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Impact of Health Belief on Medication Adherence among Patients with Chronic Diseases in Erbil City

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ABSTRACT:

Background and Objectives: Adherence to long-term medication is influenced not only by clinical instructions or drug availability but also by patients' beliefs about medicines and lifestyle practices within a specific social context. The Necessity–Concerns Framework is widely cited to explain adherence, yet empirical studies validating it in Iraq and the wider Middle East remain limited. This study assessed the relationship of medication-related beliefs with adherence among adults with chronic diseases in Erbil, Iraq.

Method: This cross-sectional study included 377 adults diagnosed with at least one chronic conditions who attended tertiary hospitals or private outpatient clinics. Adherence was measured using the Medication Adherence Report Scale (MARS-5), and beliefs about medicines were assessed using the Beliefs about Medicines Questionnaire–Specific (BMQ-S). Statistical analysis included Spearman correlation and logistic regression.

Results: The overall adherence rate was 72.4%. Participants expressed strong necessity beliefs (mean 4.3 ± 0.8) and relatively low concern levels (mean 2.1 ± 0.9). Adherence correlated positively with necessity beliefs ($\rho = 0.326$, $p < 0.001$) and negatively with concerns ($\rho = -0.366$, $p < 0.001$). Regular physical activity (OR = 7.75), employment (OR = 2.56), and older age (OR = 1.04) predicted better adherence, whereas polypharmacy, cigarette smoking, and herbal medicine use predicted poorer adherence.

Conclusion: Medication adherence among patients with chronic diseases in Erbil is driven by the interplay of medication beliefs and healthy daily behaviors. Strong necessity beliefs encourage medicine use. Pharmacist-led interventions should therefore include belief-focused counseling and simplification of treatment regimens for long-term disease control.

INTRODUCTION

Hypertension, diabetes, and cardiovascular diseases are among the major and increasing global public health challenges (1) . In addition to being the main contributors to deaths across the globe, these chronic conditions also contribute substantially to suffering and morbidity, and they exert huge resource-demand pressure on healthcare systems (2). This has also been observed

in Iraq, and is particularly noted in Erbil governorate due to increasing demographic and epidemiological transitions (3). Long-term disease management requires substantial improvement to generate better health outcomes.

Pharmacotherapy, applied in the management of chronic diseases, is effective at controlling symptoms, preventing complications, and improving quality of life. Success, however, can only be discussed in relation to patient adherence, defined as the degree to which a patient follows provider recommendations (4). Medication non-adherence is an enormous and global problem (5). It results in poor disease control, increases avoidable complications, occupies hospital beds, and contributes substantially to healthcare costs (6). Addressing it would therefore benefit both individual and public health.

Reasons for non-adherence are multifaceted. Studies converge on the fact that patient beliefs play a central role in determining adherence. The Necessity–Concerns Framework articulates this relationship well (7). It describes how patients develop an intuitive personal cost–benefit appraisal whereby the perceived necessity of medication to maintain their health is weighed against concerns regarding side effects, long-term safety, and other negative aspects of taking the medication (8). If perceived necessity does not outweigh concerns, patients will not fully adhere to the prescribed regimen. Eliciting these specific medication beliefs therefore becomes a prerequisite for intervention effectiveness (9).

Although the relationship between medication beliefs and adherence has been extensively explored among various Western and Asian populations,⁷ studies of this kind remain relatively scarce within the specific socio-cultural context of Erbil, Iraq. Indigenous factors such as cultural health beliefs, social norms, family influence, levels of health literacy, and peculiar characteristics of the local healthcare system may interact to shape patient perceptions and behaviors in ways not adequately captured by international studies (10). This gap in the literature calls for a localized inquiry into how these dynamics operate within this particular population.

This study aimed to investigate whether beliefs about medications influence the medication adherence behavior of patients with chronic diseases in Erbil, Iraq, and to explore the relationship between necessity and concern beliefs and medication adherence among these patients. It also examined demographic, socioeconomic, and educational factors affecting adherence, with the long-term goal of informing evidence-based, belief-targeted strategies to improve medication adherence through patient education and individually tailored interventions.

MATERIAL AND METHODS

Study Design and Duration

This cross-sectional observational study was conducted to determine how patients' beliefs about their prescribed medications might affect adherence among individuals with chronic diseases in Erbil city. Data collection lasted five months, from June 1 to November 1, 2025.

Study Setting

The study was conducted at several outpatient healthcare settings in Erbil, Kurdistan Region of Iraq. The medical outpatient departments belonged to Rzgary and Jmhury Teaching Hospitals, two major tertiary care centers, in addition to private medical clinics where patients with chronic diseases are treated.

