

Medication Adherence And Associated Factors Among Geriatric Population With Chronic Diseases In Rural Northern Kerala: A Cross-sectional Study

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Abstract:

Introduction: Medication adherence among elderly patients with chronic diseases is crucial for effective disease control but often remains inadequate. Limited evidence from India and the inadequate assessment of medication adherence among older adults warranted an evaluation of its determinants and impact. **Objectives:** This study aimed to assess medication adherence and associated factors among the geriatric population suffering with chronic disease using the Morisky Medication Adherence Scale (MMAS-8). **Methods:** A community-based cross-sectional study was conducted among 292 geriatric individuals aged ≥ 60 years with chronic diseases, selected through simple random sampling from a sampling frame of 537 eligible individuals in a rural field practice area of a tertiary care centre in Northern Kerala, India, in 2025. Data were collected through face-to-face interviews using a structured questionnaire, and medication adherence was assessed using the MMAS-8 scale. Data were analyzed using SPSS version 26. Chi-square test and multivariable logistic regression analysis were performed to identify factors associated with medication adherence. **Results:** Medication adherence among geriatrics showed that 62.3% had low adherence and 37.7% had high adherence. Higher adherence was independently associated with higher education (AOR=2.31), upper socioeconomic status (AOR=1.94), living with family (AOR=2.47), shorter duration of illness (AOR=2.62), having a single chronic condition (AOR=3.45), regular follow-up with healthcare providers (AOR=2.11), and absence of cost-related medication barriers (AOR=2.78). Additionally, younger elderly age, female gender, motivation to take medications, shorter waiting times, receipt of counseling, medication availability, and satisfaction with healthcare services showed significant associations with medication adherence in bivariate analysis ($p < 0.05$). **Conclusion:** Low medication adherence was observed in nearly two-thirds (62.3%) of geriatric patients with chronic diseases. Medication adherence was influenced by multiple socio-demographic, clinical, behavioral, and healthcare system factors.

Keywords: Chronic Diseases, Compliance, Geriatrics, Aged, Medication Adherence, Patient compliance, Therapeutics, Health Services Accessibility

Introduction:

Medication adherence among geriatric patients with chronic diseases remains a significant global challenge,

with nearly half of patients failing to follow prescribed treatment regimens. Poor adherence compromises treatment outcomes and increases healthcare expenditures.^[1] WHO defines adherence to long term

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therapy as the extent to which a persons behavior, such as taking medication, following a diet, and/or executing lifestyle changes correspond with agreed recommendations from a healthcare provider.^[2] Globally, adherence to treatment for chronic illnesses is estimated to be around 50%, and the rate is even lower in developing countries such as India.^[3] The Geriatric population is more prone to various chronic and recurrent illnesses like diabetes mellitus, hypertension, arthritis, neurodegenerative, gastrointestinal, ocular, genitourinary, respiratory disorders, etc., which may require chronic medication with multiple medications.^[4]

Measuring medication adherence is challenging because it reflects individual patient behavior. Various approaches have been used to assess adherence, including patient self-reports, pharmacy refill records, biomarker testing, and electronic monitoring devices. Among these methods, the Morisky Medication Adherence Scale (MMAS-8) is one of the most widely used self-report tools for assessing medication adherence behavior, with reported sensitivity and specificity of 93% and 53%, respectively.^[5] India's elderly population is expanding rapidly, currently accounting for 8.1% of the total population, and is projected to increase to 20% by 2050, with more than 70% of them having chronic diseases.^[2-5]

Despite the critical importance of adherence in chronic disease management, it is often under-assessed in routine clinical practice. The scientific rationale of this study was that suboptimal medication adherence among the geriatric population with chronic diseases contributes to poor disease control, increased complications, and a higher healthcare burden, necessitating the identification of influencing factors. In addition, there is a lack of comprehensive region-specific data on medication adherence among the geriatric Indian population.^[3-5] Therefore, this study was conducted to assess the level of medication adherence and identify associated factors among geriatric individuals with chronic diseases using the MMAS-8 scale, with the goal of generating evidence to guide targeted interventions and improve patient outcomes.

