Association of Necessity-Concerns Framework with medication adherence among Malaysian hemodialysis patients: A multicenter cross-sectional study

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ARTICLE INFO	ABSTRACT
	This study aimed to assess the association between Malaysian hemodialysis patients' Necessity-Concerns Framework and medication adherence. This was a cross-sectional multicenter study conducted in Penang, Malaysia, by purposive sampling. Data were collected using a 5-item Medication Adherence Report Scale (MARS-5) and the Beliefs about Medicine Questionnaire (BMQ). Multiple linear regression was used to assess the association between patients' medication beliefs and adherence. A total of 325 hemodialysis patients were recruited from 8 hemodialysis centers. The mean age of patients was 60.18 ± 21.54 years, and they were prescribed a median of 9 (95% CI: 8.0–11.0) medications daily. The mean score of medication adherence was 23.41 ± 1.81 based on the MARS-5 score. In the BMQ analysis, 88.0% of the patients believed that their medications prevent them from becoming worse, while 36.3% expressed worry about the side effects. The Necessity-Concerns differential score was 5.26 ± 3.91, with 67.1% of the patients having an accepting attitude. The belief of getting very sick without medications was a significant predictor of medication adherence. Meanwhile, the worry about becoming heavily dependent on medications has a significant negative association with medication adherence. In conclusion, counseling should be customized for patients with negative beliefs about medications and potential nonadherence.

INTRODUCTION

End-stage kidney disease (ESKD) is a chronic disorder that has attention globally due to its high morbidity and mortality (Cousin Sobrinho *et al.*, 2020). Malfunction of the kidney brings about multiple clinical complications, such as hyperphosphatemia, hyperkalemia, hyperuricemia, hyperparathyroidism, hyperglycemia, hypertension, hypocalcemia, uremia, metabolic acidosis, anemia, and fluid overload (de Jager *et al.*, 2009). The treatment effectiveness of hemodialysis patients depends on the adherence to hemodialysis sessions, fluid-diet control,

and medication adherence (Alkatheri *et al.*, 2014). Medication adherence is the most complex issue among these three factors because hemodialysis patients might receive about 10–12 types of medication with different names, indications, doses, frequencies, and administration times (Manley *et al.*, 2004). Poor understanding of prescribed medication can lead to medication nonadherence and bring more risk than benefit. Besides, the patient's self-experience of adverse drug reactions can cause negative beliefs about prescribed medication resulting in medication nonadherence (Cummings *et al.*, 1982; Jin *et al.*, 2008; Wileman *et al.*, 2015). A previous study showed that a patient with positive beliefs about medicine less engaged in intentional medication nonadherence (Náfrádi *et al.*, 2016).

The rate of medication nonadherence among hemodialysis patients was ranked from 12.5% to 98.6% based on previous studies (Ghimire *et al.*, 2015). Clinicians should be aware of patient-, disease-, and medication-related factors associated with medication

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nonadherence (Ghimire *et al.*, 2015). However, the psychosocial and behavioral factors should be focused on as well to address the problem of medication nonadherence (Ghimire *et al.*, 2017). Indeed, previous studies showed that belief about medication was an important predictor of medication adherence in hemodialysis patients (Drangsholt *et al.*, 2019; Horne *et al.*, 2001). Medication nonadherence among hemodialysis patients was potentially modifiable by using psychoeducational or cognitive-behavioral interventions (Ghimire *et al.*, 2017).

Patients' medication beliefs have been extensively assessed in multiple chronic illnesses by using the Beliefs about Medicine Questionnaire (BMQ), a validated tool developed by Horne *et al.* (1999). The BMQ model assesses the medication beliefs in two domains which are BMQ-Specific and BMQ-General. BMQ-Specific evaluates patients' beliefs about prescribed medication for their personal use, whereas BMQ-General assesses general beliefs about medicine. The Necessity-Concerns differential determined from BMQ-Specific was extensively used to categorize the patients' attitudes into four groups: accepting, ambivalent, indifferent, and skeptical (Horne *et al.*, 1999; Liu *et al.*, 2017; Sipos *et al.*, 2021). In the context of the Necessity-Concerns Framework, perceptions of high necessity with low concerns about the potential adverse effects of medication were associated with high medication adherence (Horne *et al.*, 2013; Jamous *et al.*, 2014). A meta-analysis revealed that the Necessity-Concerns Framework could help clinicians identify patients' perception about the medication necessity and understand the patients' degree of worry about the potential side effects of the medication (Horne *et al.*, 2013).

