



EFFECTIVENESS OF PHARMACIST-LED PATIENT COUNSELING ON MEDICATION ADHERENCE AND HEALTH-RELATED QUALITY OF LIFE IN HYPERTENSIVE PATIENTS

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ABSTRACT

Background: Hypertension is a major public health challenge in India, affecting approximately 66 million people. Poor medication adherence remains a significant barrier to achieving optimal blood pressure control and improving the health-related quality of life (HRQoL). **Objective:** To assess the impact of structured patient education on medication adherence, blood pressure control, and Health-Related Quality of Life in patients with hypertension. **Methods:** A prospective, interventional, longitudinal cohort study was conducted over 25 months at the Warangal Hospitals Diagnostics and Research Center, Telangana, India. A total of 507 patients with hypertension were randomized into the test (intervention) and control groups. The test group received structured patient education through multiple modalities, including oral counseling, patient information leaflets, audio-visual presentations, and home medication reviews. The control group received routine care only. Medication adherence was assessed using the Brief Medication Questionnaire (BMQ), HRQoL using the WHOQoL-BREF questionnaire, and clinical outcomes using blood pressure readings. Statistical analysis was performed using ANOVA, multiple regression, and Pearson's correlation coefficient. **Results:** The test group demonstrated significant improvement ($P < 0.0001$) in medication adherence scores, with the 61-80 years age group showing the most pronounced improvement (ARS scores decreasing from 1.546 to 0.2314 in males and from 2.0 to 0.8156 in females). WHOQoL-BREF domain analysis revealed that physical health contributed most significantly to overall HRQoL ($R^2 = 0.0438$, after intervention), followed by social relationships ($R^2 = 0.0246$). Systolic blood pressure decreased from 153.18 mmHg to 100.54 mmHg in the test group, while the control group showed worsening from 121.84 mmHg to 157.84 mmHg. A very strong negative correlation was observed between medication adherence and blood pressure ($r = -0.9754$, $p = 0.0048$, $R^2 = 0.9514$). **Conclusion:** Pharmacist-led structured patient education significantly improved medication adherence, blood pressure control, and HRQoL in patients with hypertension. The integration of clinical pharmacists into multidisciplinary healthcare teams is essential for effective hypertension management.

Key words:

Hypertension, Medication adherence, Health-Related Quality of Life, Patient counseling, WHOQoL-BREF, Brief Medication Questionnaire

1. INTRODUCTION

Hypertension is defined as a sustained systolic blood pressure (SBP) of greater than 140 mmHg or a sustained diastolic blood pressure (DBP) of greater than 90 mmHg (Hall & Guyton, 2006). Essential hypertension affects approximately 95% of hypertensive patients, with no

identifiable cause, whereas secondary hypertension affects the remaining 5% and is attributable to identifiable causes. Hypertension is one of the most prevalent non-communicable diseases in both industrialized and developing nations, affecting approximately 66 million individuals in India (Kearney et al., 2005). Urban populations bear a higher burden (25% prevalence) than

rural populations (10% prevalence). The "rule of halves" applies in India: only half of those with hypertension are aware of their diagnosis, half of those aware are receiving treatment, and half of those treated have controlled blood pressure. This means that only approximately 12.5% of Indians with hypertension have adequately controlled blood pressure.

Health-Related Quality of Life (HRQoL) in patients with hypertension is affected across multiple domains. The WHO defines quality of life as "individuals' perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns" (WHOQOL Group, 1997). The WHOQoL-BREF is a validated instrument for assessing HRQoL across four domains: physical health, psychological health, social relationships and environment.

Medication adherence, defined by the WHO as "the extent to which a person's behavior in taking medication corresponds with agreed recommendations from a health care provider," is crucial for achieving optimal blood pressure control (World Health Organization, 2003). Despite the availability of effective antihypertensive medications, studies have reported adherence rates of only 40-70%.

This study aimed to evaluate the impact of structured patient education on medication adherence, blood pressure control, and HRQoL in patients with hypertension.

2. MATERIALS AND METHODS

2.1 Study Design and Setting

This prospective, interventional, longitudinal cohort study was conducted over 25 months at the Warangal Hospitals, Diagnostics and Research Center, Warangal, Telangana, India. This study employed a single-blind randomized controlled trial design.

2.2 Study Population

Inclusion Criteria:

- Patients diagnosed with Hypertension treated with antihypertensive agents
- Patients aged 18 years and above
- Disease duration of 1-10 years
- Patients providing written informed consent

Exclusion Criteria:

- Patients below 18 years of age
- Patients unwilling to provide written informed consent
- Patients with comorbid conditions

A total of 507 hypertensive subjects were enrolled, comprising 276 males (54.44%) and 231 females (45.56%).

2.3 Study Procedure

Patients were randomized into the test and control groups. The test group received intensive pharmacist intervention, including oral counseling, Patient Information Leaflets (PILs), audio-video presentations, and home medication reviews. The control group received routine care only. Follow-up visits were conducted at 45–60-day intervals for four follow-ups.