2. SUBJECTS AND METHODS

2.1 Study Design, Setting, Duration

A cross-sectional field study was conducted among the geriatric population in the rural field practice area of a tertiary healthcare facility in northern Kerala, India, over a three-month period from September to November 2025.

2.2. Study population, Sample size, and Sampling

Inclusion criteria: The study population comprised geriatric individuals aged 60 years and above residing in Puzhakkattiri Panchayat, the rural field practice area of the Rural Health Training Centre attached to MES Medical College, Perinthalmanna, Kerala, who were diagnosed with one or more chronic diseases by a registered medical practitioner and had been on prescribed medication for at least six months. Individuals who were willing to participate and provide informed consent were included in the study.

Exclusion criteria: Individuals with cognitive impairment or severe illness that prevented them from providing responses were excluded from the study.

The sample size was calculated using the formula $n = 4pq/d^2$. The prevalence (p) of low medication adherence among chronic disease patients was taken as 63.33% based on a study by Shakeel Ahmad Mir et al. (2018).^[2] Accordingly, . With an absolute precision (d) of 6%, the minimum required sample size was calculated to be 258 participants. "Although the minimum required sample size was 258, a 10% non-response rate was anticipated during the planning stage. Accordingly, the minimum sample size was adjusted to 284 participants ($258 \times 1.10 = 283.8$, rounded to 284). During data collection, 292 eligible participants were available and consented to participate; therefore, all were included in the study."

A comprehensive list of geriatric individuals along with their morbidity profile was available in the field area health records maintained at the rural health centre. A total of 537 eligible geriatric individuals with chronic diseases constituted the sampling frame. From this sampling frame, eligible individuals were identified, assigned unique identification numbers, and selected

using a simple random sampling technique with the aid of a computer-generated random number table, thereby ensuring an unbiased and representative sample.

2.3 Method of data collection

The data were collected through face-to-face interviews using a structured questionnaire. Eligible geriatric individuals were selected from the sampling frame through simple random sampling, and their residential addresses were obtained from the field area health records. Household visits were then conducted to interview the selected participants. In households with more than one selected eligible individual, each selected participant was interviewed separately.

The questionnaire consisted of multiple sections that were developed by incorporating items from validated questionnaires used in previous studies and tailoring them to address the specific objectives of the study.^[3-6] The first section collected socio-demographic information. The second section included disease-related details such as the type and number of chronic diseases, duration of illness, and history of complications. The third section explored treatment-related and patient-related factors including the number of medications, complexity of the drug regimen, side effects, forgetfulness, motivation, and beliefs regarding medication, as well as health system-related factors such as frequency of follow-up visits, access to healthcare providers, availability of medicines, and financial burden of treatment.

Medication adherence was assessed using the 8-item Morisky Medication Adherence Scale (MMAS-8),^[5] a validated self-report questionnaire consisting of seven dichotomous (Yes/No) items and one Likert-scale item. Items 1-4 and 6-7 are scored as Yes = 0 and No = 1, while item 5 is reverse-scored (Yes = 1, No = 0). Item 8 is scored on a Likert scale ranging from “Never/Rarely” (1.00), “Once in a while” (0.75), “Sometimes” (0.50), “Usually” (0.25), to “All the time” (0.00). The total MMAS-8 score ranges from 0 to 8, with a score of 8 indicating high adherence, 6 to <8 indicating medium adherence, and <6 indicating low adherence according to the scoring criteria described by Morisky et al.^[5]

The MMAS-8 was administered in Malayalam through interviewer-assisted face-to-face interviews. The original English version was translated into Malayalam by the investigators and subsequently back-translated into English by an independent bilingual expert to ensure conceptual equivalence. The translated version was reviewed by subject experts from the Department of Community Medicine for clarity, content validity, and cultural appropriateness before use in the study. The MMAS-8 questionnaire was adapted from the original scale developed by Morisky et al. and used with appropriate citation.^[5] Furthermore, a pilot study was conducted in the field among 10% of the calculated sample size to assess feasibility and clarity, and necessary modifications were made accordingly. All questionnaires were checked for completeness at the time of data collection, and missing data were minimized through on-site verification by the investigators. No missing data were identified in the final dataset, and all 292 participants were included in the analysis.

