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Beyond Prescription Adherence: The Influence of Medication Beliefs and Perceived Treatment Necessity on Long-Term Disease Management

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Abstract

Medication adherence that is a well-recognized as key determinant of treatment adherence in chronic illness, but adherence alone only explains part of the variance in chronic illness management. This research aimed at assessing the impact of beliefs towards medications and treatment necessity on chronic illness management without considering adherence behavior among individuals on constant medications. An analytic cross-sectional study design was done among 294 individuals with either type-2 diabetes mellitus and/or hypertension attending medical outpatient departments selected through consecutive sampling technique. Beliefs about the medication was assessed using Beliefs about Medicines Questionnaire (BMQ-Specific), adherence using five-item Medication Adherence Report Scale (MARS-5), and disease control using target levels of glycated hemoglobin and blood pressure. Data were analysed through descriptive statistics, the chi-square test, multivariate logistic regression and mediation analysis using SPSS version 26.0. The means for necessity and concern were 18.9 ± 3.5 and 14.6 ± 3.9, while 63.3% of the subjects had high adherence and 55.1% had controlled disease. The frequency of controlled disease dropped from 74.0% in patients with accepting attitudes to 26.3% in those with skeptical attitudes ($\chi^2 = 34.82$, $p < 0.001$). Increased perceived necessity was found to decrease the probability of uncontrolled disease (adjusted OR per SD = 0.62; 95% CI 0.46–0.83; p = 0.001), while increased treatment concerns were positively correlated with this outcome. The addition of belief-related variables improved the Nagelkerke R^2 by 0.17 and the area under the ROC curve by 0.11. The role of adherence as mediator of beliefs' impact on disease control was confirmed by explaining 31.4% of this association. Medication beliefs and perceived treatment necessity are important factors in long-term disease management in addition to adherence.

Keywords: Medication Beliefs, Perceived Treatment Necessity, Medication Adherence, Chronic Disease Management, Necessity–Concerns Framework, Type 2 Diabetes Mellitus, Hypertension.

1 INTRODUCTION

1.1 Long-Term Use of Medication in Chronic Diseases Background

The chronic condition like type-2 diabetes, mellitus and hypertension, constant administration of drugs is necessary to manage the disease and avoid complications. However, non-adherence to medications is a main issue in chronic disease management. Health beliefs and perceptions of individuals as well as factors relating to the treatment determine medication adherence among patients (Al-Noumani et al., 2019; Mitzel & Vanable, 2020). Assessment of medication adherence is essential to identify patients with poor treatment results (Chan et al., 2020). The recent research findings have also stressed on the significance of changing the patient's belief regarding medicines for increasing treatment adherence (Sheils et al., 2024; Rafhi et al., 2024). Some studies have been carried out on factors determining adherence to antihypertensive medications (Ferreira Jr et al., 2024).

1.2 Medication Beliefs and Perceived Treatment Necessity

The perceptions that the patients have about the medications have an important bearing on whether they would be willing to take them for an extended period of time. The necessity of the treatment refers to how significant the patient finds the prescribed medications, while the treatment concerns refer to the perceived risks involved with the medication.

1.3 Research Problem and Rationale

While medication adherence is typically seen as a key factor in the evaluation of the effectiveness of a treatment regime, it alone cannot sufficiently be used to account for variances in disease control. Despite adherence to their prescribed medication regimen, patients can still encounter problems in obtaining desirable clinical results. For this reason, both beliefs and adherence need to be analyzed.

1.4 Objectives

This research is to determine how perceptions about medicines and necessity of the treatment regimen can affect the management of chronic diseases in patients undergoing constant medication treatment.

2 REVIEW OF LITERATURE

2.1 Determinants of Medication Adherence in Chronic Disease

Some of the factors which impact drug adherence include patient-related factors, treatment-related factors, disease duration, and health care support. Studies conducted in India on the consumption of antihypertensive drugs have revealed that non-adherence to drugs and their related factors is quite common (Pal et al., 2025). Likewise, research on patients who have type 2 diabetes has found a relationship between adherence and treatment persistence (Evans et al., 2022).