2.4 Instruments Used

Assessment of HRQoL: The WHOQoL-BREF (Hindi Version) was used to assess HRQoL in patients with hypertension. The questionnaire comprises 24 items covering four domains: Physical Health, Psychological Health, Social Relationships, and Environment. The domain scores were scaled in a positive direction, with higher scores indicating a better quality of life.

Assessment of Medication Adherence: The Brief Medication Questionnaire (BMQ) was used to measure medication adherence. The BMQ Adherence Risk Scale (ARS) ranges from 0 to 4, with lower scores indicating better adherence to the medication.

Clinical Outcomes: Blood pressure readings (SBP and DBP) were measured at baseline and at each follow-up.

2.5 Statistical Analysis

Data were analyzed using SPSS version 20.0. Descriptive statistics, analysis of variance (ANOVA), multiple regression analysis, and Pearson's correlation coefficient were employed. Statistical significance was set at $p < 0.05$.

3. RESULTS

3.1 Demographic Characteristics

The study included 507 hypertensive patients (276 males and 231 females). The majority of patients belonged to the 41-60 years age group (54.83%), followed by the 61-80 years group (28.01%) and the 20-40 years group (17.16%).

Table 1: Age Distribution of Study Patients

Age Group (Years)	Hypertension (n=507)	Percentage
20-40	87	17.16%
41-60	278	54.83%
61-80	142	28.01%

3.2 Impact of Patient Education on HRQoL WHOQoL-BREF Domain Analysis

Multiple regression analysis revealed the contribution of individual domains to the overall HRQoL (Tables 2 and 3; Figures 1-5).

Table 2: Domain-wise R-Square Values - Hypertension Control Group

S. No.	HRQoL Domain	Before Intervention (R^2)	After Intervention (R^2)
1	Physical Health	0.0382	0.0389
2	Psychological Health	0.0186	0.0181
3	Social Relationships	0.0288	0.0291
4	Environment	0.0162	0.0165

Table 3: Domain-wise R-Square Values - Hypertension Test Group

S. No.	HRQoL Domain	Before Intervention (R^2)	After Intervention (R^2)
1	Physical Health	0.0387	0.0438
2	Psychological Health	0.0189	0.0182
3	Social Relationships	0.0294	0.0246
4	Environment	0.0158	0.0147

