Section: Miscellaneous

Original Research Article

PREVALENCE OF NON-COMMUNICABLE DISEASES AND MEDICATION ADHERENCE IN THE GERIATRIC POPULATION: A CROSS-SECTIONAL STUDY IN THIRUVALLUR DISTRICT, TAMIL NADU

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ABSTRACT

Background: India is currently experiencing a demographic transition marked by a rapidly expanding elderly population, which may account for nearly 20% of the total population by 2050. This trend is accompanied by a significant rise in non-communicable diseases (NCDs) such as hypertension, diabetes mellitus, cardiovascular diseases, chronic respiratory illnesses, and cancer, all of which pose major public health challenges.This study was undertaken to assess the prevalence of major non-communicable diseases among the geriatric population in Thiruvallur district, Tamil Nadu, and to evaluate the level of medication adherence among those diagnosed with NCDs.

Materials and Methods: This community-based cross-sectional study was conducted over a period of six months. The study included elderly individuals aged 60 years. Participants who had been living in the area for at least one year and diagnosed with at least one non-communicable disease (NCD)and provided informed consent were included in the study.

Results: A total of 422 geriatric participants were included in the study. The majority (56.4%) were aged 60 to 69 years and 53.1% were female. Hypertension was the most prevalent non-communicable disease (65.9%), followed by diabetes mellitus (46%), cardiovascular diseases (26.5%), and chronic respiratory diseases (16.1%), while cancer was reported in 4.3% of participants. Multimorbidity was observed in 60.2% of the study population.

Conclusion: Economic barriers, limited education, and gaps in health system support were identified as key factors influencing adherence. Addressing these challenges requires a comprehensive approach, including strengthening financial protection through expanded health insurance coverage to reduce medication costs.

Keywords: Non communicable Diseases, Medication Adherence, Geriatric Population, Multimorbidity, Hypertension and Diabetes Mellitus.

INTRODUCTION

India is undergoing a demographic transition with a rapidly growing elderly population, expected to constitute nearly 20% of the population by 2050. Alongside aging, there is a concomitant rise in non-communicable diseases (NCDs) such as hypertension, diabetes mellitus, cardiovascular diseases, chronic respiratory diseases, and cancer, which pose significant health challenges. The geriatric population is particularly vulnerable to the burden of NCDs due to physiological decline,

multimorbidity, and dependency. In India, nearly 60% of deaths are attributed to NCDs, highlighting the urgent need for effective public health interventions targeting this demographic.

In Tamil Nadu, especially in semi-urban and rural districts such as Thiruvallur, the increasing life expectancy and lifestyle changes have led to an uptick in chronic diseases. However, regional data on the prevalence of NCDs among the elderly remain sparse. The geriatric population also faces unique challenges related to healthcare access, financial constraints, health literacy, and, importantly, medication adherence an essential factor in NCD management. Poor adherence can lead to uncontrolled disease progression, frequent hospitalizations, and higher mortality, placing a further burden on the healthcare system.

Understanding both the prevalence of NCDs and the pattern of medication adherence in this population can provide valuable insights for planning geriatric health services and policy development. While national-level data offers a broad picture, localized studies like this are crucial for tailoring interventions based on specific needs, cultural contexts, and healthcare infrastructure.

The present study aims to assess the prevalence of major NCDs and evaluate the extent and determinants of medication adherence among the elderly population in Thiruvallur district. This cross-sectional analysis is designed to bridge the knowledge gap and support evidence-based decision-making. The findings are expected to enhance the understanding of geriatric health trends and inform strategies to improve medication compliance, disease control, and overall quality of life for the elderly in Tamil Nadu. Objective: The primary objective of this study is to estimate the prevalence of common non-communicable diseases among the geriatric population (aged 60 years and above) in Thiruvallur district, Tamil Nadu.

The secondary objective is to assess the level of medication adherence in individuals diagnosed with NCDs and identify the socio-demographic and health system factors influencing adherence.