2.2 Medication Adherence in Diabetes Management

Diabetes management involves a combination of adherence to treatment through drug intake and monitoring on a long-term basis. There have been previous systematic reviews on adherence and persistence among antidiabetic drug recipients, with various differences being noted (Ogundipe et al., 2021). There have also been studies of digital diabetes self-management education and support as ways of enhancing drug adherence (Nkhoma et al., 2021).

2.3 Medication Beliefs, Adherence, and Clinical Outcomes

Medication adherence still continues to be an important part of managing diabetes. According to studies carried out on systematic review, there have been variations with regard to adherence to the oral antidiabetics people with type-2 diabetes (Boonpattharatthiti et al., 2024). In addition, studies have been conducted on the medication adherence and persistence in type-2 diabetes (McGovern et al., 2018).

2.4 Research Gap

Prior research has largely concentrated on medication adherence and persistence, as well as the influence of factors associated with medication consumption. Nevertheless, more research needs to be conducted on the relationship between beliefs about medications and necessity of treatment in controlling diseases apart from medication adherence. This current research attempts to address this void by studying medication beliefs, adherence, disease control of type 2 diabetes mellitus and hypertension patients.

3 METHODOLOGY

3.1 Study Design

The study analysis was done on the outpatient departments of a tertiary care teaching hospital for a duration of twelve months. The study sample was made up of adult patients suffering from type 2 diabetes mellitus and/or hypertension who were under regular prescription pharmacotherapy. Selection of subjects was done by consecutive sampling after meeting the inclusion criteria. Ethical clearance was granted by the Institutional Ethics Committee, informed consent was signed by all the subjects, and the study follows the STROBE guidelines.

3.2 Sample Size and Eligibility Criteria

Sample size calculation was done by the formula for the single population proportion, $n = Z^2p(1-p)/d^2$, where Z is 1.96, p equals 50%, and d equals 6% absolute precision, resulting in the minimum number of 267 subjects. Adjusting for 10% attrition rate, the sample target size was set at 294 participants, and indeed, all 294 participants recruited gave a fully completed response. The inclusion criteria for patients include age between 18 to 75 years old and a diagnosis of type 2 diabetes mellitus and/or hypertension for minimum six months on continuous prescribed medication for six months. Patients with cognitive dysfunction, instability, pregnant women, advanced renal disease, advanced

hepatic disease, advanced malignancies, or incomplete clinical/laboratory documentation were excluded from the study.

3.3 Assessment of Medication Beliefs and Adherence

The data were obtained via face-to-face interviews carried out by skilled investigators, combined with the analysis of clinical documents. The demographic factors, education, type of the condition, duration of the illness, as well as the number of medications prescribed per day, were identified. The medication beliefs were assessed with the BMQ-Specific tool that includes the necessity and concerns subscales of five items each with responses to each item ranging from one to five points of the Likert Scale. The subscale scores ranged from 5 to 25, with higher scores representing higher necessity beliefs and more concerns, respectively. The necessity-concerns differential (NCD) was derived by computing the difference between the necessity and concerns scores. The internal reliability of both subscales in the current sample was adequate (Cronbach's $\alpha = 0.81$ for necessity and 0.84 for concerns). Four different belief profiles were created based on the medians of the two subscales (necessity 19; concerns 15). Scores at or above the median were considered high.

Medication adherence was assessed using the five-item Medication Adherence Report Scale (MARS-5). The items referred to patient-reported non-adherent behaviors and patients were asked about their frequency on a five-point scale. Items were reverse scored such that high total scores (range 5 to 25) denoted better adherence. High adherence was defined as total MARS-5 score of above 20 and low adherence as score under 20. Internal reliability of the scale was adequate (Cronbach's $\alpha = 0.79$).