Sampling and Participants

Participants were recruited by convenience sampling. The required sample size was calculated using the Raosoft® sample size calculator at a 95% confidence interval and less than 5% margin of error, yielding 377 participants in total. This sample size was considered sufficient to reflect significant associations between the domains of beliefs about medications and adherence levels within the chronic disease population of Erbil.

Inclusion and Exclusion Criteria

Eligible participants were adults aged 18 years or older with a verified diagnosis of at least one chronic conditions such as hypertension, diabetes mellitus, cardiovascular disease, asthma, or rheumatoid arthritis for more than one year before recruitment. All participants had to be on continuous prescribed medication for at least one year, reside within Erbil city, and provide informed consent.

Excluded participants were those with acute medical conditions requiring short-term medications, documented cognitive impairment, severe psychiatric illness or disorders that could interfere with communication and comprehension, pregnant women, and non-residents of Erbil city. Individuals who, despite having a chronic diagnosis, were not currently on any prescribed medications were also excluded.

Ethical Approval

The study design was approved by Kurdistan Board of Health Specializations, an oral and written informed consent was obtained from all participants prior to enrollment, and all procedures were conducted in accordance with the principles of the Declaration of Helsinki.

Assessment Tools

The Medication Adherence Report Scale (MARS-5) was used to assess medication adherence. It comprises five self-reported items, each rated on a five-point Likert scale. The total score ranges from 5 to 25, with higher scores denoting better adherence. Participants scoring 20 or above were classified as adherent and those below 20 as non-adherent. Descriptive analysis of the distribution of responses for each item was used to identify common patterns of both intentional and unintentional non-adherence.

Medication beliefs were measured using the Beliefs about Medicines Questionnaire–Specific (BMQ-S). It comprises two subscales: Necessity (five items) and Concerns (six items). Each item was rated on a five-point scale, and mean scores were computed for both subscales. Respondents were further classified into four attitudinal groups (Accepting, Ambivalent, Indifferent, and Skeptical) based on the Necessity–Concerns Framework.

Statistical Analysis

Data were analyzed using descriptive and inferential statistics. Continuous variables were summarized as means and standard deviations and categorical variables as frequencies and percentages. The Mann–Whitney U test and Kruskal–Wallis test was used to compare adherence scores across sociodemographic and behavioral groups. Spearman's rank correlation was used to examine associations between adherence, necessity beliefs, and concern beliefs. Binary logistic regression was performed to identify independent predictors of adherence. A p-value of less than 0.05 was considered statistically significant.

RESULTS

Participant Characteristics

A total of 377 patients were enrolled. The average age was 58.0 ± 12.5 years, with a balanced gender distribution (59.7% female). Most participants were illiterate (58.4%) and unemployed (66.8%), reflecting the sociodemographic composition of public outpatient populations in Erbil. The mean number of diagnosed chronic conditions was 1.86 ± 0.87 , and the mean duration of the primary illness was 11.31 ± 7.44 years. The average number of prescribed medications was 4.40 ± 2.81 , and the mean body-mass index was 27.28 ± 2.87 kg/m². Regarding lifestyle, only about 21.2% reported regular physical activity, 22.5% were current smokers, and 15.1% reported using complementary or herbal therapies. Most patients (78.8%) managed their medications independently, although 21.3% relied on family assistance. Complete demographic and clinical data are shown in table (1).

Medication Adherence Patterns

The mean total MARS-5 score was 20.8 ± 5.1 (range 5–25). Based on the standard cutoff (MARS-5 ≥ 20), 72.4% of participants were classified as adherent ($n = 273$) and 27.6% as non-adherent ($n = 104$). Among MARS-5 items, the most frequent non-adherence behaviors were forgetting doses (mean = 2.8 ± 1.1) and intentionally altering the dose (mean = 3.4 ± 1.1), indicating a coexistence of unintentional and intentional non-adherence, as shown in table (2).

Adherence was significantly higher among participants engaging in regular physical activity ($U = 63.716$, $p < 0.001$) and non-users of complementary medicines ($U = 21.448$, $p < 0.001$). Current smokers, those with lower educational levels, and patients prescribed multiple medications exhibited significantly lower adherence, as shown in table (3).