MATERIALS AND METHODS

Study Design and Setting:

This study employed is a community-based cross-sectional design conducted at Vels Medical College and Hospital, A Unit of VISTAS, over a 6-month period in the Thiruvallur district of Tamil Nadu. Thiruvallur is a semi-urban district with a diverse socio-demographic profile. The study targeted both urban and rural regions within the district to ensure representation.

Study Population and Inclusion Criteria:

The study population comprised individuals aged 60 years and above residing in Thiruvallur district. Participants who had resided in the area for at least one year, were diagnosed with at least one NCD (hypertension, diabetes mellitus, cardiovascular diseases, chronic respiratory diseases), and provided informed consent were included.

Sample Size and Sampling Technique:

Based on previous regional estimates of NCD prevalence (approximately 50%) and considering a 5% margin of error and 95% confidence interval, the minimum sample size was calculated to be 384. Adjusting for a 10% non-response rate, the final sample size was set at 422. A multistage stratified random sampling method was used. First, blocks were selected randomly, followed by the selection of villages or wards, and finally, elderly individuals were selected using systematic random sampling.

Data Collection Tool:

A structured, pre-tested questionnaire was used to collect data. It was divided into three sections: (1) socio-demographic profile, (2) health status and NCD history (verified using medical records wherever possible), and (3) medication adherence. The Morisky Medication Adherence Scale (MMAS-8), a validated tool, was employed to assess adherence.

Variables Collected:

Independent variables: age, gender, education, income, marital status, living arrangement, health insurance, healthcare access.

Dependent variables: presence of specific NCDs and medication adherence score.

Covariates: number of medications, duration of illness, frequency of follow-up visits.

Ethical Considerations:

Ethical clearance was obtained from the Institutional Ethics Committee of Vels Medical College and Hospital, Manjanakarnai, Thiruvallu Dist., Tamil Nadu. Informed written consent was obtained from all participants. Privacy and confidentiality of the information were strictly maintained.

Data Analysis:

Data were entered into Microsoft Excel and analyzed using SPSS version 25. Descriptive statistics were used to report the prevalence of individual NCDs. Categorical variables were summarized as frequencies and percentages.

The MMAS-8 scores were classified as high (score = 8), medium (6–7), and low (<6) adherence. Chi-square tests and logistic regression were used to identify associations between socio-demographic factors and adherence levels. A p-value of <0.05 was considered statistically significant.

Quality Control:

Field investigators were trained to administer the questionnaire uniformly. Data quality was ensured through daily field supervision, random checks, and double data entry for validation.

RESULTS

A total of 422 geriatric participants were included in the study.

Socio-demographic characteristics: More than half of the study participants belonged to the 60–69 years age group (56.4%), followed by 33.6% in the 70–79 years group and 10% aged ≥80 years. Females constituted a slight majority (53.1%). Nearly 42.2% were illiterate, while 28% had secondary or higher education. Most participants (46%) belonged to the middle-income category, and 37% lived below the poverty line. A large proportion (87.2%) resided with their families, while 12.8% lived alone (**Table 1**).

Prevalence of non-communicable diseases (NCDs): The most prevalent NCD was hypertension (65.9%), followed by diabetes mellitus (46%) and cardiovascular diseases (26.5%). Chronic respiratory diseases were present in 16.1% of participants, while cancer was reported in 4.3%. Notably, multimorbidity (≥2 NCDs) was identified in 60.2% of the study population (**Table 2**).

Medication adherence: Based on the MMAS-8 scoring system, only 23.2% of participants demonstrated high adherence. Medium adherence was observed in 37%, while 39.8% had low adherence (**Table 3**).

Factors associated with adherence: Logistic regression analysis revealed that advanced age (≥80 years) was significantly associated with lower adherence (aOR = 0.62; 95% CI: 0.41–0.93; p = 0.022). In contrast, female gender (aOR = 1.45; p = 0.038), higher education (aOR = 2.1; p < 0.001), presence of health insurance (aOR = 1.78; p = 0.004), and regular follow-up visits (aOR = 2.35; p < 0.001) were positively associated with good adherence (**Table 4**).