3.4 Assessment of Disease Control

Disease control served as the main outcome measure and was measured through clinical endpoints. Participants who had type 2 diabetes mellitus had their disease control defined as an HbA1c level lower than 7.0%, which was tested within eight weeks prior to the study using the high-performance liquid chromatography technique. Participants who had hypertension had their disease control defined as blood pressure less than 140/90 mmHg, which was calculated from two measurements taken after five minutes of resting in a seated position using a calibrated automated sphygmomanometer. Participants who had both types of diseases had their disease control determined based on both criteria.

3.5 Study Framework

Methodological framework is presented in figure. 1. Outpatient participants were evaluated according to three concurrent dimensions (attitudes toward medication, medication adherence, and disease control). The assessment was performed from an individual standpoint employing descriptive, bivariate, multivariable, and mediation analysis techniques.

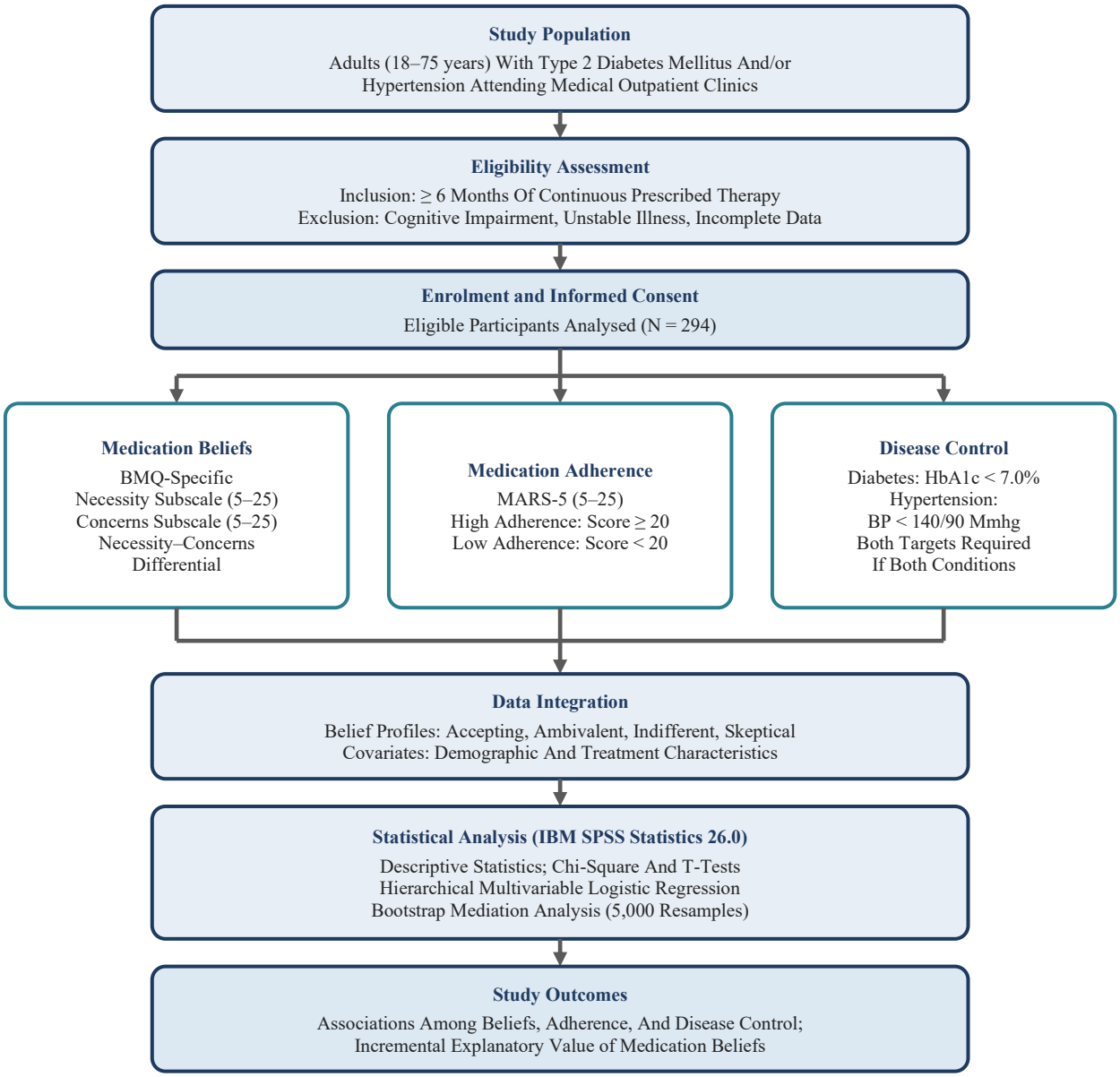


Figure 1: Methodological Architecture of The Study Showing Participant Selection, Assessment of Medication Beliefs, Adherence, And Disease Control, Data Integration, Statistical Analysis, And Study Outcomes

3.6 Statistical Analysis

Statistical analysis was done by using IBM SPSS Statistics software version 26.0. The continuous variables were analyzed as mean ± SD or median (IQR), and categorical variables as frequency and percentage. Hierarchical binary logistic regression was used to identify the factors related to uncontrolled disease. Model 1 consists of adherence and clinical covariates while model 2 consisted of adherence, clinical covariates, and standardized scores of necessity and concerns. Odds ratios and their 95% confidence intervals were estimated. Performance of the model was assessed by Hosmer–Lemeshow test, Nagelkerke R^2, AUC, likelihood ratio test, and DeLong test. Mediation analysis was performed for the role of adherence using 5,000 sample bootstrap with the bias-corrected of 95% confidence intervals.