Beliefs About Medicines

Participants displayed markedly higher necessity beliefs than concern beliefs. The mean necessity score was 4.3 ± 0.8 , significantly exceeding the concerns score (2.1 ± 0.9 , $p < 0.001$). The statement “My health, at present, depends on my medicines” received the highest agreement (mean = 4.46 ± 1.12), while “This medicine gives me unpleasant side effects” had the lowest (mean = 1.50 ± 1.09), as shown in table (4). According to the Necessity–Concerns Framework, 77.7% of participants were Accepting (high necessity, low concerns), followed by Ambivalent (15.9%), Indifferent (3.2%), and Skeptical (3.2%), as shown in table (5) and figure (1).

Correlation Analysis

Spearman’s correlation revealed a moderate positive association between medication adherence and necessity beliefs ($\rho = 0.326$, $p < 0.001$) and a moderate negative association between adherence and concern beliefs ($\rho = -0.366$, $p < 0.001$), as shown in table (6) and figure (2). A strong inverse correlation between necessity and concern scores ($\rho = -0.581$, $p < 0.001$) further supports the cognitive divergence between confidence and apprehension toward medicines.

Multivariate Predictors of Medication Adherence

The binary logistic regression model demonstrated a good overall fit ($-2 \text{ Log Likelihood} = 268.09$; Nagelkerke $R^2 = 0.54$; Hosmer–Lemeshow $\chi^2 = 9.28$, $p = 0.319$), indicating satisfactory explanatory power. Regular physical activity emerged as the strongest independent positive predictor of adherence (OR = 7.75, 95% CI 2.28–26.39, $p = 0.001$), followed by employment (OR = 2.56, 95% CI 1.26–5.21, $p = 0.009$) and older age (OR = 1.04 per year, 95% CI 1.01–1.07, $p = 0.015$). Conversely, higher medication count (OR = 0.69, 95% CI 0.59–0.81, $p < 0.001$), current smoking (OR = 0.12, 95% CI 0.04–0.32, $p < 0.001$), former smoking (OR = 0.14, 95% CI 0.07–0.31, $p = 0.001$), and use of complementary and alternative medicine (OR = 0.29, 95% CI 0.13–0.63, $p = 0.002$) were significant negative predictors. Necessity and concern beliefs exerted opposing influences consistent with the Necessity–Concerns Framework. Adjusted odds ratios and 95% confidence intervals for all predictors are presented in table (7) and figure (3).

DISCUSSION

This study, conducted in Erbil, Iraq, on the determinants of medication adherence among patients with chronic diseases revealed that 72.4% of respondents met the MARS-5 threshold for adherence. The data demonstrated that necessity and concern beliefs, interacting with specific behavioral and treatment characteristics, confirmed the relevance of the Necessity–Concerns Framework (NCF) in this population through a context-specific adaptation (7,11).

The observed adherence of 72.4% is higher than most reports from Middle Eastern settings, where non-adherence ranges between 1.4% and 88% among chronic disease patients (12). This relatively high rate may be accounted for by sociocultural factors peculiar to Erbil, including strong family participation in medication practices, collective household health decision-making, and general trust in physicians; such factors probably increase perceived necessity and reinforce medication-taking behavior (13). It also reflects the increasing burden of chronic diseases in Iraq; the prevalence of hypertension in the adult population of Erbil reached 88.8%, (14) which accentuates the need for adherence-support interventions matched to regional health profiles.

Participants articulated strong necessity beliefs (mean = 4.3, SD = 0.8), which related positively to adherence ($\rho = 0.326$, $p < 0.001$). This pattern is supported by the meta-analytic synthesis of Horne et al.,(7) who noted that perceived necessity remains the most consistent predictor of better adherence across chronic disease populations. Higher necessity scores also significantly increased the odds of adherence in Palestinian patients, a finding similar to ours (15). The strong necessity observed here most probably reflects cumulative disease burden, dependence on pharmacotherapy, and limited access to alternative therapies, all of which heighten the perceived need for medicines in resource-limited settings.

The mean concerns score was much lower than the necessity score (2.1, SD = 0.9). Higher concern scores were associated with lower odds of adherence (OR = 0.393, 95% CI 0.272–0.568, $p < 0.001$), consistent with the classical Necessity–Concerns Framework (8) This finding is also consistent with the negative correlation observed between concern beliefs and adherence ($\rho = -0.366$, $p < 0.001$).

The attitudinal profiles show that most respondents fell into the Accepting category (high necessity, low concerns) at 77.7%, followed by Ambivalent (15.9%), Indifferent (3.2%), and Skeptical (3.2%). This distribution differs from Western and East Asian cohorts where Ambivalent attitudes dominate (17,18). The dominant Accepting profile in Erbil reflects collectivist health norms, deference to medical authority, and limited access to alternative health narratives. These results suggest that interventions should target the small subset of doubting patients rather than the general population.

