Journal of Chemical and Pharmaceutical Sciences

Journal of Chemical and Pharmaceutical Sciences-JCHPS (2025) 18 (4): 128-137
Online ISSN: Online 2349-8552, Print ISSN: 0974-2115
Research Article | Pharmaceutical Sciences | MCI Approved | Peer-Reviewed | Referred | OA Journal |

The Impact of MA on HRQoL Among Patients with Diabetes and Hypertension in India: A Cross-Sectional Analysis

Priyanka D[1*] and K. Ashok Kumar[2]

[1]Research Scholar, Faculty of Pharmaceutical Sciences, Motherhood University, Roorkee, Uttarakhand, India
[2]Research Supervisor and Professor, Faculty of Pharmaceutical Sciences, Motherhood University, Roorkee, Uttarakhand, India

Received: 15 Aug 2025 / Accepted: 21 Sept 2025 / Published online: 01 Oct 2025
*Corresponding Author Email: priyanka1610229@gmail.com

ABSTRACT

Background: Medication adherence is a critical determinant of health outcomes in chronic diseases. This study aimed to assess the level of medication adherence, its relationship with Health-Related Quality of Life (HRQoL), and factors influencing adherence among patients with diabetes and/or hypertension in India. **Methods:** A cross-sectional study was conducted among 410 patients with chronic conditions attending outpatient clinics at tertiary care hospitals in Uttarakhand, India. Data were collected using the Morisky Medication Adherence Scale (MMAS-8), Short Form-36 (SF-36), and WHOQOL-BREF. Statistical analysis included descriptive statistics, chi-square tests, Pearson's correlation, and multiple linear regression.**Results:** The results revealed that only 19.0% of participants demonstrated high adherence, while 40.0% exhibited low adherence. Mean MMAS-8 score was 5.8 ± 1.9. Significant positive correlations were found between adherence and all HRQoL domains ($p < 0.001$ for all), with the strongest correlations for General Health ($r = 0.412$) and Physical Component Summary ($r = 0.398$). Medication adherence emerged as the strongest predictor of both physical ($\beta = 0.318$, $p < 0.001$) and mental ($\beta = 0.286$, $p < 0.001$) HRQoL, even after controlling for demographic and clinical factors. Forgetfulness (34.6%), lack of symptoms (23.9%), and too many medications (21.0%) were the most common barriers to adherence. **Conclusions:** Medication adherence is suboptimal and significantly associated with HRQoL in this population. Interventions to improve adherence, particularly those addressing forgetfulness and regimen complexity, could lead to improved quality of life for patients with chronic conditions in India.

KEY WORDS: Medication Adherence, Health-Related Quality of Life, Diabetes Mellitus, Hypertension, India, MMAS-8, SF-36.

1. INTRODUCTION

The global healthcare landscape is shifting towards a patient-centered approach, elevating Health-Related Quality of Life (HRQoL) as a critical metric for evaluating treatment effectiveness (Karimi & Brazier, 2016). In chronic conditions like diabetes and hypertension, high HRQoL is often dependent on effective symptom management, which is closely tied to medication adherence (Chantzaras & Yfantopoulos, 2022). The World Health Organization (WHO) defines medication adherence as the extent to which a patient's behavior aligns with the recommendations provided by healthcare professionals (WHO, 2003).

Non-adherence remains a pervasive challenge, with the WHO estimating that only about 50% of patients with chronic illnesses adhere to long-term therapies (WHO, 2003; Albadrani et al., 2024). In India, the situation is particularly concerning. A systematic review found a pooled prevalence of non-adherence ranging from 11% to 68% across studies for type 2 diabetes (Basu et al., 2025). The burden of non-adherence is profound, contributing to suboptimal health outcomes, increased morbidity and mortality, higher healthcare costs, and diminished quality of life (Iuga & McGuire, 2014; Khan & Socha-Dietrich, 2018).

Journal of Chemical and Pharmaceutical Sciences

Journal of Chemical and Pharmaceutical Sciences-JCHPS (2025) 18 (4): 128-137
Online ISSN: Online 2349-8552, Print ISSN: 0974-2115
Research Article | Pharmaceutical Sciences | MCI Approved | Peer-Reviewed | Referred | OA Journal |

While the relationship between adherence and HRQoL has been studied, findings are mixed, and there is limited research from the Indian context (Chantzaras & Yfantopoulos, 2023; Horvat et al., 2018). This study aims to bridge this gap by examining the impact of medication adherence on HRQoL among patients with chronic conditions in India and identifying key factors influencing adherence. The specific objectives were to assess the level of medication adherence and HRQoL, examine their relationship, and identify factors contributing to non-adherence.