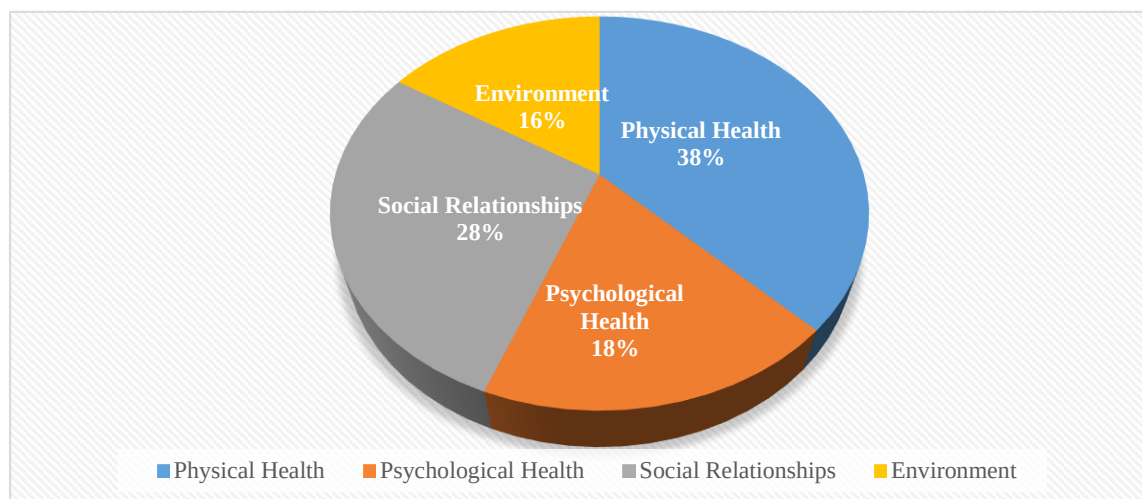


Figure 1: R-Square Values for HRQoL Domains in Hypertension Control Group

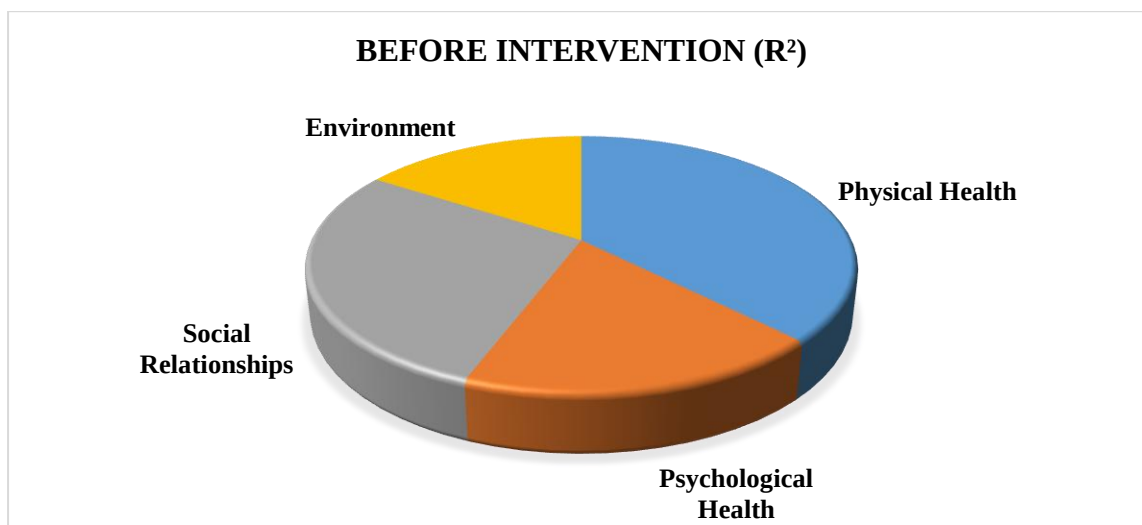


Figure 2: Contribution of Individual Domains on Overall HRQoL - Control Group (Before Intervention)

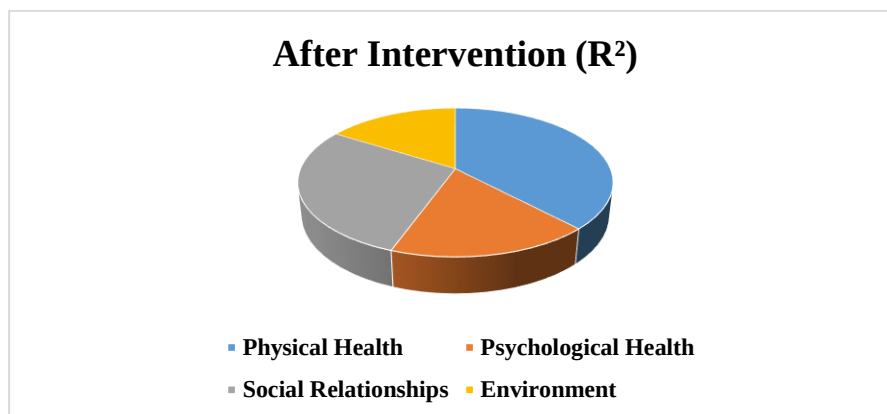


Figure 3: Contribution of Individual Domains on Overall HRQoL - Control Group (After Intervention)

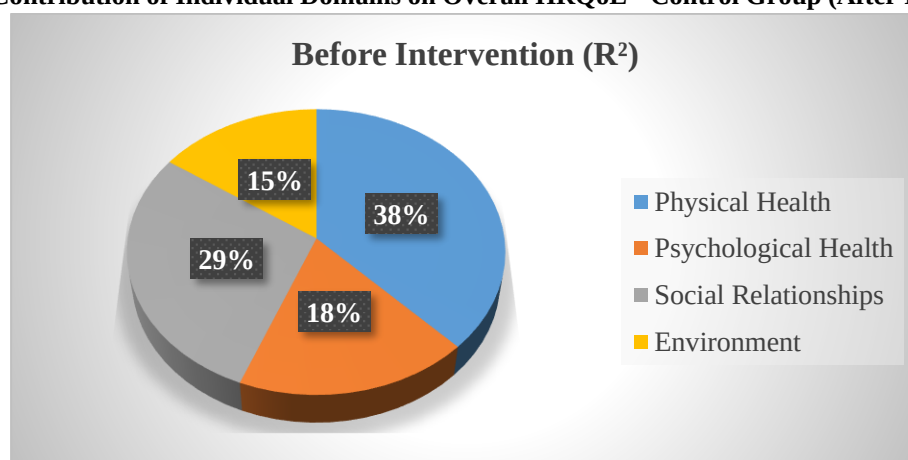


Figure 4: R-Square Values of Test Group Showing Domain Contributions (Before Intervention)

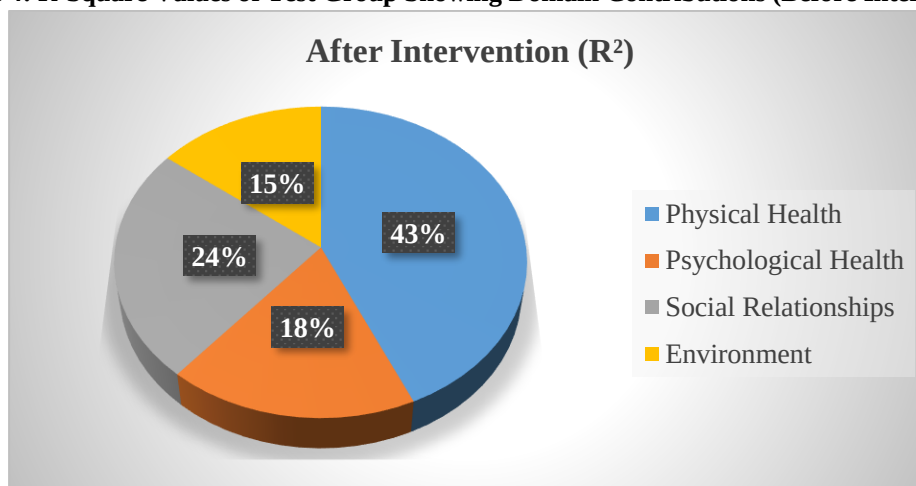


Figure 5: R-Square Values of Test Group Showing Domain Contributions (After Intervention)

Physical health contributed most significantly to overall HRQoL ($R^2=0.0438$ after the intervention), followed by social relationships ($R^2=0.0246$). Both the physical and psychological health domains showed improvement following the intervention.