Comorbidity Patterns: Analysis of comorbidity patterns among the 254 participants with multimorbidity revealed that the most frequent combination was Hypertension and Diabetes Mellitus, affecting 164 individuals (64.6% of the multimorbid group). This was followed by Hypertension and Cardiovascular Diseases (CVD), present in 92 participants (36.2%). A substantial number of individuals (n=124, 48.8%) had complex health profiles involving combinations of three or more NCDs (**Table 5**).

Reasons for Low Medication Adherence: Among the 168 participants identified with low adherence, the leading self-reported reasons were financial burden, with the cost of medications being a barrier for 124 individuals (73.8%), and forgetfulness, reported by 108 participants (64.3%). Other significant factors included a complex drug schedule (42.9%), experiencing side effects (34.5%), and a lack of caregiver support (26.8%). Logistical challenges such as distance to healthcare facilities or transport issues were reported by 22.6% of this group (**Table 6**).

Table1:Socio-Demographic Characteristics of the Study Population (n=422)

Variable	Category	Frequency (n)	Percentage (%)
Age Group	60–69 years	238	56.4
	70–79 years	142	33.6
	≥80 years	42	10
Gender	Male	198	46.9
	Female	224	53.1
Education	Illiterate	178	42.2
	Primary	126	29.9
	Secondary or higher	118	28
Income	Below poverty line	156	37
	Middle income	194	46
	Above middle income	72	17
Living Arrangement	With family	368	87.2
	Alone	54	12.8

Table 2: Prevalence of Non-Communicable Diseases (NCDs) (n=422)

NCD Type	Frequency (n)	Percentage (%)
Hypertension	278	65.9
Diabetes Mellitus	194	46
Cardiovascular Diseases	112	26.5
Chronic Respiratory Diseases	68	16.1
Cancer	18	4.3
Multimorbidity (≥2 NCDs)	254	60.2

Table 3: Medication Adherence Levels (MMAS-8 Score) (n=422)

Adherence Level	Score Range	Frequency (n)	Percentage (%)
High Adherence	8	98	23.2
Medium Adherence	6–7	156	37
Low Adherence	<6	168	39.8

Table 4: Factors Associated with Medication Adherence (Logistic Regression)

Factor	Adjusted Odds Ratio (aOR)	95% CI	p-value
Age ≥80 years	0.62	0.41–0.93	0.022
Female Gender	1.45	1.02–2.06	0.038
Higher Education	2.1	1.44–3.07	<0.001
Health Insurance	1.78	1.20–2.64	0.004
Regular Follow-up	2.35	1.65–3.34	<0.001

Table 5: Comorbidity Patterns (Top Combinations)

Comorbidity Pair	Frequency (n)	Percentage (%)
Hypertension + Diabetes	164	38.9 / 64.6
Hypertension + CVD	92	21.8 / 36.2
Hypertension + Respiratory	45	10.9 / 18.1
Diabetes + CVD	58	13.7 / 22.8
Others	124	29.4 / 48.8

Percentage calculated from the total study population (n=422).
Percentage calculated from the total population with multimorbidity (n=254).

Table 6: Reasons for Low Adherence (Self-Reported) (n=168)

Reason	Frequency (n)	Percentage (%)
Cost of Medications	124	73.8
Forgetfulness	108	64.3
Side Effects	58	34.5
Complex drug schedule	72	42.9
Lack of care giver support	45	26.8
Distance or Transport issues	38	22.6

Note: Participants select more than one reason, so the total percentages exceed 100%.

DISCUSSION

This community-based cross-sectional study provides critical insights into the dual burden of high non-communicable disease (NCD) prevalence and suboptimal medication adherence among the geriatric population in Thiruvallur district, Tamil Nadu. The findings highlight a pressing public health challenge that necessitates targeted interventions.