2. METHODS

2.1 Study Design and Setting

A cross-sectional study was conducted at selected outpatient clinics and tertiary care hospitals and surrounding regions, including MGM Hospital. The study was part of a larger mixed-methods project.

2.2 Study Population and Sample Size

Patients aged 18 years or above, diagnosed with diabetes mellitus and/or hypertension, and on long-term medication for at least 6 months were included. A sample size of 423 was calculated based on an estimated 50% adherence prevalence, a 95% confidence level, and a 5% margin of error, plus a 10% non-response rate. A total of 423 patients provided informed consent, and complete data were obtained from 410 participants.

2.3 Data Collection Tools

Medication adherence was assessed using the validated 8-item Morisky Medication Adherence Scale (MMAS-8), with scores categorized as high (score = 8), medium (score 6 to <8), and low (score <6) (Tanaka et al., 2021). HRQoL was assessed using the Short Form-36 (SF-36) Health Survey, which measures eight health domains and yields Physical (PCS) and Mental (MCS) Component Summary scores (Kumari et al., 2025). The WHOQOL-BREF was also used to capture culturally relevant aspects of quality of life. A structured questionnaire collected demographic and clinical information.

2.4 Ethical Considerations

The study protocol was approved by the Institutional Ethics Committee. Written informed consent was obtained from all participants.

2.5 Statistical Analysis

Descriptive statistics were used to summarize data. Bivariate analysis included chi-square tests for categorical variables. Pearson's correlation coefficient was used to assess the relationship between adherence and HRQoL scores. Multiple linear regression was used to identify predictors of HRQoL, controlling for potential confounders such as age, gender, socioeconomic status, disease duration, and comorbidities.

3. RESULTS

3.1 Participant Characteristics

A total of 410 patients were included in the analysis. The majority were in the age group of 51-60 years (28.8%), followed by those above 60 years (21.2%). The mean age was 52.8 ± 14.6 years. Male participants constituted 59.0% of the sample. Among the participants, 36.1% had diabetes mellitus, 39.5% had hypertension, and 24.4% had both conditions (Table 1). Notably, only 23.6% of diabetes patients had optimal glycemic control (HbA1c <7%), and 45.8% of hypertension patients had uncontrolled blood pressure.

Table 1: Clinical Characteristics of Study Participants (N=410)

Characteristic	Category	Frequency (n)	Percentage (%)
Primary Diagnosis	Diabetes Mellitus	148	36.1
	Hypertension	162	39.5

Journal of Chemical and Pharmaceutical Sciences

Journal of Chemical and Pharmaceutical Sciences-JCHPS (2025) 18 (4): 128-137
Online ISSN: Online 2349-8552, Print ISSN: 0974-2115
Research Article | Pharmaceutical Sciences | MCI Approved | Peer-Reviewed | Referred | OA Journal |

Characteristic	Category	Frequency (n)	Percentage (%)
	Both (Diabetes + Hypertension)	100	24.4
Duration of Illness	<5 years	125	30.5
	5-10 years	168	41.0
	>10 years	117	28.5
	Mean ± SD	7.8 ± 4.2 years	
Number of Medications	1-2	145	35.4
	3-4	178	43.4
	≥5	87	21.2
	Mean ± SD	3.2 ± 1.4	
Frequency of Dosing	Once daily	168	41.0
	Twice daily	185	45.1
	Three times daily	57	13.9
Comorbidities	None	125	30.5
	1 comorbidity	158	38.5
	≥2 comorbidities	127	31.0
HbA1c (for diabetes patients)	<7%	58	23.6*
	7-8%	95	38.6*
	>8%	93	37.8*
Blood Pressure (for hypertension patients)	Controlled (<140/90)	142	54.2#
	Uncontrolled (≥140/90)	120	45.8#

**Among 246 diabetes patients; #Among 262 hypertension patients*

3.2 Medication Adherence

The analysis of medication adherence using the MMAS-8 revealed that only 19.0% of participants demonstrated high adherence, while 41.0% had medium adherence, and 40.0% exhibited low adherence (Table 2). The mean adherence score was 5.8 ± 1.9 (Figure 1).