3.3 Impact of Patient Education on Medication Adherence

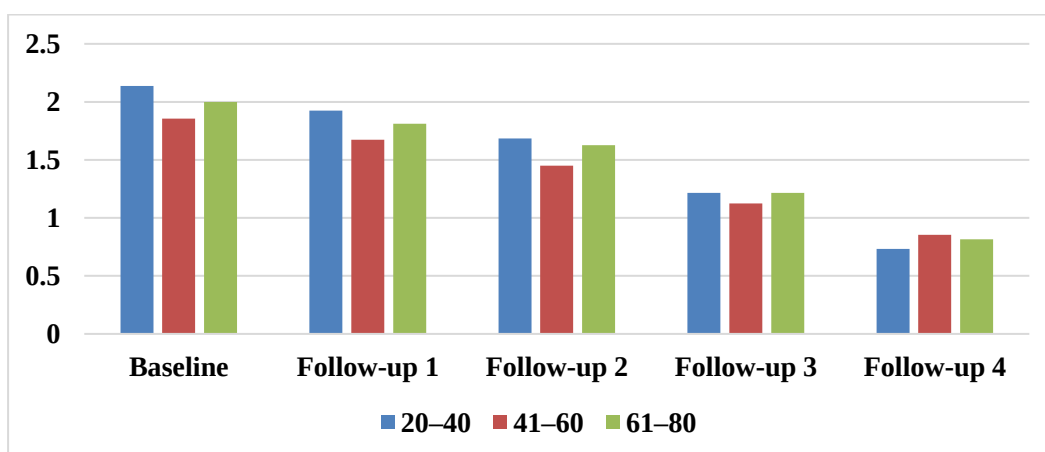
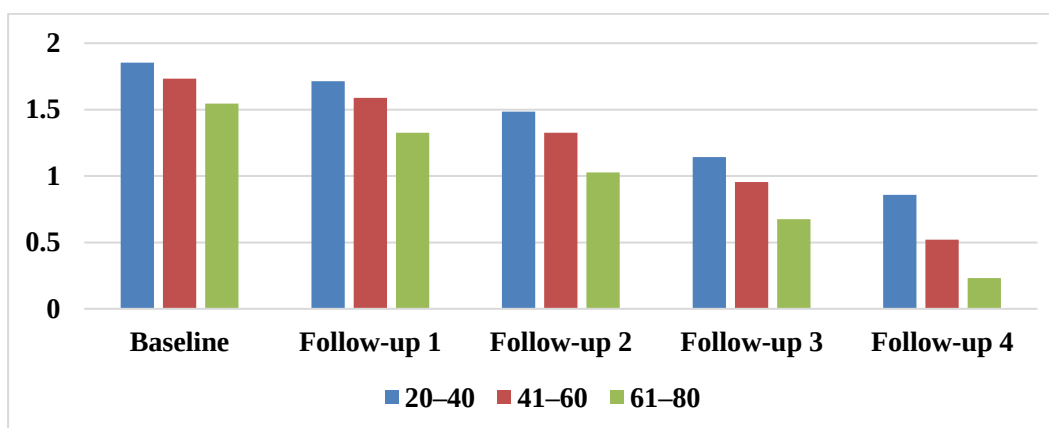
Test Group: Statistically significant improvement ($P<0.0001$) in medication adherence scores was observed across all age groups (Tables 4 and 5; Figures 6 and 7). The 61-80 years age group showed the most pronounced improvement, with ARS scores decreasing from 1.546 to 0.2314 in males and from 2.0 to 0.8156 in females.

Table 4: Medication Adherence Scores - Hypertension Test Group Females

S. No.	Age Group	Baseline	Follow-up 1	Follow-up 2	Follow-up 3	Follow-up 4	P-value
1	20-40	2.13652	1.92543	1.68421	1.21468	0.73250	P<0.0001
2	41-60	1.85452	1.67234	1.45127	1.12365	0.85470	P<0.0001
3	61-80	2.00000	1.81273	1.62546	1.21584	0.81560	P<0.0001

Table 5: Medication Adherence Scores - Hypertension Test Group Males

S. No.	Age Group	Baseline	Follow-up 1	Follow-up 2	Follow-up 3	Follow-up 4	P-value
1	20-40	1.8540	1.7125	1.4857	1.1428	0.8571	P<0.0001
2	41-60	1.7320	1.5874	1.3254	0.9547	0.5215	P<0.0001
3	61-80	1.5460	1.3254	1.0256	0.6752	0.2314	P<0.0001

**Figure 6: Mean Medication Adherence Score - Hypertension Test Group Females****Figure 7: Mean Medication Adherence Score - Hypertension Test Group Males****Control Group:**