Regular physical activity was the strongest positive predictor of adherence (OR = 7.75, 95% CI 2.28–26.39, $p = 0.001$), reinforcing the concept of a “health-conscious phenotype” in which adherence clusters with other positive health behaviors (19). Current and former smoking showed negative associations with adherence (OR = 0.12 and 0.14, respectively), validating findings from other studies in which smoking was associated with poor management of chronic diseases (20). Similarly, complementary and alternative medicine (CAM) use was a predictor of non-adherence (OR = 0.29, 95% CI 0.13–0.63, $p = 0.002$), as reported elsewhere, where reliance on alternatives coexists with lower trust in conventional treatments (21).

Employment and advancing age were positively associated with adherence (OR = 2.56 and OR = 1.04 per year, respectively), possibly reflecting organized schedules and heightened wellness awareness. Conversely, higher medication counts were associated with lower adherence (OR = 0.69, 95% CI 0.59–0.81, $p < 0.001$), confirming that regimen complexity remains an important determinant of adherence (22). Polypharmacy adds cognitive burden and leads to confusion, suggesting the need for pharmacist-led medication reviews and fixed-dose combinations to reduce treatment fatigue through regimen simplification. This parallels findings from a study in the Kurdistan Region where polypharmacy among chronic disease patients induced substantial psychological distress that diminished motivation to adhere, supporting the interpretation of polypharmacy as both a cognitive and emotional barrier to consistent medicine use (23).

These findings show that adherence is a composite behavior shaped by cognitive conviction and lifestyle. High necessity beliefs sustain motivation, but behavioral patterns ultimately determine execution. Patients who maintain physical activity and avoid smoking exhibit broader health-promotion tendencies extending to medication use, while those engaging in complementary medicine use or managing complex regimens demonstrate lower adherence. This interplay supports multidimensional adherence models integrating cognitive, behavioral, and contextual elements (24).

Chronic disease clinics should routinely use the BMQ-S to evaluate patients’ beliefs about medication, thereby identifying those with low necessity and high concern scores. Pharmacist-led adherence counseling that addresses misconceptions about safety, dependence, and long-term efficacy can directly respond to concern-related barriers (25). Screening for smoking and complementary medicine use offers ready behavioral indicators of adherence risk, and promoting physical activity has an indirect adherence effect through strengthening self-regulatory health behavior (26).

At the system level, embedding structured adherence assessment, pharmacist counseling, and regimen simplification into primary-care practice across the Kurdistan Region may produce sustainable improvements. Given that most patients already demonstrate strong necessity beliefs, future interventions should pivot toward alleviating residual barriers—treatment burden, side-effect concerns, and behavioral inertia—rather than focusing solely on motivational reinforcement (27–29).

LIMITATIONS

Several limitations are worth noting. First, the cross-sectional nature of the study does not allow causal inference between predictors and adherence outcomes. The use of validated self-reported adherence measures (which are at risk of recall or social desirability bias) and the focus on tertiary and private care in a single area may affect the generalizability of the findings. Despite these limitations, the study provides insight into behavioral and belief-based adherence determinants from a culturally distinct population. Future work could include longitudinal or interventional studies, such as pharmacist counseling or simplification of complex regimens, to increase adherence and improve outcomes.

CONCLUSIONS

This study showed that medication adherence is a function of the dynamic interaction of beliefs, behaviors, and social dimensions among patients with chronic diseases in Erbil. Beyond the cognitive factors hypothesized in the Necessity–Concerns Framework, adherence is related to modifiable health behaviors such as physical activity, smoking cessation, and avoidance of unprescribed complementary medicine, all of which are amenable to intervention. Given the clear harm associated with polypharmacy, the findings suggest that care plans should be kept as simple as possible and focus on patient behavior

change. Multicomponent strategies that include lifestyle modification, smoking-cessation programs, and open discussions about medications within usual care could form an agenda for healthcare systems managing chronic conditions and polypharmacy. Utilizing family networks, an underutilized cultural resource in this context, could further improve the success of adherence interventions.

Conflicts of interest

The authors have no conflict of interest to disclose.

Author Contributions

Lana Kamal Awni: Conceptualization, study design, data collection, data analysis, interpretation of results, manuscript drafting, and revision of the manuscript.

Prof. Dr. Kawa Fareq Dizaye: Supervision, study design, methodological guidance, interpretation of results, critical review, and revision of the manuscript.

Suha Saeed Azeez Shangula: Contribution to the study design and methodology, critical review of the manuscript, and revision of the manuscript.

All authors read and approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

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