In Malaysia, the pharmacist-led medication therapy adherence clinic (MTAC) is well established in government hospital settings (Pharmaceutical Service Program, 2019). The MTAC aims to improve patient medication knowledge and adherence by providing systematic medication counseling (Pharmaceutical Service Program, 2019). However, the medication beliefs perspective has not been incorporated in medication counseling for hemodialysis patients in Malaysia due to the lack of local supportive data. Hence, this study aimed to assess the association between medication beliefs (by using the Necessity-Concerns Framework) and medication adherence among Malaysian hemodialysis patients. The study findings would guide the incorporation of the medication beliefs perspective in medication counseling for Malaysian hemodialysis patients.

MATERIALS AND METHODS

Study design, site, and duration

A multicenter, cross-sectional study was conducted between September 2019 and January 2020 in eight hemodialysis centers in Penang state, Malaysia. The centers were conveniently selected, including one government hospital hemodialysis center and seven nongovernment hemodialysis centers. The study was approved by the Medical Research Ethics Committee, Ministry of Health Malaysia (Ethics Approval No. NMRR-19-280-46289).

Study participants and sampling method

The sample was enrolled by using purposive sampling. Patients who fulfilled the inclusion criteria were sampled. The inclusion criteria were ESKD patients aged more than 18 years and undergoing hemodialysis for at least 6 months. The patients who were cognitively and physically unstable were excluded.

Sample size

The sample size was determined by using the formula for prevalence study. The sample size was determined by using an estimation of 30% prevalence of medication nonadherence among hemodialysis patients from a previous Malaysian study (Chan *et al.*, 2012). The calculated required sample size was 323 patients. With an estimation of an 85% response rate, 380 patients needed to be recruited.

Study instruments

A data collection form was used in the study. The data collection form consisted of demographic data, a five-item medication adherence report scale (MARS-5), and the BMQ. Baseline information such as demographic data and current medication list was obtained from the patient's medical record. Meanwhile, a patient's social history, medication adherence, and beliefs about medicine were obtained from the patient's structured interview. A pilot test was conducted to examine the feasibility of the MARS-5 and BMQ prior to the data collection.

Medication adherence report scale

MARS-5 (Horne and Weinman, 1999) was used to assess medication adherence. The approval to use MARS-5 was obtained from the copyright holder. The reliability test for MARS-5 in a previous study showed a Cronbach's alpha of 0.67–0.89 for hypertension, asthma, and diabetes mellitus patients (Chan *et al.*, 2020). MARS-5 included five statements of nonadherence behavior, which are "forgetting," "changing of dosage," "stopping," "skipping," and "using medication less than what is prescribed." The answers are on a five-point Likert scale. The patients indicated the frequency ("always," "often," "sometimes," "rarely," or "never") for each question with ascending score from "always" (1 point) to "never" (5 points). A higher score of MARS-5 indicates high levels of medication adherence, with a maximum score of 25 (Horne and Weinman, 1999). The English version of MARS-5 was translated to the Malay language by using the forward-backward translation procedure in the present study.

Beliefs about Medicine Questionnaire

The BMQ is a reliable, validated tool to assess beliefs about medicine in patients with chronic diseases (Horne *et al.*, 1999). The permission to use both the English (Horne *et al.*, 1999) and Malay (Supramaniam *et al.*, 2019) versions of the BMQ in this study was obtained from the copyright holder. A total of 10 questions in the questionnaire are scored on a 5-point Likert scale (where 1 = strongly disagree, 2 = disagree, 3 = uncertain, 4 = agree, and 5 = strongly agree). The BMQ-Specific is divided into subscales of Necessity and Concerns. The total scores for the Specific-Necessity and Specific-Concerns subscale range from 5 to 25, with the midpoint of 15. A higher score reflects higher beliefs in necessity and more concern, respectively. Considering the reliability of the BMQ, a previous study showed the Cronbach's alpha values for each scale in kidney disease patients were 0.55 for Specific-Necessity and 0.73 for Specific-Concerns (Horne *et al.*, 1999). In Malaysia, the internal consistency of the BMQ among diabetes mellitus and hypertensive patients was 0.75 and 0.86, respectively (Supramaniam *et al.*, 2019; Tan *et al.*, 2018).