2.4 Operational definitions

- Geriatric population: Individuals aged 60 years and above.
- Chronic disease: A medical condition diagnosed by a registered medical practitioner that has persisted for at least six months and requires ongoing medication or follow-up.
- Medication adherence: Adherence was assessed using the 8-item Morisky Medication Adherence Scale (MMAS-8).^[5] Based on the original scoring criteria, participants with a score of 8 were classified as having high adherence, those with scores from 6 to <8 as having medium adherence, and those with scores <6 as having low adherence. Although adherence was initially categorized as high, medium, and low according to the original MMAS-8 scoring criteria, for analytical purposes, participants with MMAS-8 scores ≥ 6 (high and medium adherence categories) were combined and classified as having high adherence, whereas those with scores <6 were classified as having low adherence. This dichotomization was performed to facilitate statistical analysis and interpretation of

factors associated with adequate medication adherence.

- Educational status: Educational status was categorized as high education (higher secondary/intermediate or diploma, graduate, and professional education) and low education (high school, middle school, primary school, and illiterate).
- Occupational status: Occupational status was categorized as high occupation (professional, semi-professional, clerical/shop owner/farmer, and skilled worker) and low occupation (semi-skilled, unskilled, and unemployed/retired).
- Socioeconomic status (SES): Socio-economic status was assessed using the Modified BG Prasad Scale and categorized as upper socio-economic status (Classes I, II, and III) and lower socio-economic status (Classes IV and V).

2.5 Data analysis and ethical considerations

Data collected were entered and analyzed using Statistical Package for the Social Sciences (SPSS) version 26. Descriptive statistics were expressed as frequencies and percentages, and cross-tabulation was performed for relevant variables. Chi-square test was used for bivariate analysis, and a p-value ≤ 0.05 was considered statistically significant. To account for potential confounding, multivariable logistic regression analysis was performed. Adjusted odds ratios (AORs) with 95% confidence intervals (CIs) were calculated.

All participants were assured of confidentiality and anonymity, participation was voluntary, and written informed consent was obtained prior to data collection. Ethical approval was obtained from the Institutional Ethics Committee of the MES Medical College, Perinthalmanna, Kerala, India, with reference number IEC/MES/UG64/2025 dated 11th September 2025.

3. RESULTS

3.1 Sociodemographic characteristics (n=292)

Among the 292 participants, the majority belonged to the age group >76 years (34.2%), followed by 6065 years (28.1%). Females constituted a slightly higher

proportion (51.4%). Most participants were in the low occupation category (76.0%) and had lower education (72.6%). A majority were married (71.9%) and belonged to the lower socio-economic class (76.0%). Most were living with spouse or family (82.9%), had a duration of illness >5 years (62.3%). Regarding disease burden, 34.9% of participants had two chronic conditions, 33.6% had one chronic condition, and 31.5% had three or more chronic conditions. (Table 1)

3.2 Patient-related treatment factors and health system-related factors (n=292)

A high proportion of participants believed that medications help control their disease (93.2%), were motivated to take them as prescribed (95.3%), and were aware of the purpose of their medications (95.8%). Meanwhile, a smaller proportion reported experiencing complexity in the medication schedule (16.7%) or side effects causing hesitation (9.9%). Use of aids or reminders was notably low (4.2%), and only one-fourth (25.0%) reported receiving assistance from family members or caregivers. (Table 2)

Most participants reported regular follow-up with healthcare providers (83.3%), easy communication with doctors (97.4%), and easy access to required medications (93.2%). A majority had also received education or counseling regarding the importance of medication adherence (80.7%). Barriers such as missing medications due to high cost (8.9%), long waiting times affecting follow-up (14.6%), and unavailability of prescribed medications (12.5%) were reported by a relatively small proportion of participants. Overall, patient satisfaction with healthcare services was high. (Table 3)