4 RESULTS

4.1 Sociodemographic and Clinical Characteristics

There were a total number of 294 patients, of whom 148 (50.3%) were men and 146 (49.7%) were women with the mean age of 54.8±11.9 years. Out of these 294 patients, there were 102 (34.7%) who suffered only from type 2 diabetes mellitus, 96 (32.7%) had only hypertension and 96 (32.7%) were affected by both these diseases. The median time duration of the disease was 7 years (IQR 4-11) and 84 patients (28.6%) were on five or more medications per day. Disease control was achieved in 162 patients (55.1%) while uncontrolled disease was found in 132 (44.9%) patients is shown in table 1.

Table 1: Sociodemographic, Clinical, and Treatment Characteristics of Participants (N = 294)

Parameter	Value
Demographic characteristics	
Age (years), mean ± SD	54.8 ± 11.9
Male, n (%)	148 (50.3)
Female, n (%)	146 (49.7)
Secondary education or below, n (%)	143 (48.6)
Higher secondary education or above, n (%)	151 (51.4)
Clinical characteristics	
Type 2 diabetes mellitus only, n (%)	102 (34.7)
Hypertension only, n (%)	96 (32.7)
Both conditions, n (%)	96 (32.7)
Disease duration (years), median (IQR)	7 (4–11)
HbA1c (%) among participants with diabetes (n = 198), mean ± SD	6.9 ± 1.3
Systolic blood pressure (mmHg) among participants with hypertension (n = 192), mean ± SD	134.6 ± 13.8
Diastolic blood pressure (mmHg) among participants with hypertension (n = 192), mean ± SD	81.9 ± 8.7
Treatment characteristics	
Daily medicines ≤ 2, n (%)	87 (29.6)
Daily medicines 3–4, n (%)	123 (41.8)
Daily medicines ≥ 5, n (%)	84 (28.6)
Disease control	
Controlled, n (%)	162 (55.1)
Uncontrolled, n (%)	132 (44.9)