Data collection

A preannouncement of the study to the patients was performed a day before the data collection. Written informed consent was obtained from all the patients before study participation. The data were collected during a researcher (the first author) administered structured interview. The interview was performed by a single researcher (the first author) at the time before the starting of the hemodialysis session.

Data analysis

All the data were processed with IBM Statistical Package for the Social Sciences® version 27.0. Data were tested for normality by using the Kolmogorov–Smirnov method. Categorical data such as demographic data were presented as frequency and percentage. The medication adherence score (MARS-5) was presented as the mean score. The scores of items in the Specific-Necessity and Specific-Concerns were presented as a percentage. The dependent variable was medication adherence, and the independent variables were demographic data and BMQ score. The differences in the medication adherence based on the patients' demographic data were analyzed by using the Mann–Whitney U test and the Kruskal–Wallis test, whereas the association of the BMQ-Specific items with medication adherence was analyzed by using single linear regression, followed by multiple linear regression.

The Necessity-Concerns differential was determined by subtracting the total mean score of Specific-Concerns from the total mean score of Specific-Necessity. The score was on a differential varied from the lowest score of −20 to the highest score of +20 (Horne and Weinman, 1999; Liu *et al.*, 2017). The Necessity-Concerns Framework was split at the midscale to form the four attitude groups which are accepting (a high necessity with low concerns), ambivalent (a high necessity with high concerns), indifferent (a low necessity with low concerns), and skeptical (a low necessity with high concerns) (Horne and Weinman, 1999; Horne *et al.*, 2001). The differences between the attitude groups based on the MARS-5 score were analyzed by using the Kruskal–Wallis test. In all steps of analysis, $p \leq 0.05$ was considered statistically significant.

RESULTS

Demographic characteristics of patients

Out of 380 patients who fulfilled the inclusion criteria, 55 patients disagreed with consenting to participate in the study. Hence, 325 patients were recruited and completed the study, corresponding to a response rate of 85.5%. The required sample size was achieved. The mean age of the patients was 60.18 ± 21.54 years, with 57.6% less than 65 years old. Additionally, 54.8% of the patients were male, and 57.2% were Chinese. Most (68.3%) of the patients were married. Slightly more than half (55.1%) of the patients had an education level of secondary school, and the majority (86.8%) were employed. The patients mostly received hemodialysis with a duration of 10 years or less (87.1%) and received 6–10 types of prescribed medications (58.2%). The median number of daily medications received by the patients was 9 (95% CI: 8.0–11.0). Among the demographic variables, age and number of prescribed medications showed significant differences in the MARS-5 score (Table 1). The patients with age ≥65 years had a significantly higher MARS-5 mean score

than the patients with younger ages (18–44 years old). In terms of the number of prescribed medications, the patients who were prescribed 5 or fewer medications showed lower MARS-5 mean scores as compared to patients who received 6–10 and 11 or more prescribed medications, respectively (Table 1).

Necessity-Concerns Framework analysis

Figures 1 and 2 show the descriptive analysis of hemodialysis patients' responses to the BMQ Specific-Necessity and Specific-Concerns. Most of the patients (88.0%) believed that their medication prevents them from becoming worse, and 85.5% of them agreed that their current health depends on the prescribed medication (Fig. 1). Considering the Specific-Concerns analysis, the worry about long-term side effects of medication was the main concern among the patients (36.3%). Meanwhile, 29.5% of the patients were worried about becoming too dependent on their prescribed medication (Fig. 2).

This study found that most patients perceived high necessity beliefs about their prescribed medication with a mean score of 18.42 ± 2.30 and low concerns about medication side effects with a mean score of 13.16 ± 3.13. The Necessity-Concerns differential showed a positive value of 5.26 ± 3.91. By analyzing whether the patient scored above or below the scale midpoint for both scales, this study found that 67.1% of hemodialysis patients were accepting, 26.5% were ambivalent, 3.7% were indifferent, and 2.8% were skeptical towards prescribed medication. Figure 3 showed that the rate of medication adherence was highest among the patients with accepting attitudes (75.8%), followed by ambivalent (19.2%), skeptical (3%), and indifferent (2%) ones.

Differences in MARS-5 score among the attitudinal groups

The four attitudinal groups of patients showed a significant difference in medication adherence based on the MARS-5 score (Table 2). The accepting group scored the highest mean score of 23.65 ± 1.65, followed by the ambivalent group (22.98 ± 1.92), skeptical group (23.33 ± 1.94), and indifferent group (22.50 ± 2.91). *Post hoc* analysis showed a significant difference in adherence between the accepting and ambivalent groups of patients.