3.3 Medication Adherence (n=292)

Medication adherence among geriatrics was assessed using the MMAS-8 questionnaire, which showed that 110 participants (37.7%) had high adherence, while 182 (62.3%) had low adherence. This indicates that a greater proportion of the geriatric population demonstrated low adherence compared to high adherence. (Figure 1)

Table 1: Sociodemographic and clinical characteristics of the study participants (n = 292)

Variable	Frequency (n)	Percentage (%)
Age (years)		
60-65	82	28.1
66-70	60	20.5
71-75	50	17.1
>76	100	34.2
Gender		
Female	150	51.4
Male	142	48.6
Occupation		
High	70	24.0
Low	222	76.0
Education		
Higher	80	27.4
Lower	212	72.6
Marital Status		
Married	210	71.9
Others	82	28.1
Socio-economic Status		
Upper	70	24.0
Lower	222	76.0
Living Arrangement		
With family	242	82.9
Alone	50	17.1
Duration of Illness		
<1-5 years	110	37.7
>5 years	182	62.3
Number of Chronic Conditions		
1	98	33.6
2	102	34.9
≥3	92	31.5

Table 2: Patient-related treatment factors influencing medication-taking behavior among the geriatric population (n-292)

Patient-related factors	YES n (%)	NO n (%)
Felt medication schedule complex or confusing	49 (16.7)	243 (83.3)
Believe that the medications help control your disease	272 (93.2)	20 (6.8)
Motivated to take your medications as prescribed	278 (95.3)	14 (4.7)
Use aids/reminders to remember medication	12 (4.2)	280 (95.8)
Experienced any side effects that made you hesitant to take medications	29 (9.9)	263 (90.1)
Knows the purpose of each of the medications used	280 (95.8)	12 (4.2)
Receive help from a family member or caregiver to take medications	73 (25.0)	219 (75.0)

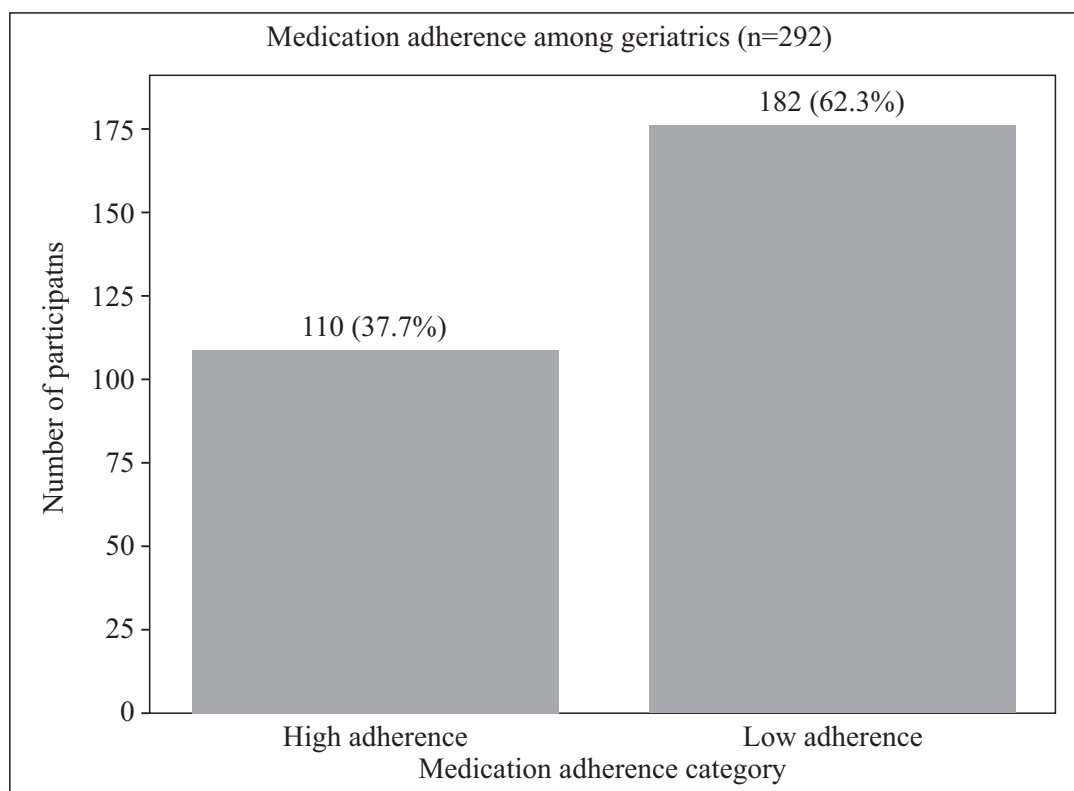
3.4 Medication adherence and sociodemographic characteristics (n=292)