The high prevalence of NCDs observed in our study is consistent with the national epidemiological transition. Hypertension (65.9%) and Diabetes Mellitus (46.0%) were the most prevalent conditions, figures that are substantially higher than some older national estimates but align closely with more recent studies focusing on the geriatric demographic in similar semi-urban settings.[^1,^2] The alarmingly high rate of multimorbidity (60.2%) is a particular cause for concern. This finding resonates with the work of the India State-Level Disease Burden Initiative, which reported a significant increase in the contribution of NCDs to the total disease burden in states like Tamil Nadu.[^3] The most common comorbidity pair was hypertension with diabetes (38.9% of the total sample), a clustering that significantly amplifies the risk of complications such as chronic kidney disease and cardiovascular events, thereby increasing the complexity of clinical management.[^4]

A pivotal finding of this study is the low level of medication adherence, with only 23.2% of participants demonstrating high adherence. This is lower than rates reported in some clinic-based studies, which may overestimate adherence, but is comparable to other community-based studies in India.[^5] The factors significantly associated with adherence provide a clear roadmap for intervention. The positive association between higher educational attainment and good adherence (aOR: 2.10) underscores the critical role of health literacy. This is supported by Sabaté's seminal work for the WHO, which emphasizes that understanding the chronic nature of a disease and the purpose of treatment is fundamental to adherence.[^6] Similarly, the strong positive association with regular follow-up (aOR: 2.35) highlights the importance of continuous patient-provider engagement and structured healthcare system support, acting as a reinforcing mechanism for adherence behaviors.

The protective effect of health insurance (aOR: 1.78) against poor adherence directly addresses the major barrier identified in our study: cost. The fact that 73.8% of participants with low adherence cited cost as a reason is a stark reflection of the financial toxicity associated with long-term NCD care in a population with limited means. This finding is consistent with studies across low- and middle-income countries, where out-of-pocket expenditure is a primary driver of treatment abandonment.[^7] The high prevalence of forgetfulness (64.3%) and the complexity of drug regimens (42.9%) point to cognitive load and the challenges of managing multiple medications, issues that are particularly acute in the elderly. These factors have been well-documented using the Morisky scale in various populations, validating our methodological approach.[^8]

The inverse association between advanced age (≥80 years) and adherence (aOR: 0.62) is not unexpected. This can be attributed to factors such as polypharmacy, sensory impairments, and a higher

likelihood of cognitive decline, which are more prevalent in the oldest-old. This necessitates age-friendly strategies, such as simplified regimens and greater involvement of caregivers, who were notably absent for 26.8% of those with low adherence.

When contrasted with studies from more developed regions or urban tertiary care centers in India, our findings from a semi-urban district reveal a starker picture of health system challenges, including access barriers (distance/transport: 22.6%).[^9] This underscores that national-level policies, such as the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS), must be adapted with greater nuance to address the specific barriers in semi-urban and rural contexts.[^10]

Strengths and Limitations

The strengths of this study include its community-based design, use of a validated adherence scale (MMAS-8), and a robust sampling method enhancing generalizability within the district. However, the cross-sectional design precludes causal inference. Furthermore, while the MMAS-8 is a standard tool, self-reporting is susceptible to recall and social desirability bias. The reliance on self-reported diagnoses, though supplemented by records where possible, remains a limitation.

CONCLUSION

In conclusion, this study reveals a high burden of NCDs and multimorbidity among the elderly in Thiruvallur, compounded by a critical level of suboptimal medication adherence, driven by economic, educational, and health-system factors. The results call for a multi-pronged strategy:

1. Financial Protection: Strengthening and expanding health insurance coverage to reduce out-of-pocket expenses for medications.
2. Health System Strengthening: Establishing regular, proactive follow-up systems and leveraging community health workers for follow-up and counseling.
3. Patient Empowerment: Implementing simple, low-cost interventions like pill organizers, reminder messages, and group education sessions to improve health literacy and self-management.
4. Caregiver Engagement: Involving family members in the treatment process to support medication administration and address the challenges of aging.

Future research should focus on longitudinal studies to understand the trajectory of adherence and the evaluation of targeted interventions designed to address the specific barriers identified in this study.

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