Association of Necessity-Concerns Framework with medication adherence

The multiple linear regression analysis showed that the overall medication adherence in hemodialysis patients was positively associated with the Specific-Necessity score but negatively associated with the Specific-Concerns score (Table 3). The association between each BMQ-Specific item and medication adherence was further analyzed (Table 4). The belief of getting very sick without medications was a significant predictor of medication adherence (adjusted regression coefficient = 0.344; 95% CI: 0.113–0.576). Meanwhile, the worry about becoming heavily dependent on medications has a significant negative association with medication adherence (adjusted regression coefficient = −0.264, 95% CI: −0.469–0.059).

DISCUSSION

The present study revealed that hemodialysis patients of varied ages had a significant difference in medication adherence. This study showed a different trend from a previous study

Table 1. Demographic characteristics, social history, and difference in MARS-5 score of the hemodialysis patients.

Characteristics	Frequency (%)	MARS-5 score (Mean ± SD)	Difference in MARS-5 score
Age (years)			0.004[ac]
18–44	48 (14.8%)	22.83 ± 1.88	
45–64	139 (42.8%)	23.27 ± 2.09	
≥65	138 (42.4%)	23.77 ± 1.37	
Gender			0.774[b]
Male	178 (54.8%)	23.48 ± 1.70	
Female	147 (45.2%)	23.35 ± 1.94	
Ethnicity			0.090[a]
Malay	117 (36.0%)	23.16 ± 1.91	
Chinese	186 (57.2%)	23.61 ± 1.59	
Other	22 (6.8%)	23.18 ± 2.72	
Marital status			0.331[b]
Single/widowed/divorced	103 (31.7%)	23.33 ± 1.72	
Married	222 (68.3%)	23.45 ± 1.86	
Level of education			0.305[a]
Primary or no formal education	130 (40%)	23.58 ± 1.73	
Secondary	179 (55.1%)	23.35 ± 1.88	
Tertiary	16 (4.9%)	22.94 ± 1.73	
Employment status			0.083[b]
Employed	43 (13.2%)	23.09 ± 1.91	
Unemployed	282 (86.8%)	23.47 ± 1.80	
Duration of dialysis			0.280[b]
10 years or less	283 (87.1%)	23.49 ± 1.73	
>10 years	42 (12.9%)	22.90 ± 2.23	
Number of prescribed medications			0.023[ad]
≤5	17 (5.2%)	22.18 ± 2.13	
6–10	189 (58.1%)	23.51 ± 1.78	
≥11	119 (36.6%)	23.45 ± 1.78	

[a] Kruskal–Wallis test.
[b] Mann–Whitney U test.
[c] *Post hoc* pairwise comparison using Mann–Whitney U test showed significant difference in adherence between the age group of 18–44 and ≥65 years.
[d] *Post hoc* pairwise comparison using Mann–Whitney U test showed significant difference in adherence between the number of prescribed medications of: (i) ≤5 and 6–10 items and (ii) ≤5 and ≥11 items.
MARS-5 = Five items-medication adherence reporting scale.

by Theofilou (2013), which found that hemodialysis patients aged over 65 years were less likely to take their medications as prescribed. This is because elderly patients are more prone to forgetfulness of taking medication, making it easier for them to encounter drug side effects (Moreira *et al.*, 2008). However, the present study discovered that older patients had higher medication adherence than the younger-aged group. This finding could be attributed to the daily monitoring of elderly hemodialysis patients' medication-taking behavior by the caregivers.

    This study revealed an interesting finding that patients who were prescribed more medications had better adherence. These patients might have experienced complications of ESKD which led to the extra medication treatment. The extra medication might serve as a reminder to the patients to adhere

to their treatment in order to avoid further severe complications. Nevertheless, a previous study showed a different trend that high pill load in hemodialysis patients was substantially associated with medication nonadherence (Neri *et al.*, 2011). Besides, a recent study found that chronic kidney disease patients who consumed more than five medications per day had lower adherence (Bai *et al.*, 2022). The patients' nonadherence was due to a lack of tolerance for the complex regimen's negative effects and drug interactions (Chiu *et al.*, 2009).