Higher medication adherence was more common among individuals aged 60-65 years, with adherence declining as age increased ($\chi^2=76.91$, $p<0.001$). Females

demonstrated better adherence compared to males ($\chi^2=7.71$, $p=0.005$). Participants with higher occupation, higher education, upper socio-economic status, and those who were married showed significantly better adherence ($p<0.05$). Similarly, those living with family

Table 3: Health system-related factors influencing medication-taking behavior among the geriatric population (n=292)

Health system-related factors	Yes n (%)	No n (%)
Regular follow-up with the healthcare provider	243 (83.3)	49 (16.7)
Able to communicate concerns to the doctor easily	284 (97.4)	8 (2.6)
Easy to access the medications needed	272 (93.2)	20 (6.8)
Ever missed taking medicines due to high cost	26 (8.9)	266 (91.1)
Long waiting times at health centers affected follow-up	43 (14.6)	249 (85.4)
Received education or counseling about the importance of taking medications from healthcare providers	236 (80.7)	56 (19.3)
Ever found prescribed medications unavailable at nearby pharmacies or facilities	37 (12.5)	255 (87.5)

Figure 1: Medication adherence among geriatric patients assessed using MMAS-8 (n=292)

had higher adherence than those living alone ($\chi^2=9.94$, $p=0.011$). In terms of clinical factors, shorter duration of illness (<5 years) and having a single chronic condition were significantly associated with higher adherence ($p<0.001$). (Table 4)

3.5 Medication adherence and different factors (n=292)

A statistically significant association was observed across patient and health system-related factors. Higher adherence was consistently seen among those who were

motivated to take medicines (38.8% vs 14.3%), had regular follow-up (39.1% vs 30.6%), did not miss medications due to cost (39.5% vs 19.2%), and were not affected by long waiting times (40.2% vs 23.3%). Similarly, participants who received counseling (39.0% vs 32.1%), did not experience medication unavailability (40.4% vs 18.9%), and were satisfied with their doctor (38.4% vs 12.5%) demonstrated better adherence compared to their counterparts. (Table 5)

Table 4: Sociodemographic characteristics and their association with medication adherence (n=292)

Variable	Category	High adherence n (%)	Low adherence n (%)	Chi-square	P value
Age (years)	60–65	58 (70.7)	24 (29.3)	76.91	<0.001
	66–70	27 (45.0)	33 (55.0)		
	71–75	14 (28.0)	36 (72.0)		
	>76	11 (11.0)	89 (89.0)		
Gender	Female	68 (45.3)	82 (54.7)	7.71	0.005
	Male	42 (29.6)	100 (70.4)		
Occupation	High	43 (61.4)	27 (38.6)	22.10	0.010
	Low	67 (30.2)	155 (69.8)		
Education	Higher	48 (60.0)	32 (40.0)	23.30	<0.001
	Lower	62 (29.2)	150 (70.8)		
Marital status	Married	93 (44.3)	117 (55.7)	13.90	0.010
	Others	17 (20.7)	65 (79.3)		
SES Upper	44 (62.9)	26 (37.1)	24.80	<0.010	
	Lower	66 (29.7)	156 (70.3)		
Living arrangement	With family	101 (41.7)	141 (58.3)	9.94	0.011
	Alone	9 (18.0)	41 (82.0)		
Duration of illness	<1–5 years	63 (57.3)	47 (42.7)	15.82	<0.001
	>5 years	47 (25.8)	135 (74.2)		
No. of chronic conditions	1	61 (62.2)	37 (37.8)	38.80	<0.001
	2	29 (28.4)	73 (71.6)		
	≥3	20 (21.7)	72 (78.3)		

