenced by vital elements such as age, level of education, socioeconomic status, type of occupation, alcohol and tobacco use, sedentary lifestyle, obesity, and poor dietary habits. The study found a strong association between low socioeconomic status and sedentary lifestyle, which increases hypertension risks, particularly within marginalised groups. There is a pressing need for culturally specific public health initiatives aimed at creating awareness, prevention, and management of hypertension to effectively address these issues among underserved populations. A strong political commitment is also essential here. Health department can use tele health and AI technology to track the hypertension patients in rural parts of the state.

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