    In this study, hemodialysis patients showed a high level of awareness regarding the benefits of their prescribed medications. The majority of patients believe their medication keeps them from becoming worse, according to the Specific-Necessity analysis. Patients also believed that their current health was dependent on
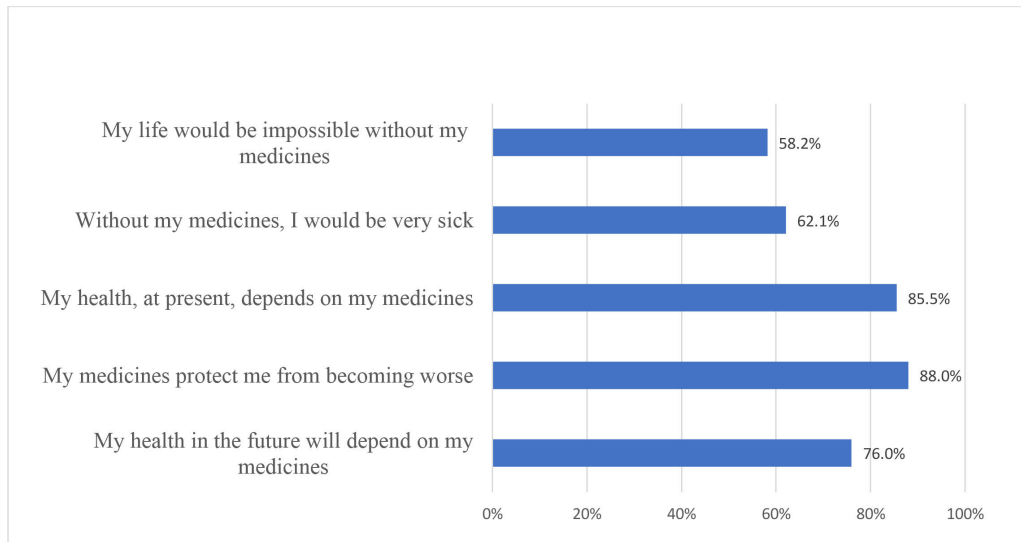
Figure 1. Percentage of patients expressing belief the need of their medication as indicated by responding agree or strongly agree to the Specific-Necessity items in the BMQ.
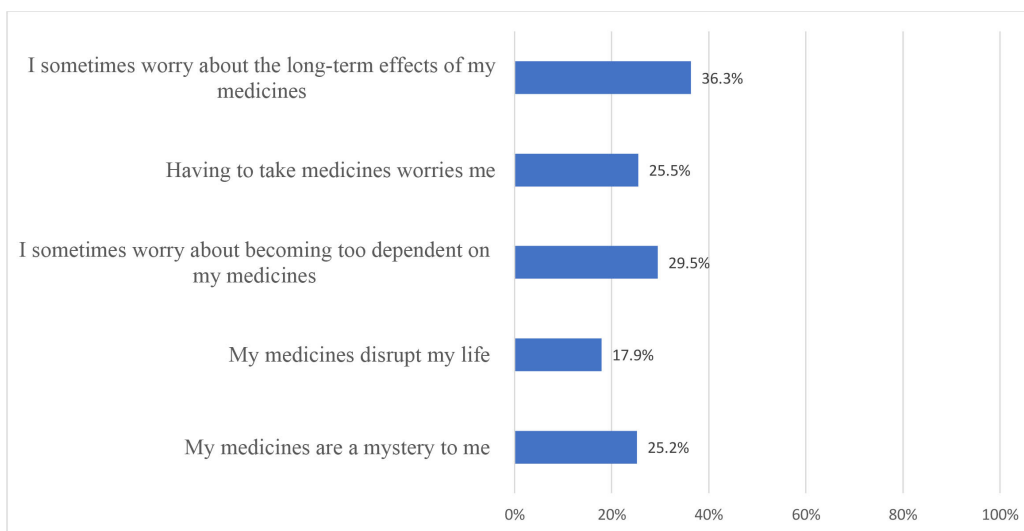

Figure 2. Percentage of patients expressing concern the side effects of their medication as indicated by responding agree or strongly agree to the Specific-Concerns items in the BMQ.

the medications they were taking. These positive views were also discovered in a prior study done among Norwegian hemodialysis patients (Drangsholt *et al.*, 2019). The patients might have experienced recovery from the ESKD complications after taking their prescribed medications. A rapid deterioration of clinical outcomes might occur if the patient defaults on the medication treatments (Horne *et al.*, 2001).