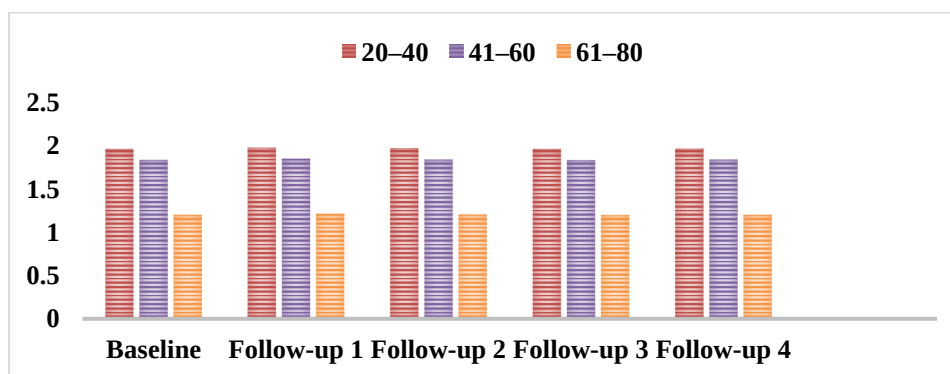
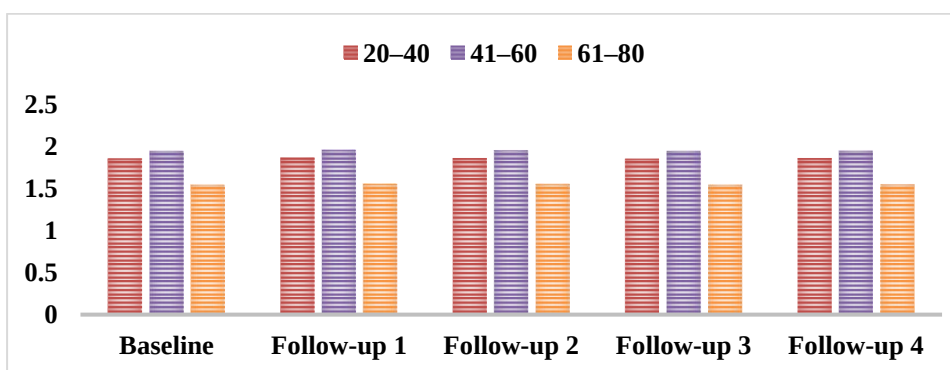
Minimal changes were observed, with some patients showing worsening adherence over time (Tables 6 and 7; Figures 8 and 9).

Table 6: Medication Adherence Scores - Hypertension Control Group Females

S. No.	Age Group	Baseline	Follow-up 1	Follow-up 2	Follow-up 3	Follow-up 4	P value
1	20-40	1.9674	1.9800	1.9725	1.9650	1.9700	P<0.0001
2	41-60	1.8400	1.8525	1.8450	1.8375	1.8425	P<0.0001
3	61-80	1.2000	1.2125	1.2050	1.1975	1.2025	P<0.0001

Table 7: Medication Adherence Scores - Hypertension Control Group Males

S. No.	Age Group	Baseline	Follow-up 1	Follow-up 2	Follow-up 3	Follow-up 4	P value
1	20–40	1.8560	1.8700	1.8625	1.8550	1.8600	P<0.0001
2	41–60	1.9420	1.9550	1.9475	1.9400	1.9450	P<0.0001
3	61–80	1.5429	1.5550	1.5475	1.5400	1.5450	P<0.0001

**Figure 8: Mean Medication Adherence Score - Hypertension Control Group Females****Figure 9: Mean Medication Adherence Score - Hypertension Control Group Males**

3.4 Treatment Outcomes

Test Group:

The systolic blood pressure decreased from 153.18 mmHg to 100.54 mmHg.

Control Group:

SBP increased from 121.84 mmHg to 157.84 mmHg, demonstrating worsening blood pressure control in the absence of any intervention.

3.5 Correlation Analysis

HRQoL vs. Medication Adherence

The test group showed a progressive increase in positive correlation, improving from a weak negative association at baseline ($r=-0.1906$) to a moderate positive association at T4 ($r=0.5728$) (Table 8; Figure 10). The control group exhibited weak and inconsistent correlations (Table 9; Figure 11).

Table 8: Correlation between HRQoL and Medication Adherence - Hypertension Test Group

Time Point	Pearson Correlation Coefficient (r)
T0	-0.1906
T1	0.0487
T2	0.1864
T3	0.3952
T4	0.5728