Table 2: Distribution of Medication Adherence (MMAS-8) Scores (N=410)

Adherence Category	MMAS-8 Score	Frequency (n)	Percentage (%)
High Adherence	8	78	19.0
Medium Adherence	6 to <8	168	41.0
Low Adherence	<6	164	40.0
Total		**410**	**100.0**
Statistic			**Value**
Mean ± SD			5.8 ± 1.9
Median			6.0
Range			1-8
Interquartile Range			4-7

Journal of Chemical and Pharmaceutical Sciences-JCHPS (2025) 18 (4): 128-137
Online ISSN: Online 2349-8552, Print ISSN: 0974-2115
Research Article | Pharmaceutical Sciences | MCI Approved | Peer-Reviewed | Referred | OA Journal |

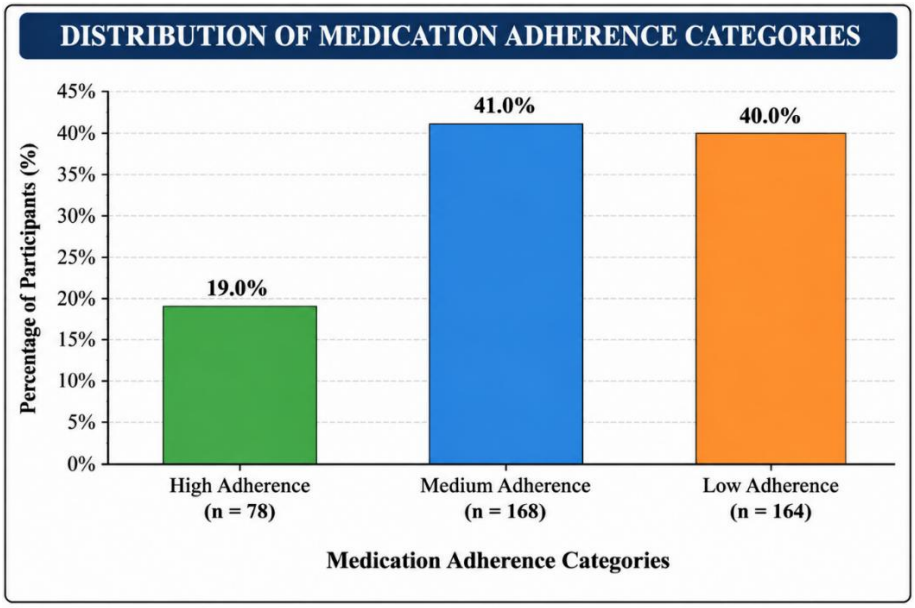


Figure 1: Distribution of Medication Adherence Categories

3.3 Health-Related Quality of Life

Participants reported moderate to low scores across all SF-36 domains (Table 3). The highest scores were in Social Functioning (65.4 ± 25.2) and Physical Functioning (62.4 ± 24.8), while the lowest scores were in General Health (45.8 ± 20.4) and Vitality (48.2 ± 22.6). The mean PCS score was 52.4 ± 18.6, and the MCS score was 56.8 ± 19.2 (Figure 2).

Table 3: SF-36 Domain Scores of Study Participants (N=410)

SF-36 Domain	Mean ± SD	Median	Range	Interpretation
Physical Functioning (PF)	62.4 ± 24.8	65.0	0-100	Moderate
Role Limitations - Physical (RP)	48.6 ± 38.2	50.0	0-100	Low
Bodily Pain (BP)	58.2 ± 26.5	60.0	0-100	Moderate
General Health (GH)	45.8 ± 20.4	45.0	0-100	Low
Vitality (VT)	48.2 ± 22.6	50.0	0-100	Low
Social Functioning (SF)	65.4 ± 25.2	68.0	0-100	Moderate
Role Limitations - Emotional (RE)	52.8 ± 40.5	55.0	0-100	Low
Mental Health (MH)	58.6 ± 21.8	60.0	0-100	Moderate
Physical Component Summary (PCS)	52.4 ± 18.6	54.0	10-85	Moderate
Mental Component Summary (MCS)	56.8 ± 19.2	58.0	12-88	Moderate

Journal of Chemical and Pharmaceutical Sciences-JCHPS (2025) 18 (4): 128-137
Online ISSN: Online 2349-8552, Print ISSN: 0974-2115
Research Article | Pharmaceutical Sciences | MCI Approved | Peer-Reviewed | Referred | OA Journal |