Table 5: Different factors associated with medication adherence among the geriatric population (n=292)

Factor	Category	High adherence n (%)	Low adherence n (%)	P value
Motivated to take medicines	No	2 (14.3)	12 (85.7)	0.018
	Yes	108 (38.8)	170 (61.2)	
Regular follow-up	No	15 (30.6)	34 (69.4)	0.002
	Yes	95 (39.1)	148 (60.9)	
Missed medication due to cost	Yes	5 (19.2)	21 (80.8)	<0.001
	No	105 (39.5)	161 (60.5)	
Waiting time affected follow-up	Yes	10 (23.3)	33 (76.7)	<0.001
	No	100 (40.2)	149 (59.8)	
Received counseling	No	18 (32.1)	38 (67.9)	0.004
	Yes	92 (39.0)	144 (61.0)	
Medication unavailable	Yes	7 (18.9)	30 (81.1)	0.003
	No	103 (40.4)	152 (59.6)	
Satisfied with the doctor	No	1 (12.5)	7 (87.5)	<0.001
	Yes	109 (38.4)	175 (61.6)	

3.6 Multivariable logistic regression findings

In multivariable logistic regression analysis, higher education (AOR=2.31, p=0.008), upper socioeconomic status (AOR=1.94, p=0.042), living with family (AOR=2.47, p=0.027), shorter duration of illness (<5

years) (AOR=2.62, p=0.002), having a single chronic condition (AOR=3.45, p<0.001), regular follow-up with healthcare providers (AOR=2.11, p=0.041), and absence of cost-related medication barriers (AOR=2.78, p=0.039) were independently associated with better

Table 6: Multivariable logistic regression analysis of factors associated with medication adherence among geriatric patients with chronic diseases (n=292)

Variable	AOR	95% CI	p value
Higher education	2.31	1.24–4.31	0.008
Upper SES	1.94	1.02–3.68	0.042
Living with family	2.47	1.11–5.52	0.027
Duration <5 years	2.62	1.42–4.83	0.002
One chronic condition	3.45	1.78–6.69	<0.001
Regular follow-up	2.11	1.03–4.34	0.041
Missed medication due to cost (No)	2.78	1.05–7.36	0.039
Received counseling	1.84	0.94–3.58	0.074
Medication unavailable (No)	2.07	0.88–4.89	0.095

medication adherence. Although receipt of counseling (AOR=1.84, $p=0.074$) and absence of medication unavailability (AOR=2.07, $p=0.095$) showed higher odds of adherence, these associations were not statistically significant. (Table 6)

4. DISCUSSION

The present study assessed medication adherence among geriatric patients with chronic diseases and found that 62.3% exhibited low adherence, while 37.7% had high adherence, indicating a substantial burden of non-adherence. Similar findings were reported by Regina Antony et al.^[6], who observed noncompliance rates ranging from 40-75%, Shakeel Ahmad Mir et al.^[2], who reported low adherence in 63.33% of patients, Awad et al.^[7], who documented poor adherence in 54.7% of geriatric patients, Jin et al.^[12], who found 52.5% low adherence, Angela Francis et al.^[14] and Smaje et al.^[15], both of whom reported low adherence in more than half of the study participants. Likewise, Khaizer et al.^[17] reported 47.1% medium-to-poor adherence, Shruthi et al.^[18] observed nearly 55% low adherence, Andhi et al.^[19] documented only 27.12% high adherence, and Lakshmi et al.^[22] reported 53.84% low adherence, 31.63% medium adherence, and 14.5% high adherence, all supporting the finding of suboptimal adherence among older adults. In contrast, Punnapurath et al.^[8] reported high, medium, and low adherence rates of 74%, 25%, and 1%, respectively, while Lemay et al.^[9] observed low adherence in only 24% of participants. Similarly, Cardona et al.^[13] reported only 6% low adherence, Angadi et al.^[20] documented 58.5% adherence, Sharma et al.^[21] reported 80.3% good