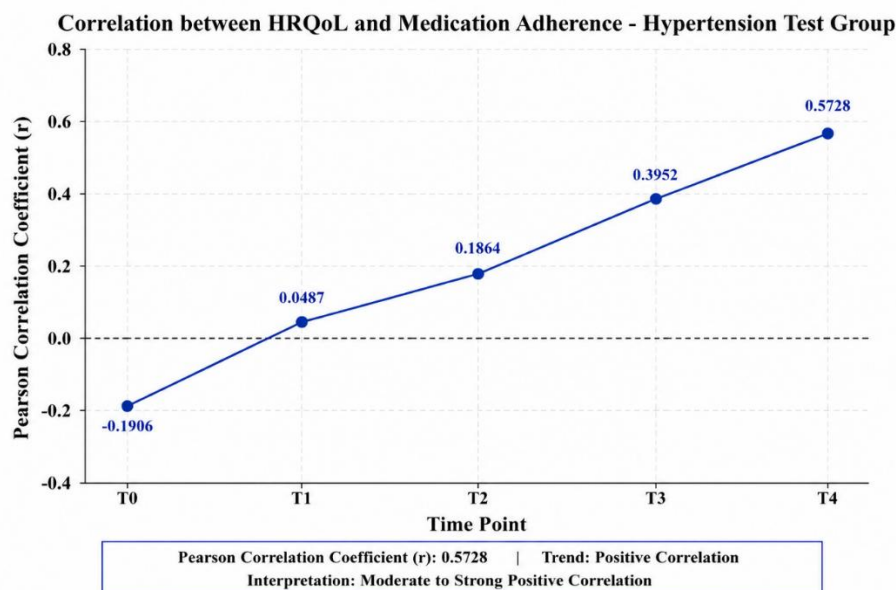


Figure 10: Correlation between HRQoL and Medication Adherence - Hypertension Test Group

Table 9: Correlation between HRQoL and Medication Adherence - Hypertension Control Group

Time Point	Pearson Correlation Coefficient (r)
T0	-0.1842
T1	0.0215
T2	0.0189
T3	-0.1128
T4	-0.1414

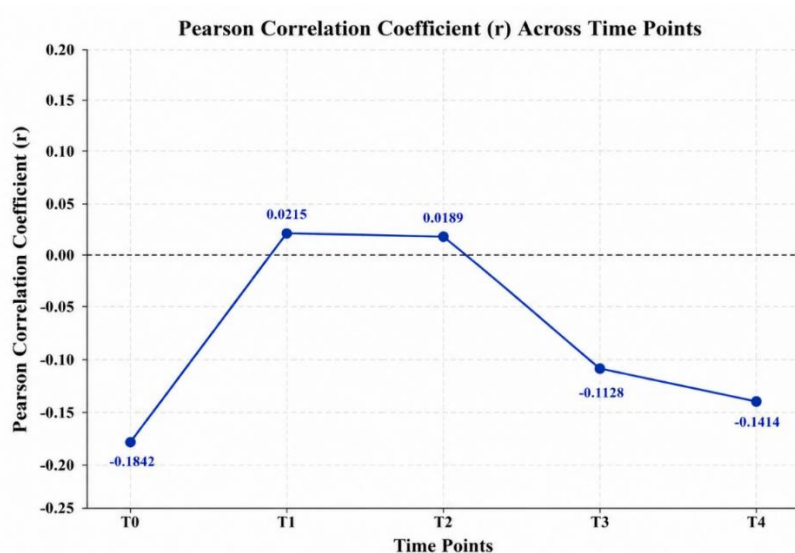


Figure 11: Correlation between HRQoL and Medication Adherence - Hypertension Control Group

HRQoL vs. Blood Pressure

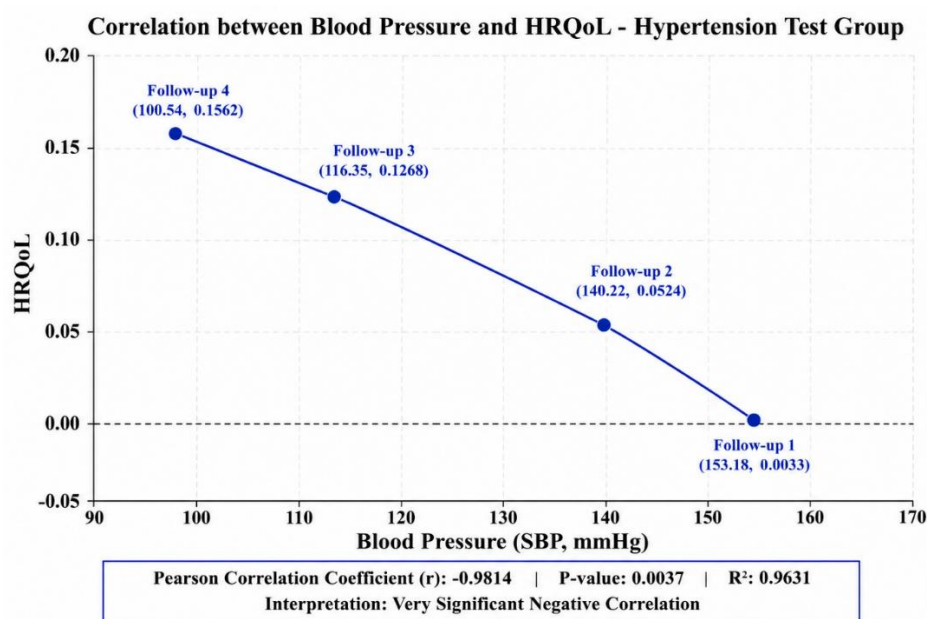
The test group demonstrated a very strong and statistically significant negative correlation ($r = -0.9814$, $p = 0.0037$,

$R^2 = 0.9631$) (Table 10; Figure 12). The control group also showed a significant negative correlation ($r = -0.9564$, $p = 0.0436$, $R^2 = 0.9147$) (Table 11; Figure 13).