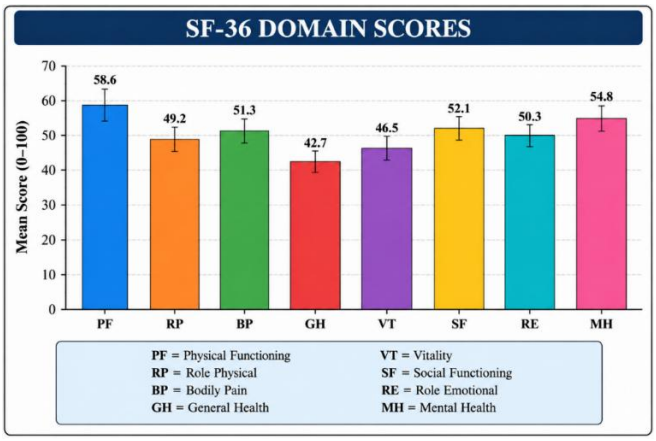


Figure 2: SF-36 Domain Scores

3.4 Relationship Between Adherence and HRQoL

Table 4: Correlation Between Medication Adherence and HRQoL Domains

HRQoL Domain	Pearson's r	p-value	Interpretation
Physical Functioning	0.342	<0.001*	Moderate positive
Role Limitations-Physical	0.286	<0.001*	Weak positive
Bodily Pain	0.318	<0.001*	Moderate positive
General Health	0.412	<0.001*	Moderate positive
Vitality	0.368	<0.001*	Moderate positive
Social Functioning	0.298	<0.001*	Weak positive
Role Limitations-Emotional	0.274	<0.001*	Weak positive
Mental Health	0.386	<0.001*	Moderate positive
PCS	0.398	<0.001*	Moderate positive
MCS	0.372	<0.001*	Moderate positive

*Statistically significant at $p < 0.05$

Pearson's correlation analysis revealed significant positive correlations between medication adherence and all HRQoL domains ($p < 0.001$ for all) (Table 4). The strongest correlations were observed with General Health ($r = 0.412$), Physical Component Summary ($r = 0.398$), Mental Health ($r = 0.386$), and Vitality ($r = 0.368$) (Figure 3).

The multiple linear regression analysis identified medication adherence as the strongest predictor of both physical ($\beta = 0.318$, $p < 0.001$) and mental ($\beta = 0.286$, $p < 0.001$) HRQoL (Tables 5 and 6). Other significant predictors of PCS included socioeconomic status ($\beta = 0.158$), number of medications ($\beta = -0.148$), and comorbidities ($\beta = -0.156$).

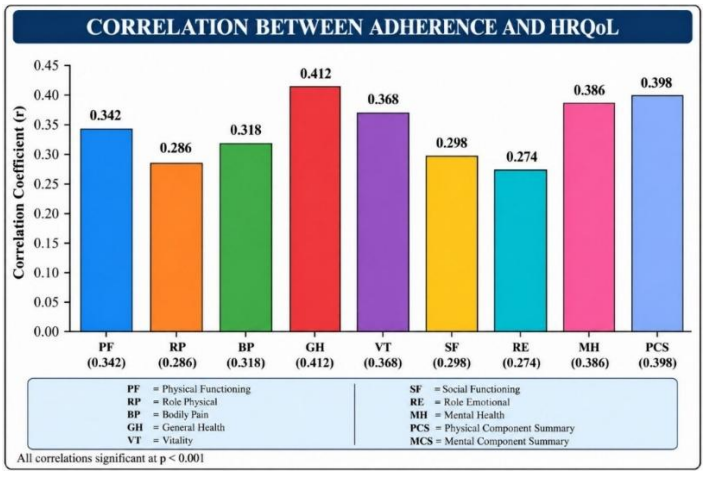


Figure 3: Correlation Between Adherence and HRQoL Domains

Journal of Chemical and Pharmaceutical Sciences

Journal of Chemical and Pharmaceutical Sciences-JCHPS (2025) 18 (4): 128-137
Online ISSN: Online 2349-8552, Print ISSN: 0974-2115
Research Article | Pharmaceutical Sciences | MCI Approved | Peer-Reviewed | Referred | OA Journal |

Table 5: Multiple Linear Regression Analysis - Predictors of HRQoL (PCS)