The worries about long-term side effects and becoming too dependent on medications were the hemodialysis patients' main concerns according to the Specific-Concerns analysis in this study. A study conducted in England found a similar finding that the dialysis patients' erroneous beliefs about medication were always tempered with concern about long-term safety and medication dependence (Horne *et al.*, 2001). Indeed, a more recent study showed that informing patients about known drug side effects and

the countermeasures for dealing with them can help in enhancing the patients' beliefs about long-term medication treatment (Bai *et al.*, 2022). Thus, alleviating such concern among hemodialysis patients is one of the strategies for counseling intervention to improve their medication adherence.

The positive value of the Necessity-Concerns differential indicated that hemodialysis patients held beliefs that their medication brought about more benefits than side effects. This result reflects that the responding Malaysian hemodialysis patients have a good acceptance of their prescribed medication, which was consistent with previous studies involving patients with other chronic diseases (Gonzalez *et al.*, 2007; Neame and Hammond, 2005; Wei *et al.*, 2017). Additionally, this study found that the majority of hemodialysis patients had an accepting attitude with the highest medication adherence rate. However, the
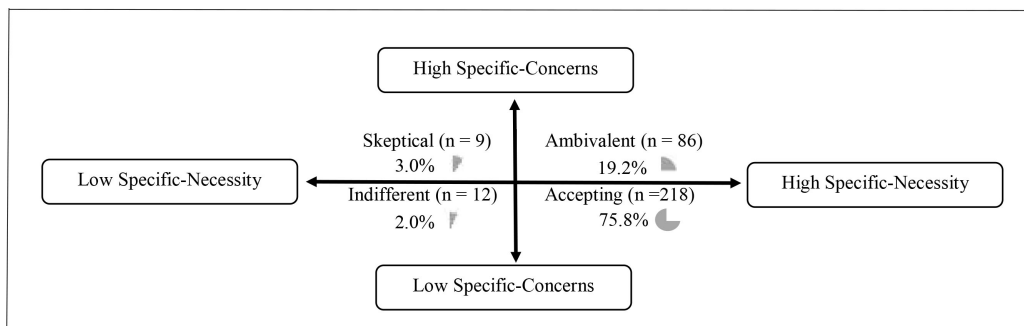
Figure 3. Rate of patients' adherence according to the four attitudinal groups from the BMQ analysis.

Table 2. Differences in MARS-5 score among the attitudinal groups

Attitudinal groups	MARS-5 scores (mean ± SD)	p value
Kruskal–Wallis test analysis of the four attitudinal groups		
Accepting	23.65 ± 1.65	0.005[a]
Ambivalent	22.98 ± 1.92	
Skeptical	23.33 ± 1.94	
Indifferent	22.50 ± 2.91	
Post hoc pairwise comparison using Mann–Whitney *U* test		
Accepting versus ambivalent		0.001[b]
Accepting versus skeptical		0.609
Accepting versus indifferent		0.112
Ambivalent versus skeptical		0.468
Ambivalent versus indifferent		0.889
Skeptical versus indifferent		0.500

[a] Kruskal–Wallis test showed significant differences in adherence between the four attitudinal groups.
[b] *Post hoc* pairwise comparison using Mann–Whitney *U* test showed significant difference in adherence between the accepting and ambivalent group.
MARS-5 = Five items-medication adherence reporting scale.

rate of medication adherence was lower in the ambivalent group of patients as their medication beliefs were tempered with worrying about the medication's long-term adverse effects and medication dependence. A previous study showed that patients who are ambivalent about their medication might need proper medication counseling. In fact, healthcare providers need to always be alert to the patients' history of side effects (Liu *et al.*, 2017). In this study, only 3% of patients adhered to medications with a skeptical attitude. Patients with skepticism might not have good adherence until they experience the worsening symptoms of the disease (Liu *et al.*, 2017). Meanwhile, the present study found that the patients with an indifferent attitude have the lowest adherence. This finding deviated from a study conducted among nondialysis ESKD patients, which reported that skeptical patients showed the lowest adherence score (Bai *et al.*, 2022). The low medication adherence in patients with an indifferent attitude might be due to the poor understanding of their medication. Therefore, a good patient and healthcare provider relationship should be established to correct the misunderstanding of medication and reduce the negative beliefs about medication (Ghimire *et al.*, 2017).

Overall, the present study's findings supported that the Necessity-Concerns Framework is a good predictor tool for medication adherence behavior in hemodialysis patients (Horne *et al.*, 2013; Nie *et al.*, 2019).