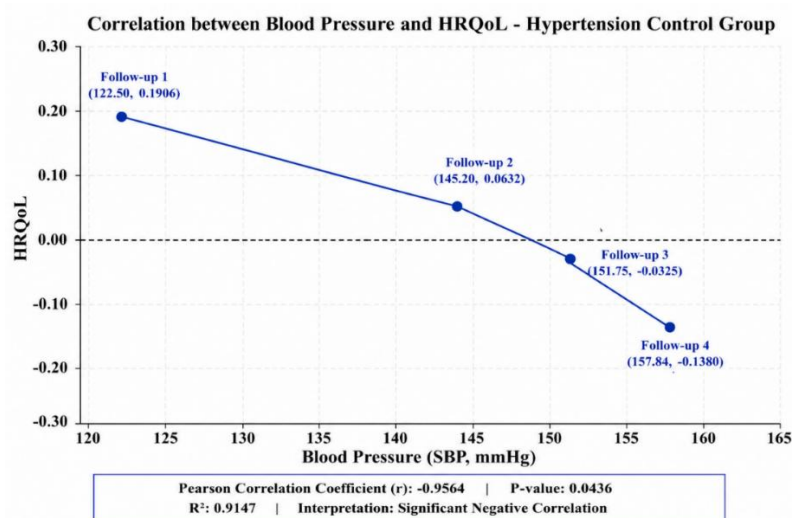
Table 10: Correlation between Blood Pressure and HRQoL-Hypertension Test Group

Follow-up No.	HRQoL	Blood Pressure (SBP, mmHg)
1	0.0033	153.18
2	0.0524	140.22
3	0.1268	116.35
4	0.1562	100.54

Pearson Correlation Coefficient (r): -0.9814, P -value:0.0037, R^2 :0.9631, Interpretation: Very Significant Negative Correlation

**Figure 12: Correlation between Blood Pressure and HRQoL-Hypertension Test Group****Table 11: Correlation between Blood Pressure and HRQoL-Hypertension Control Group**

Follow-up No.	HRQoL	Blood Pressure (SBP, mmHg)
1	0.1906	122.50
2	0.0632	145.20
3	-0.0325	151.75
4	-0.1380	157.84

**Figure 13: Correlation between Blood Pressure and HRQoL - Hypertension Control Group**

Medication Adherence vs. Blood Pressure

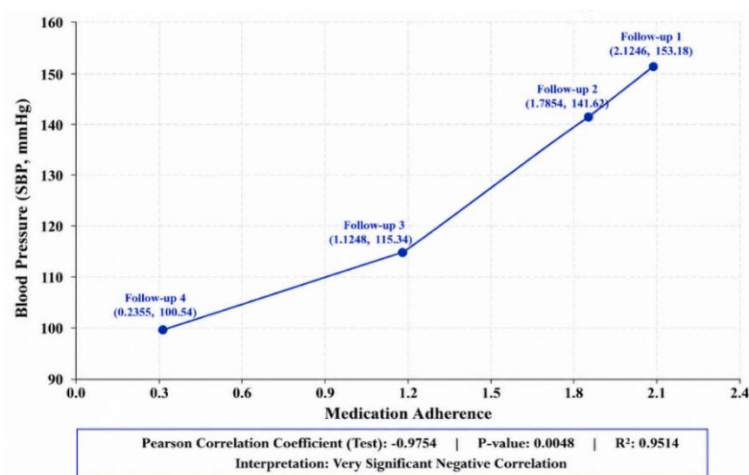
The test group demonstrated a very strong and statistically significant negative correlation ($r=-0.9754$, $p=0.0048$, $R^2=0.9514$) (Table 12; Figure 14). The control group

showed a strong negative correlation that was not statistically significant ($r=-0.8942$, $p=0.1058$, $R^2=0.7996$) (Table 13; Figure 15).

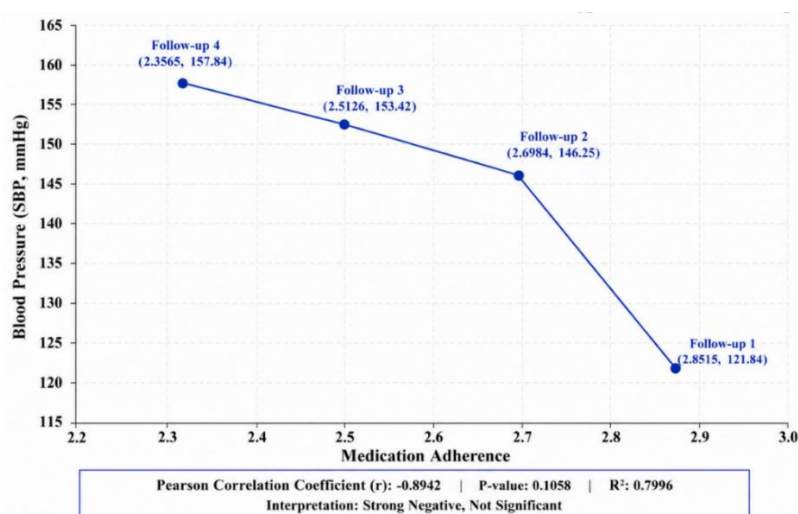
Table 12: Correlation between Medication Adherence and Blood Pressure-Hypertension Test Group