Variable	B	SE	β	t	p-value	95% CI
(Constant)	38.42	3.86	0	9.95	<0.001*	30.84-46.00
Medication Adherence	2.86	0.42	0.318	6.81	<0.001*	2.04-3.68
Age	-0.18	0.06	-0.142	-3.02	0.003*	-0.30-(-0.06)
Gender (Male=1)	2.42	1.68	0.064	1.44	0.151	-0.88-5.72
Education	1.86	0.72	0.124	2.58	0.010*	0.44-3.28
SES	2.24	0.68	0.158	3.29	0.001*	0.90-3.58
Duration of Illness	-0.42	0.18	-0.108	-2.33	0.020*	-0.78-(-0.06)
Number of Medications	-1.86	0.58	-0.148	-3.21	0.001*	-3.00-(-0.72)
Comorbidities	-2.42	0.72	-0.156	-3.36	0.001*	-3.84-(-1.00)

$R^2 = 0.386$; Adjusted $R^2 = 0.374$; $F = 31.42$; $p < 0.001$
*Statistically significant at $p < 0.05$

Table 6: Multiple Linear Regression Analysis - Predictors of HRQoL (MCS)

Variable	B	SE	β	t	p-value	95% CI
(Constant)	42.68	3.92	0	10.89	<0.001*	34.98-50.38
Medication Adherence	2.64	0.44	0.286	6.00	<0.001*	1.78-3.50
Age	-0.12	0.06	-0.092	-1.92	0.056	-0.24-0.00
Gender (Male=1)	1.86	1.72	0.048	1.08	0.281	-1.52-5.24
Education	1.42	0.74	0.092	1.92	0.056	-0.04-2.88
SES	2.86	0.70	0.196	4.09	<0.001*	1.48-4.24
Duration of Illness	-0.36	0.18	-0.090	-2.00	0.046*	-0.72-(-0.00)
Number of Medications	-1.42	0.60	-0.110	-2.37	0.018*	-2.60-(-0.24)
Comorbidities	-2.68	0.74	-0.168	-3.62	<0.001*	-4.14-(-1.22)

$R^2 = 0.352$; Adjusted $R^2 = 0.340$; $F = 27.86$; $p < 0.001$

**Statistically significant at $p < 0.05$*

3.5 Factors Influencing Adherence

Significant factors associated with high adherence included older age (>50 years) ($p = 0.028$), higher education ($p = 0.009$), higher socioeconomic status ($p = 0.004$), shorter duration of illness ($p = 0.015$), fewer medications ($p < 0.001$), once-daily dosing ($p < 0.001$), and absence of comorbidities ($p = 0.001$) (Tables 7 and 8). The most common self-reported barriers to adherence were forgetfulness (34.6%), lack of symptoms (23.9%), and too many medications (21.0%) (Table 9, Figure 4).

Journal of Chemical and Pharmaceutical Sciences

Journal of Chemical and Pharmaceutical Sciences-JCHPS (2025) 18 (4): 128-137
Online ISSN: Online 2349-8552, Print ISSN: 0974-2115
Research Article | Pharmaceutical Sciences | MCI Approved | Peer-Reviewed | Referred | OA Journal |

Table 7: Association Between Demographic Factors and Medication Adherence

Factor	Category	High Adherence n (%)	Medium/Low Adherence n (%)	χ^2	p-value
Age	≤50 years	32 (16.2)	166 (83.8)	4.85	0.028*
	>50 years	46 (21.7)	166 (78.3)		
Gender	Male	48 (19.8)	194 (80.2)	0.21	0.647
	Female	30 (17.9)	138 (82.1)		
Education	≤Primary	24 (14.7)	139 (85.3)	6.82	0.009*
	≥Secondary	54 (21.9)	193 (78.1)		
SES	Low	18 (12.4)	127 (87.6)	8.45	0.004*
	Middle/High	60 (22.6)	205 (77.4)		
Residence	Urban	52 (21.0)	196 (79.0)	2.36	0.124
	Rural	26 (16.0)	136 (84.0)		
Family Type	Nuclear	45 (17.4)	213 (82.6)	1.28	0.258
	Joint	33 (21.7)	119 (78.3)		