4.2 Medication Beliefs, Adherence, and Disease Control

Necessity score had a mean value of 18.9 ± 3.5, and the mean concerns score was 14.6 ± 3.9, making the mean NCD 4.3 ± 5.7. MARS-5 score had a mean value of 21.2 ± 3.2, and 186 subjects (63.3%) were considered to have high adherence. Controlled disease patients showed increased necessity scores (20.1 ± 3.0 compared to 17.4 ± 3.4; $t = 7.14$, $p < 0.001$), reduced concerns scores (13.2 ± 3.5 compared to 16.4 ± 3.6; $t = -7.68$, $p < 0.001$), increased NCD (6.9 ± 4.6 compared to 1.0 ± 5.3; $t = 10.07$, $p < 0.001$) and higher adherence scores (22.4 ± 2.7 compared to 19.8 ± 3.1; $t = 7.58$, $p < 0.001$) when compared to uncontrolled patients. High adherence was observed in 76.5% of patients with controlled diseases and in 47.0% of patients with uncontrolled diseases ($\chi^2 = 27.37$, $p < 0.001$) shows in table 2.

Table 2: Medication Beliefs and Adherence According to Disease Control Status

Variable	Overall (N = 294)	Controlled (n = 162)	Uncontrolled (n = 132)	Test statistic	p-value
Necessity score, mean ± SD	18.9 ± 3.5	20.1 ± 3.0	17.4 ± 3.4	t = 7.14	< 0.001
Concerns score, mean ± SD	14.6 ± 3.9	13.2 ± 3.5	16.4 ± 3.6	t = −7.68	< 0.001
Necessity–concerns differential, mean ± SD	4.3 ± 5.7	6.9 ± 4.6	1.0 ± 5.3	t = 10.07	< 0.001
MARS-5 score, mean ± SD	21.2 ± 3.2	22.4 ± 2.7	19.8 ± 3.1	t = 7.58	< 0.001
High adherence, n (%)	186 (63.3)	124 (76.5)	62 (47.0)	χ^2 = 27.37	< 0.001

Using Spearman correlation test, it was found that necessity score was positively correlated with adherence score ($\rho = 0.42$, $p < 0.001$), concerns score was negatively correlated with adherence score ($\rho = -0.37$, $p < 0.001$), and NCD was the most strongly correlated factor with adherence ($\rho = 0.51$, $p < 0.001$). The necessity and concerns scores were moderately but oppositely correlated with each other ($\rho = -0.14$, $p = 0.016$), further confirming their distinction as separate dimensions of beliefs about medications.

4.3 Belief Profiles, Adherence, and Disease Control

From the median split, it was found that 104 subjects (35.4%) were in the accepting profile, 71 (24.1%) in the ambivalent profile, 62 (21.1%) in the indifferent profile, and 57 (19.4%) in the skeptical profile. High adherence was most common among those in the accepting profile (85.6%) and the least among those in the skeptical profile (31.6%) ($\chi^2 = 48.80$, $p < 0.001$). Control of the disease was also consistent, decreasing from 74.0% for the accepting profile to 54.9% for the ambivalent profile, 50.0% for the indifferent profile, and 26.3% for the skeptical profile ($\chi^2 = 34.82$, $p < 0.001$) is represented in table 3.

Table 3: Distribution of Belief Profiles and Their Association with Adherence and Disease Control

Belief profile	Definition	n (%)	High adherence, n (%)	Controlled disease, n (%)
Accepting	High necessity, low concerns	104 (35.4)	89 (85.6)	77 (74.0)
Ambivalent	High necessity, high concerns	71 (24.1)	45 (63.4)	39 (54.9)
Indifferent	Low necessity, low concerns	62 (21.1)	34 (54.8)	31 (50.0)
Skeptical	Low necessity, high concerns	57 (19.4)	18 (31.6)	15 (26.3)
Total		**294 (100)**	**186 (63.3)**	**162 (55.1)**
Chi-square test (df = 3)			$\chi^2 = 48.80$, $p < 0.001$	$\chi^2 = 34.82$, $p < 0.001$