adherence and 19.7% poor adherence, and Polat et al.^[16] found more than 90% high adherence, indicating considerably better adherence than that observed in the present study. These similarities may reflect the common challenges of chronic disease management in the elderly, whereas the observed differences may be attributed to variations in socio-demographic characteristics, healthcare accessibility, patient awareness, healthcare delivery systems, and socio-cultural factors across different study settings.

The sociodemographic profile of the participants in the present study was broadly comparable to that reported in previous studies among elderly populations with chronic diseases. Females constituted a slightly higher proportion (51.4%), similar to Sharma et al.^[21] (56.6%), whereas male predominance was reported by Shruthi et al.^[18] (60.2%), Antony et al.^[6] (51.3%), and Udupa et al.^[10] (>70%). A majority of participants in the present study had lower educational status (72.6%) and belonged to lower socioeconomic groups (76.0%), which was comparable to findings by Awad et al.^[7] where 60% had low education, and 88.7% were unemployed, and Udupa et al.^[10], where most participants belonged to the lower socioeconomic class. The proportion of married participants in the present study (71.9%) was also comparable to Jin et al.^[12] (81.3%) and Antony et al.^[6] (82.8%). Furthermore, most participants were living with family members (82.9%), similar to Sharma et al.^[21], where 63.9% lived in joint families. These similarities suggest that the study population was largely representative of geriatric populations evaluated in previous medication adherence studies.

In the present study, a high proportion of participants believed that medications help control their disease (93.2%), were motivated to take them as prescribed (95.3%), and knew the purpose of their medications (95.8%), indicating good awareness regarding disease management. These findings were comparable to Lemay et al.^[9], who reported that patients perceiving medications as necessary were more likely to adhere. However, despite this high level of awareness and positive perception, adherence remained suboptimal, suggesting a gap between knowledge and actual practice. Similar observations were reported by Udupa et al.,^[10] where 94% believed in the benefits of adherence, yet only 72% demonstrated actual adherence, indicating that favorable attitudes alone may not ensure consistent medication-taking behavior. This disparity may be due to the influence of behavioral, psychological, and practical barriers such as forgetfulness, polypharmacy, side effects, and limited social support that hinder the translation of knowledge into consistent medication-taking behavior.

Healthcare system factors, including regular follow-up, medication availability, shorter waiting times, patient satisfaction, and receipt of counseling, showed significant associations with better adherence, consistent with K J et al.^[11], who identified healthcare access and continuity of care as key determinants. Similarly, Awad et al.^[7] reported that healthcare system barriers such as accessibility and medication-related burden influenced adherence behavior. Financial constraints, although affecting a smaller proportion of participants, were strongly associated with adherence, in line with Punnapurath et al.^[8], which identified financial dependence as a barrier. Furthermore, improved adherence among those who received education or counseling was comparable to findings by Morisky et al.^[5], emphasizing the role of patient engagement and effective communication in promoting adherence.

Findings from Jin et al.^[12], Angela Farances et al.^[14], Smaje et al.^[15], and Cardona et al.^[13] were largely consistent with the present study, as they collectively highlighted the role of education, socio-economic status, patient satisfaction, counseling, healthcare access, and

multimorbidity as significant determinants of medication adherence, similar to the socio-demographic and healthcare-related factors identified in the present study. However, Polat et al.^[16] reported higher adherence motivation among males and professionally active individuals, in contrast to the present findings, where better adherence was observed among females. These similarities and variations may be attributed to differences in healthcare systems, socio-cultural context, and patient behavior across study populations.