**Statistically significant at $p < 0.05$*

Table 8: Association Between Clinical Factors and Medication Adherence

Factor	Category	High Adherence n (%)	Medium/Low Adherence n (%)	χ^2	p-value
Duration of Illness	<5 years	32 (25.6)	93 (74.4)	5.92	0.015*
	≥5 years	46 (16.2)	239 (83.8)		
Number of Medications	1-2	42 (29.0)	103 (71.0)	15.68	<0.001*
	≥3	36 (13.6)	229 (86.4)		
Frequency of Dosing	Once daily	48 (28.6)	120 (71.4)	18.45	<0.001*
	Twice or more daily	30 (12.4)	212 (87.6)		
Comorbidities	None	35 (28.0)	90 (72.0)	10.25	0.001*
	≥1 comorbidity	43 (15.1)	242 (84.9)		
Disease Control	Controlled	58 (24.9)	175 (75.1)	9.87	0.002*
	Uncontrolled	20 (11.3)	157 (88.7)		

**Statistically significant at $p < 0.05$*

Table 9: Self-Reported Reasons for Non-Adherence (Multiple Responses Allowed)

Reason	Frequency (n)	Percentage (%)
Forgetfulness	142	34.6
Lack of symptoms	98	23.9
Too many medications	86	21.0

Journal of Chemical and Pharmaceutical Sciences-JCHPS (2025) 18 (4): 128-137
Online ISSN: Online 2349-8552, Print ISSN: 0974-2115
Research Article | Pharmaceutical Sciences | MCI Approved | Peer-Reviewed | Referred | OA Journal |

Reason	Frequency (n)	Percentage (%)
Side effects	68	16.6
Cost of medications	62	15.1
Complex dosing schedule	58	14.1
Lack of family support	42	10.2
Difficulty in obtaining medications	38	9.3
Belief that medications are not necessary	35	8.5
Depression/psychological distress	32	7.8

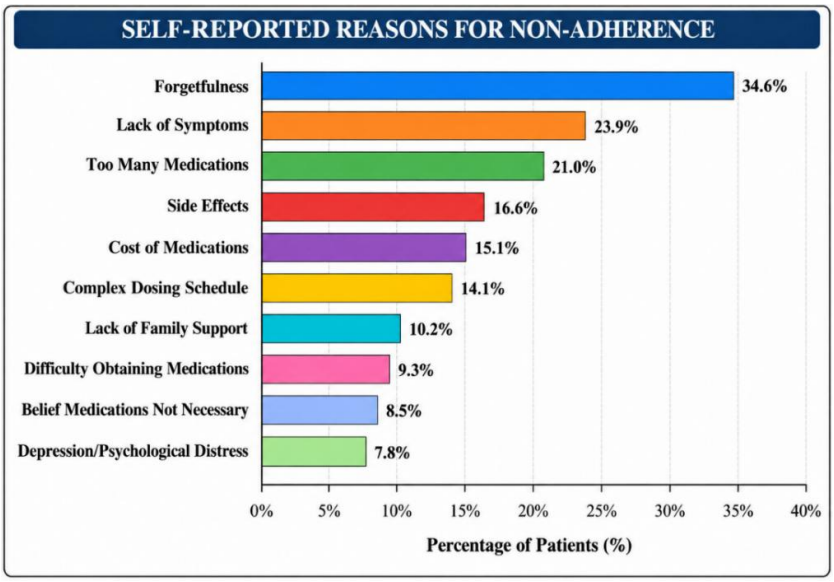


Figure 4: Self-Reported Reasons for Non-Adherence

4. DISCUSSION

This study provides strong evidence of a significant positive relationship between medication adherence and HRQoL among patients with chronic conditions in India. The finding that only 19.0% of patients had high adherence is alarming and consistent with the global estimate that only 50% of patients adhere to long-term therapies (WHO, 2003). The prevalence of non-adherence observed here is similar to a study from Telangana, which also reported high adherence in only 19% of participants (Soma et al., 2025).

Our results confirm that better adherence is associated with improved HRQoL, a finding consistent with previous research (Chantzaras & Yfantopoulos, 2022; Chantzaras & Yfantopoulos, 2023; Saleem et al., 2012). The finding that adherence independently predicts both physical and mental HRQoL, even after controlling for confounders, underscores its clinical importance. This suggests that adherence is not merely a marker of good health behavior but may have a direct causal effect on quality of life.

The study identified several modifiable factors associated with non-adherence. Forgetfulness was the most common barrier, highlighting the need for reminder systems and memory aids. The finding that patients with fewer medications and simpler dosing regimens had better adherence supports the clinical practice of simplifying regimens, such as using once-daily dosing or fixed-dose combinations. The strong association between patient activation and adherence, also reported in other studies (Caballero et al., 2024), suggests that empowering patients through education and shared decision-making is a key strategy for improvement.

