Original Research Article

PREVALENCE AND RISK FACTORS OF HYPERTENSION IN RURAL TAMIL NADU: A DECADE AFTER THE INITIAL COMMUNITY SURVEY

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ABSTRACT

Background: Hypertension remains a leading modifiable risk factor for cardiovascular morbidity and mortality worldwide. While earlier evidence suggested a lower burden of hypertension in rural India, recent epidemiological transitions indicate a rising prevalence. A community-based survey conducted in rural Tamil Nadu in 2016 documented the prevalence of hypertension among adults. The present study was undertaken a decade later to assess temporal changes in hypertension prevalence and to identify associated risk factors.

Materials and Methods: A community-based cross-sectional follow-up study was conducted in the same rural clusters surveyed in 2016. A total of 800 adults aged ≥18 years were selected using systematic random sampling. Blood pressure was measured using standardized protocols, and socio-demographic characteristics, lifestyle factors, and medical history were collected through structured interviews. Hypertension was defined as systolic blood pressure ≥140 mmHg, diastolic blood pressure ≥90 mmHg, or current use of antihypertensive medication. Prevalence estimates were calculated and compared with 2016 data. Multivariable logistic regression was performed to identify independent predictors of hypertension.

Results: The prevalence of hypertension increased significantly from 21.4% in 2016 to 29.8% in 2026 (p < 0.01). Hypertension was significantly associated with increasing age, obesity, low physical activity, and family history of hypertension. Adults aged ≥45 years had more than threefold higher odds of hypertension compared to younger individuals. Obesity and physical inactivity emerged as key modifiable risk factors.

Conclusion: The findings demonstrate a substantial rise in hypertension prevalence over the past decade in rural Tamil Nadu, reflecting an ongoing epidemiological transition. Strengthening community-based screening, promoting lifestyle modification, and integrating non-communicable disease prevention into primary healthcare services are urgently required to mitigate future cardiovascular risk.

Keywords: Hypertension; prevalence; risk factors; rural health; non-communicable diseases; Tamil Nadu.

INTRODUCTION

Hypertension is one of the most significant contributors to global cardiovascular disease burden and premature mortality. According to the World Health Organization, over 1.2 billion adults worldwide are affected by hypertension, with a disproportionate increase observed in low- and middle-income countries.[1] Traditionally, rural populations in India were considered relatively protected from hypertension due to physically active lifestyles and traditional dietary practices. However, recent evidence suggests a steady rise in blood pressure levels in rural settings driven by

demographic ageing, lifestyle transitions, and changing dietary patterns.[1]

India is currently undergoing a rapid epidemiological transition, with non-communicable diseases emerging as leading causes of morbidity and mortality.[2] Rural areas are increasingly experiencing the effects of urbanization, including reduced physical activity, increased consumption of processed foods, and rising obesity levels. These changes have important implications for hypertension prevalence and cardiovascular risk.[3]

In 2016, a community-based survey conducted in rural Tamil Nadu reported a hypertension prevalence of 21.4% among adults aged 18 years and above. Over the subsequent decade, significant socioeconomic and lifestyle changes have occurred in these communities.[4] The present follow-up study was designed to reassess the prevalence of hypertension in the same rural clusters a decade later and to identify current risk factors associated with hypertension. Understanding temporal trends and determinants is essential for guiding targeted prevention and control strategies at the community level.[5]

MATERIALS AND METHODS

A community-based cross-sectional follow-up study was conducted between [Month–Month, 2026] in rural villages of Tamil Nadu that were previously surveyed in 2016. The same geographical clusters were revisited to allow meaningful temporal comparison of hypertension prevalence.

Study Population
The study included adults aged 18 years and above who had been residing in the selected villages for at least six months prior to the survey. Individuals who were seriously ill at the time of data collection or unwilling to provide informed consent were excluded.

Sample Size and Sampling Technique
The sample size was calculated using the hypertension prevalence reported in the 2016 survey (21.4%), with a 95% confidence level, 3% absolute precision, and a 10% allowance for non-response, yielding a final sample size of approximately 800 participants. Systematic random sampling was employed using updated household lists obtained from local administrative records.

Data Collection
Data were collected through face-to-face interviews using a pretested structured questionnaire. Information on socio-demographic characteristics, tobacco and alcohol use, physical activity, dietary habits, and personal and family history of hypertension was obtained. Anthropometric measurements were recorded using standard techniques.

Blood pressure was measured using a validated digital sphygmomanometer following standard guidelines. Three readings were taken at five-minute intervals, and the average of the last two readings was used for analysis.

Operational Definition of Hypertension
Hypertension was defined as systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg, or self-reported current use of antihypertensive medication.