Follow-up No.	Medication Adherence	Blood Pressure (SBP, mmHg)
1	2.1246	153.18
2	1.7854	141.62
3	1.1248	115.34
4	0.2355	100.54

Pearson Correlation Coefficient (Test): -0.9754 ; P-value: 0.0048 ; R^2 : 0.9514 (Very Significant Negative Correlation)

**Figure 14: Correlation between Medication Adherence and Blood Pressure-Hypertension Test Group****Table 13: Correlation between Medication Adherences and Blood Pressure- Hypertension Control Group**

Follow-up No.	Medication Adherence	Blood Pressure (SBP, mmHg)
1	2.8515	121.84
2	2.6984	146.25
3	2.5126	153.42
4	2.3565	157.84

**Figure 15: Correlation between Medication Adherences and Blood Pressure- Hypertension Control Group**

4. DISCUSSION

This study demonstrated that structured patient education significantly improved medication adherence, blood pressure control, and HRQoL in patients with hypertension. These findings are consistent with recent research highlighting the critical role of patient education and pharmacist interventions in hypertension management.

Recent research has highlighted the critical role of health literacy in ensuring medication adherence. A study published in 2025 examining the relationship between health literacy and treatment adherence among patients with hypertension and diabetes found that 75.4% of participants had inadequate health literacy, and those with inadequate health literacy showed lower adherence to treatment (Dallacosta et al., 2025).

The significant improvement in HRQoL scores aligns with a recent study conducted in rural Punjab, India, which found that individuals with pre-existing hypertension were at a significantly higher risk of poor QoL in the psychological and social relationship domains than those with normal blood pressure (Sidhu et al., 2024). The study also found that SBP had a significant inverse correlation with satisfaction with health and QoL domain scores.

Reeves et al. (2020) conducted a systematic review of randomized controlled trials to ascertain the effectiveness of pharmacist interventions to improve blood pressure control and medication adherence in patients with hypertension. The review found that the vast majority of trials (n=29) showed statistically significant improvement in blood pressure in the intervention groups at the follow-up. Of the 35 studies, most (n=20) assessed medication adherence, with several trials (n=9) showing a statistically significant improvement in medication adherence in patients receiving additional pharmaceutical care services. The authors concluded that pharmacist-led interventions improved blood pressure control and medication adherence through education, counseling, or a combination of both methods.

Tawhari et al. (2024) conducted a systematic review specifically examining the outcomes of counseling by pharmacists for diabetic and hypertensive patients. The review concluded that counseling by pharmacists resulted in favorable outcomes, including improvement in medication adherence, KAP, QOL, and clinical measures. Blood pressure improved in hypertensive patients.

Recent evidence from Ethiopia demonstrated that medication therapy management (MTM) intervention improved medication adherence, with the adherence rate in the intervention group increasing by 50%, whereas it remained fairly constant in the control group ($p < 0.001$)

(Tadesse et al., 2025). Similarly, a study from India confirmed that patient counseling by clinical pharmacists improved knowledge of disease and medication, increased quality of life, and improved patient outcomes, with systolic and diastolic blood pressure significantly lower in the intervention group (Sequiera et al., 2025).

Osoro et al. (2023) investigated pharmacist interventions in minimizing drug-related problems in diabetes with co-existing hypertension in India, finding that clinical pharmacists play a crucial role in minimizing drug-related problems, with particular emphasis on patient counseling and follow-up.

The WHOQoL-BREF has been validated and extensively used in the Indian population. The MINICHAL scale, a disease-specific instrument for hypertensive patients, has also been validated, with studies reporting that poor sleep, feeling distressed continuously, and feeling worn out were among the most affected items in the mental domain, while feeling sick and breathless were most affected in the somatic domain.

5. CONCLUSION

This study conclusively demonstrated that structured patient education delivered by clinical pharmacists significantly improved medication adherence, blood pressure control, and Health-Related Quality of Life in patients with hypertension. The strong correlations among these variables suggest that improved adherence mediates the relationship between patient education and better clinical outcomes, which, in turn, contributes to improved HRQoL.

These findings have important implications for clinical practice and healthcare policy in India. Healthcare providers should integrate structured patient education and counseling into the routine clinical care of hypertensive patients. This study provides strong evidence for the expanded role of clinical pharmacists in patient education and medication management. Healthcare institutions should invest in clinical pharmacy services and ensure that pharmacists are adequately trained in patient counseling. Healthcare policies should prioritize patient education and counseling as essential components of chronic-disease management. The significant improvement in clinical outcomes in the test group demonstrated the effectiveness of these interventions in achieving treatment goals. The strong correlation between subjective and objective adherence measures validates the use of self-reported tools in routine clinical practice.

Future research should explore the long-term sustainability of improvements, cost-effectiveness of pharmacist-led

interventions, and technology-enabled interventions, including mobile health applications and telemedicine.

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