Limitations:

The use of self-report measures for adherence may be subject to recall and social desirability bias. The cross-sectional design limits causal inference. The study was conducted in a single region, which may limit generalizability.

5. CONCLUSIONS

Medication adherence is suboptimal among patients with chronic conditions in India and is significantly and positively associated with HRQoL. Forgetfulness, lack of symptoms, and polypharmacy are key barriers to adherence. Healthcare providers should routinely assess adherence, educate patients, simplify medication regimens where possible, and involve family members in adherence support. Policymakers should prioritize the development of adherence programs and provide financial support mechanisms to address cost-related non-adherence. Future research should include longitudinal studies to establish causality and evaluate the effectiveness of specific intervention components.

REFERENCES

Adeyemo, T. A., Ogunleye, O. O., Oladimeji, A. B., & Adeyemo, W. L. (2015). Pattern and predictive factors of health-related quality of life of patients with hypertension, diabetes and concomitant hypertension with diabetes in Ilorin, Nigeria. *Journal of Public Health in Africa*, 6(2), 559.

Al-Amer, R., Alqudah, A., Alzoubi, K. H., & Al-Smadi, A. (2026). Patient activation and diabetes outcomes among Jordanian patients with type 2 diabetes: Longitudinal evidence on adherence and glycemic control with linear mixed model analysis. *Research in Nursing & Health*, 49(1), e70080.

Albadrani, M., Aljeelani, Y., Farsi, S., Alsaedi, A., Aljohani, M., & Alharbi, R. (2024). Effect of medication adherence on quality of life, activation measures, and health imaging in elderly people: A cross-sectional study. *BMC Geriatrics*, 24(1), 631.

Basu, B., Sengupta, S., & Kundu, S. (2025). Medication adherence and its predictors in patients with type 2 diabetes mellitus in India: A systematic review and meta-analysis of current evidence. *Health Science Reports*, 8(3), e71845.

Caballero, J., Patel, N., Waldrop, D., & Ownby, R. L. (2024). Patient activation and medication adherence in adults. *Journal of the American Pharmacists Association*, 64(3), 102025.

Chantzaras, A., & Yfantopoulos, J. (2022). Association between medication adherence and health-related quality of life of patients with diabetes. *Hormones*, 21(4), 691-705.

Chantzaras, A., & Yfantopoulos, J. (2023). Association between medication adherence and health-related quality of life of patients with hypertension and dyslipidemia. *Hormones*, 22(3), 665-676.

Horvat, N., Locatelli, I., Kos, M., & Janežič, A. (2018). Medication adherence and health-related quality of life among patients with chronic obstructive pulmonary disease. *Acta Pharmaceutica*, 68(1), 117-125.

Iuga, A. O., & McGuire, M. J. (2014). Adherence and health care costs. *Risk Management and Healthcare Policy*, 7, 35-44.

Karimi, M., & Brazier, J. (2016). Health, health-related quality of life, and quality of life: What is the difference? *PharmacoEconomics*, 34(7), 645-649.

Khan, R., & Socha-Dietrich, K. (2018). *Investing in medication adherence improves health outcomes and health system efficiency: Adherence to medicines for diabetes, hypertension, and hyperlipidaemia* (OECD Health Working Papers No. 105). OECD Publishing.

Kumari, R., Sharma, S., & Gupta, R. (2025). Validation of the Hindi version of the MOS SF-36 health survey for evaluating quality of life among the elderly population in North India. *Journal of Family Medicine and Primary Care*, 14(3), 880-887.

Saleem, F., Hassali, M. A., Shafie, A. A., Awad, G. A., Atif, M., Haq, N. U., Aljadhey, H., & Farooqui, M. (2012). Does treatment adherence correlate with health-related quality of life? Findings from a cross-sectional study. *BMC Public Health*, 12, 318.

Soma, S., Vyshnavi, V., Bhavin, B., Hoque, H., & Chinnaeswaraiah, C. (2025). Socioeconomic status and medication adherence as determinants of health-related quality of life in patients with diabetes and hypertension. *Irish Journal of Medical Science*.

Tanaka, M., Kawakami, A., & Iwao, Y. (2021). Validity and reliability of the Japanese version of the Morisky Medication Adherence Scale-8 in patients with ulcerative colitis. *Gastroenterology Nursing*, 44(1), 31-38.

World Health Organization. (2003). *Adherence to long-term therapies: Evidence for action*. World Health Organization.