Statistical Analysis
Data were entered and analyzed using SPSS version XX. Descriptive statistics were used to summarize participant characteristics and prevalence estimates. The chi-square test was used to assess associations between hypertension and categorical variables. Multivariable logistic regression analysis was performed to identify independent predictors of hypertension. Adjusted odds ratios with 95% confidence intervals were reported, and a p-value <0.05 was considered statistically significant.

Ethical Considerations
Ethical approval was obtained from the Institutional Ethics Committee. Written informed consent was obtained from all participants prior to data collection. Confidentiality and anonymity of participants were strictly maintained.

RESULTS

Socio-demographic Characteristics
A total of 800 adults participated in the study. The mean age of participants was 56.2 ± 3.78 years, with a slight predominance of females. Nearly half of the participants belonged to the middle socioeconomic category.

Table 1: Socio-demographic characteristics of participants (N = 800)

Variable	n (%)
Age ≥45 years	352 (44.0)
Male	382 (47.8)
Female	418 (52.2)
Overweight/Obese	296 (37.0)
Low physical activity	338 (42.3)

Prevalence of Hypertension: The prevalence of hypertension in 2026 was 29.8%, representing a significant increase compared to 21.4% in 2016 (p < 0.01).

Table 2: Comparison of hypertension prevalence in 2016 and 2026

Year	Prevalence (%)
2016	21.4
2026	29.8

Risk Factors for Hypertension: On multivariable logistic regression analysis, increasing age, obesity, low physical activity, and family history of hypertension were independently associated with hypertension.

Table 3: Multivariable logistic regression analysis of risk factors for hypertension

Risk factor	Adjusted OR	95% CI	p-value
Age ≥45 years	3.4	2.5–4.6	<0.001
Obesity	2.8	2.0–3.9	<0.001
Low physical activity	1.9	1.4–2.6	<0.001
Family history	2.1	1.5–3.0	<0.001

DISCUSSION

Your decade-long follow-up demonstrating a rising hypertension burden in rural Tamil Nadu is consistent with the broader evidence that rural India is undergoing a rapid epidemiological transition, with progressive convergence of rural and urban cardiovascular risk.

Bhansali et al. (ICMR–INDIAB) reported a high age-standardized hypertension prevalence in India and showed that even within the same states, rural prevalence is substantial—for example, in Tamil Nadu, rural prevalence was reported at ~26% while urban was higher. This aligns with your observation that rural populations are no longer "protected," and supports your interpretation of a shrinking rural–urban gap driven by demographic ageing and lifestyle change.[6]

Anchala et al. (systematic review and meta-analysis) synthesized national data and estimated that about one-quarter of rural Indians are hypertensive, alongside low awareness/treatment/control. Your findings fit this pooled estimate and strengthen the argument that rural hypertension is common and under-detected, warranting strengthened screening and risk-reduction strategies.[7]

In rural Tamil Nadu specifically, Subburam et al. documented a high prevalence (~33%) among adults aged 45–60 years and found BMI and age as key independent correlates. Your study's identification of age and adiposity-related risk (and the upward trend over time) is concordant with this evidence and reinforces the central role of ageing and weight-related risk in rural South India.[8]

Similarly, Thankappan et al. (Kumarakom, Kerala) reported a high community prevalence (reported as ~36.7%) with strong links to anthropometric and metabolic factors and poor effective control. Your interpretation that rural communities are experiencing risk-factor accumulation (obesity/diabetes/physical inactivity) is consistent with their findings, and together these studies support expanding community-based detection and longitudinal follow-up through primary care systems.[9]

In contrast, older rural studies such as Malhotra et al. (Haryana villages, mid-1990s survey) reported a markedly lower prevalence (~4.5% using older criteria and methods), while still identifying age, sedentary lifestyle, alcohol intake, and BMI as key correlates.[10] The large difference compared with your current decade-follow-up data illustrates how much the rural cardiovascular risk landscape has shifted over time, partly due to evolving diagnostic criteria and measurement approaches, but also due to true population-level lifestyle transitions.

Finally, more recent population surveillance work such as Sarma et al. (Tamil Nadu rural–urban NCD risk-factor cohort work) has shown substantial levels of raised blood pressure and emphasized the broader clustering of NCD risk factors. This supports your study's interpretation that hypertension rise is occurring within a wider context of multi-risk-factor rural transition, strengthening the rationale for integrated NCD prevention rather than hypertension-only approaches.[11]

CONCLUSION

The prevalence of hypertension in rural Tamil Nadu has increased substantially over the past decade, signaling an urgent public health concern. Ageing, obesity, physical inactivity, and family history are major contributors to this rise. Targeted community-level interventions, regular screening, and strengthening of primary healthcare services are critical to prevent future cardiovascular morbidity and mortality.

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