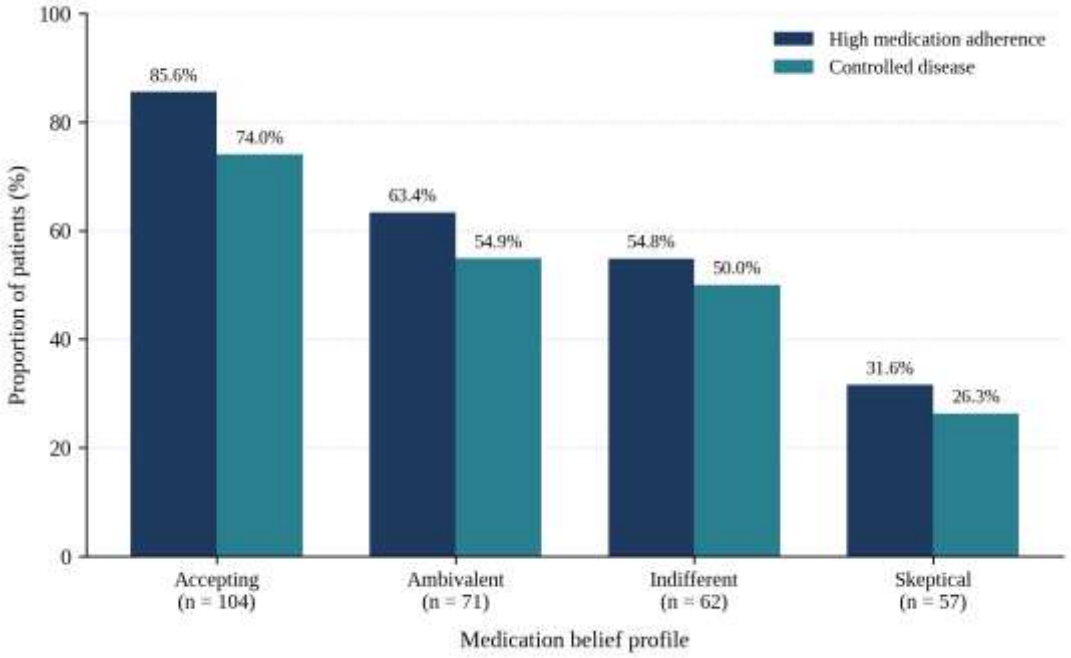


Figure 2: Medication Adherence and Disease Control Patterns According to Belief Profiles

Figure 2 illustrates a decrease in disease control from the accepting, ambivalent, indifferent to the skeptical profile, as well as in high adherence. It is still significant when participants are divided into groups according to their adherence. Patients with high adherence (n = 186) had the rate of disease control as follows: 77.5%, 57.8%, 55.9%, and 55.6%, correspondingly ($\chi^2 = 9.10$, $p = 0.028$). Low adherent patients (n = 108) had the following rates: 53.3%, 50.0%, 42.9%, and 12.8% ($\chi^2 = 13.94$, $p = 0.003$).

4.4 Factors Associated with Uncontrolled Disease

Perceived necessity was inversely correlated to uncontrolled disease (aOR = 0.62, 95% CI 0.46-0.83, p = 0.001), whereas greater treatment concerns raised the odds of uncontrolled disease (aOR = 1.38, 95% CI 1.04-1.83, p = 0.025). Poor adherence to medication regime still was statistically significant (aOR = 1.74, 95% CI 1.01-3.00, p = 0.046), although it was less statistically significant compared to the results of Model 1 (aOR = 3.42, 95% CI 2.01-5.82, p < 0.001). Disease duration is positively correlated with uncontrolled disease (aOR = 1.27 per 5 years, 95% CI 1.03-1.57, p = 0.026). Age, gender, education level, number of medications taken per day, and type of medical condition were not statistically significant. Results of Model 2 are presented in figure 3 and table 4.