Findings from Shruthi et al.^[18], Shakeel Ahmad Mir et al.^[2], and K J et al.^[11] were consistent with the present study, as factors such as higher education, female gender, younger elderly age, regular follow-up, and lower treatment complexity were associated with better adherence, while lower literacy and polypharmacy were linked to non-adherence. Similarly, Angadi et al.^[20] and Sharma et al.^[21] highlighted the influence of socio-economic status, occupation, and awareness, which corresponded with the present findings on occupation, socio-economic class, and financial constraints. Studies by Andhi et al.^[19] and Lakshmi et al.^[22] further emphasized the role of regimen complexity, number of comorbidities, and barriers such as forgetfulness and duration of therapy, aligning with the present observation that multiple chronic conditions and longer illness duration reduced adherence. Meanwhile, Udupa et al.^[10] reported limited influence of socio-demographic factors, contrasting with the present findings, and Khaizer et al.^[17] identified gender differences in outcomes, though in a different context. These similarities and differences may be explained by variations in healthcare access, patient awareness, treatment complexity, and behavioral factors across different populations. These variations may also reflect contextual differences in healthcare access, cultural factors, and patient support systems.

Taken together, medication adherence among geriatric patients showed considerable variability across different settings, with consistently suboptimal levels despite good awareness and positive attitudes toward treatment. Both individual factors, such as socio-demographic profile, disease burden, and behavioral

aspects, as well as healthcare system factors like accessibility, counseling, and continuity of care, were found to influence adherence. The discussion overall indicates a persistent gap between knowledge and practice, shaped by contextual, behavioral, and system-level determinants

5. LIMITATIONS

The study used a validated medication adherence assessment tool (MMAS-8) and employed community-based random sampling, which enhanced the reliability and representativeness of the findings. In addition, a wide range of socio-demographic, clinical, patient-related, and healthcare system factors were evaluated to provide a comprehensive assessment of medication adherence among geriatric patients. The findings of this study should be interpreted in light of certain limitations. The cross-sectional design precludes the establishment of causal relationships between the identified factors and medication adherence. Adherence was assessed using the self-reported MMAS-8 scale, which may have been subject to recall bias and social desirability bias, whereby participants might have overreported adherence behaviors. In addition, no objective measures of adherence, such as pill counts or pharmacy refill records, were used for validation. As the study was conducted in a single rural Panchayat, the findings may have limited generalizability to other populations and healthcare settings.

6. CONCLUSION

Medication adherence among geriatric patients with chronic diseases was suboptimal, with 62.3% of participants exhibiting low adherence and only 37.7% demonstrating high adherence. Better adherence was observed among younger elderly individuals, females, those with higher educational and socioeconomic status, those living with family, and participants with a lower disease burden. Healthcare-related factors such as regular follow-up, absence of cost-related barriers, counseling, and medication availability were also associated with improved adherence. Multivariable logistic regression identified higher education, upper socioeconomic status, living with family, shorter

duration of illness, having a single chronic condition, regular follow-up, and absence of cost-related barriers as independent predictors of medication adherence. These findings highlight the multifactorial nature of medication adherence among older adults with chronic diseases.

7. RECOMMENDATIONS

Targeted interventions should be implemented to improve medication adherence among the geriatric population with chronic diseases, focusing on both individual and healthcare system factors identified in the study. Structured patient education and counseling should be strengthened to enhance understanding of treatment importance, while regular follow-up mechanisms and reminder systems should be incorporated to address forgetfulness. Improving accessibility and affordability of medications may be achieved through strengthening the availability of essential medicines at public health facilities, promoting the use of low-cost generic medications, and expanding government-supported drug distribution schemes. Reducing waiting times through appointment-based services, streamlined patient flow, and dedicated geriatric clinics may further help minimize treatment-related barriers and improve medication adherence. Furthermore, promoting effective patient-provider communication and encouraging the involvement of family members or caregivers can support sustained adherence. These measures should be integrated into routine clinical practice and community health programs to achieve better disease control and reduce the overall healthcare burden.

8. DECLARATIONS

Conflict of Interest: No

Funding: Self-funded study

Use of AI: Artificial intelligence was used during manuscript preparation to assist with grammar correction, paraphrasing, and sentence refinement. The AI tool used was ChatGPT. No AI tools were used for study design, data collection, or data analysis.

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