The present study showed similar findings to studies from overseas that medication adherence in ESKD patients was positively associated with the Specific-Necessity score but negatively associated with the Specific-Concerns score (Bai *et al.*, 2022; Horne *et al.*, 2001). Medication adherence was significantly higher in patients with the belief that their condition would become worse without the prescribed medicines. This finding is valuable in the customization of medication counseling for hemodialysis patients. Counseling on the benefit of disease control by the medication would enhance hemodialysis patients' adherence. Besides, the patients should be educated on the clinical complications of ESKD to further strengthen their adherence to the medication treatment. These complications include fatigue, fluid overload, electrolyte imbalance, and uncontrolled blood pressure (Saran *et al.*, 2003). Meanwhile, medication adherence was found to be lower in patients worried about medication dependence.

Table 3. Association of the BMQ-Specific subscale with MARS-5 score in hemodialysis patients.

BMQ variables	Simple linear regression		Multiple linear regression	
	Crude regression coefficient (95% CI)	*p*-value	Adjusted regression coefficient (95% CI)	*p*-value
Specific-Necessity	0.090 (0.005, 0.176)	0.039	0.089 (0.004, 0.174)	0.040
Specific-Concerns	−0.082 (−0.144, −0.019)	0.011	−0.081 (−0.143, −0.019)	0.011
Necessity-Concerns Differential	0.084 (0.034, 0.134)	0.001		

Enter multiple linear regression method applied. Model assumption not met.
Coefficient of determination: $R^2 = 0.033$.
Final model equation: Medication adherence score = 22.85 + 0.389 (Specific-Necessity) + (−0.081) (Specific-Concerns).

Table 4. Association of BMQ-Specific items with MARS-5 score in hemodialysis patients.

BMQ-Specific items	Simple linear regression		Multiple linear regression	
	Crude regression coefficient (95% CI)	*p*-value	Adjusted regression coefficient (95% CI)	*p*-value
Specific-Necessity				
My life would be impossible without my medicines	0.201 (−0.039, 0.440)	0.101		
Without my medicines, I would be very sick	0.341 (0.107, 0.575)	0.004	0.344 (0.113, 0.576)	0.004
My health, at present, depends on my medicines	0.116 (−0.198, −0.429)	0.468		
My medicines protect me from becoming worse	0.273 (−0.082, −0.627)	0.131		
My health in the future will depend on my medicines	−0.083 (−0.043, −0.261)	0.636		
Specific-Concerns				
I sometimes worry about the long-term effects of my medicines	−0.243 (−0.440, 0.047)	0.015		
Having to take medicines worries me	−0.240 (−0.455, −0.026)	0.028		
I sometimes worry about becoming too dependent on my medicines	−0.026 (−0.468, −0.054)	0.014	−0.264 (−0.469, −0.059)	0.012
My medicines disrupt my life	−0.133 (−0.368, −0.102)	0.267		
My medicines are a mystery to me	−0.039 (−0.274, 0.196)	0.744		

Forward multiple linear regression method applied. Model assumption not met.
Coefficient of determination: $R^2 = 0.038$.
Final model equation: Medication adherence score = 22.22 + 0.344 (without my medicines, I would be very sick) + (−0.264) (I sometimes worry about becoming too dependent on my medicines).

Patient counseling on the indication of each prescribed medication would address the misconception of medication dependence. When the patients clearly understand the indication, their confidence in taking their medications will improve.

CONCLUSION

In conclusion, a positive belief in necessity with less concern about medication side effects was associated with medication adherence in hemodialysis patients. The Necessity-Concerns Framework is a useful tool to predict medication adherence behavior in hemodialysis patients. Targeted counseling should be customized for hemodialysis patients with negative beliefs about medications and potential nonadherence.

AUTHOR CONTRIBUTIONS

All authors made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; agreed to submit to the current journal; gave final approval of the version to be published; and agree to be accountable for all aspects of the work. All the authors are eligible to be an author as per the international committee of medical journal editors (ICMJE) requirements/guidelines.

CONFLICTS OF INTEREST

The authors report no financial or any other conflicts of interest in this work.

ETHICAL APPROVALS

The study was approved by the Medical Research Ethics Committee, Ministry of Health Malaysia (Ethics Approval No. NMRR-19-280-46289).

DATA AVAILABILITY

All data generated and analyzed are included within this research article.

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