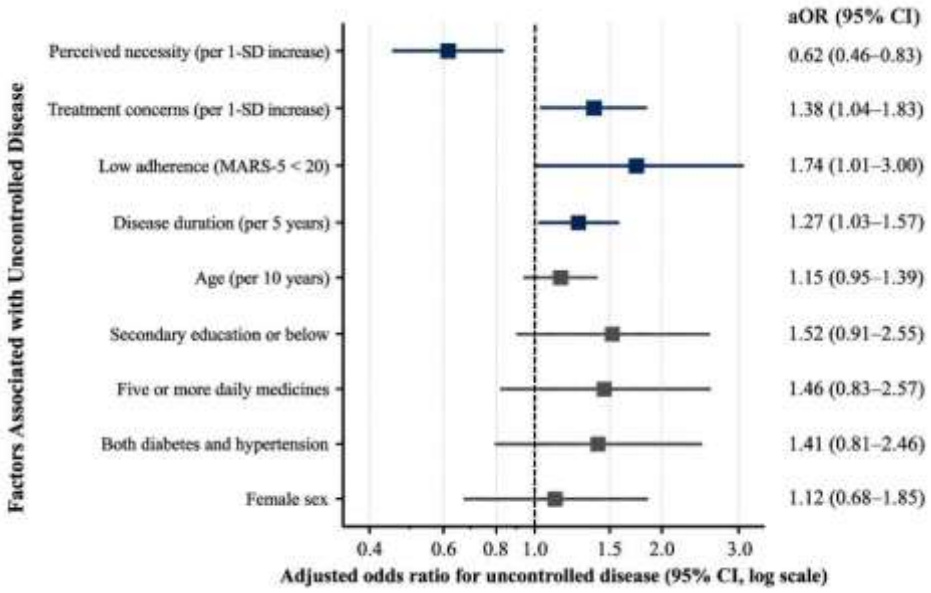


Figure 3: Forest Plot of Adjusted Odds Ratios And 95% Confidence Intervals for Factors Associated with Uncontrolled Disease (Model 2)

Table 4: Adjusted Predictors of Poor Disease Control Using Logistic Regression

Variable	β	SE	Adjusted OR (95% CI)	p-value
Perceived necessity (per 1-SD increase)	−0.478	0.151	0.62 (0.46–0.83)	0.001
Treatment concerns (per 1-SD increase)	0.322	0.144	1.38 (1.04–1.83)	0.025
Low adherence (MARS-5 < 20)	0.554	0.278	1.74 (1.01–3.00)	0.046
Disease duration (per 5 years)	0.239	0.108	1.27 (1.03–1.57)	0.026
Age (per 10 years)	0.140	0.097	1.15 (0.95–1.39)	0.150
Secondary education or below	0.419	0.263	1.52 (0.91–2.55)	0.111
Five or more daily medicines	0.378	0.288	1.46 (0.83–2.57)	0.189
Both diabetes and hypertension	0.344	0.283	1.41 (0.81–2.46)	0.225
Female sex	0.113	0.255	1.12 (0.68–1.85)	0.657

4.5 Incremental Explanatory Value of Medication Beliefs

The inclusion of the necessity and concerns scores into the model that included adherence and other covariates resulted in a marked improvement in the model fit (likelihood ratio $\chi^2 = 47.1$, df = 2, $p < 0.001$). The Nagelkerke R^2 improved from 0.19 in Model 1 to 0.36 in Model 2, and the AUC improved from 0.70 (95% CI 0.64–0.76) to 0.81 (95% CI 0.76–0.86) (DeLong z = 4.12, $p < 0.001$) shows in table 5.

Table 5: Comparison of Model Fit and Discrimination for Models with and Without Medication Beliefs

Index	Model 1 (adherence and covariates)	Model 2 (Model 1 plus beliefs)
Nagelkerke R^2	0.19	0.36
Area under the curve (95% CI)	0.70 (0.64–0.76)	0.81 (0.76–0.86)
Hosmer–Lemeshow test (df = 8)	$\chi^2 = 6.9$, p = 0.547	$\chi^2 = 5.8$, p = 0.670
Likelihood ratio test, Model 2 versus Model 1	—	$\chi^2 = 47.1$, df = 2, $p < 0.001$
DeLong test for AUC difference	—	z = 4.12, $p < 0.001$

4.6 Mediation of the Belief–Control Association by Adherence

Under the mediation model, an increase in the NCD level was positively related to an increased adherence level (standardized path a = 0.47, 95% CI = 0.37 - 0.57, $p < 0.001$), while increased adherence was negatively correlated with uncontrolled disease (standardized path b = -0.174, 95% CI = -0.256 - 0.092, $p < 0.001$). The total impact of the NCD on uncontrolled disease was -0.261 (95% CI = -0.364 - -0.158, $p < 0.001$). Indirect effect via adherence was the value of -0.082 (95 percentage Bootstrap CI = -0.126 - -0.045), whereas the direct effect controlling for adherence was still significant (-0.179, 95% CI = -0.287 - -0.071, p = 0.001). Thus, adherence explained 31.4% of the total association, while the rest 68.6% was mediated independently of adherence.

5 DISCUSSION

This study shows the medication beliefs and the management of chronic diseases besides medication adherence. There were three major findings. Necessity beliefs that were high and treatment concerns that were low had positive relationships with disease control, whereas there was an increment in controlled patients from 74.0% of accepting patients to 26.3% of skeptical patients. Adjusted for medication adherence and clinical variables, the relationship between beliefs and disease control remained significant, where there was an increase in the explained variance from 0.19 to 0.36 and discrimination from 0.70 to 0.81. Medication adherence accounted for less than one-third of the relationship, which implies that beliefs affect disease control independent of medication adherence. There was a reduction in the relationship between non-adherence and poor disease control (aOR 3.42

to 1.74), which shows that adherence is affected by treatment beliefs. From a clinical perspective, BMQ-Specific use on a routine basis can help in identifying patients who have low necessity beliefs and high concerns even if they are using their medications regularly. They need tailored counseling regarding side effects and concerns about treatment in the long run to better manage their diseases. The strengths of this research include using validated measures, objective clinical measures, two chronic diseases, and mediation analysis. The limitations of this research include the cross-sectional study design and self-reporting adherence.

6 CONCLUSION

This study is about to investigate whether medication beliefs and perceived need for treatment affect the disease management of patients diagnosed with type 2 diabetes mellitus and/or hypertension, regardless of medication adherence. Novelty of this research is in showing the independent role of medication beliefs on objectively measured disease control, even in adherent patients. This cross-sectional analysis study included 294 patients and was performed by using BMQ-Specific and MARS-5, with disease control measured by HbA1c and BP targets. Analysis techniques used include chi-square, hierarchical multivariate logistic regression, and bootstrap mediation analysis. Disease control rate decreased from 74.0% in the Accepting Profile group to 26.3% in the Skeptical Profile group ($\chi^2 = 34.82$, $p < 0.001$). Greater perceived necessity had lower odds of having an uncontrolled disease (aOR = 0.62, 95% CI 0.46–0.83, p = 0.001), whereas higher treatment concerns had higher odds. The inclusion of belief measures raised Nagelkerke R^2 to 0.36 and AUC to 0.81 compared to a model with 0.19 and 0.70, respectively. Adherence mediated 31.4% of the relationship, thus beliefs have added value aside from adherence behavior. The results suggest that routine assessment of beliefs and tailored counseling is needed in chronic diseases management. Further study will require longitudinal design, multicenter approach, adherence measure using objective data, condition-specific analysis, and interventional studies.

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