Original Article

Development and Psychometric Evaluation of the Belief and Attitude About Herbal Medicine Inventory Among Iranian Patients with Cardiovascular Disease

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ABSTRACT

Background: Over-the-counter use of herbal products puts patients with cardiovascular diseases (CVDs) at risk for drug interactions. Belief and attitude have significant effects on behavior. **Objectives:** This study was conducted to develop and evaluate the psychometric properties of the Belief and Attitude about Herbal Medicine Inventory (BAHMI). **Methods:** In this methodological study, the BAHMI draft was developed based on the approach of Waltz and colleagues and using the existing instruments and the three main theory of planned behavior subscales. After face and content validity assessment, BAHMI construct and concurrent validity were assessed. Accordingly, 200 patients with CVD were consecutively recruited from a heart clinic in Kashan, Iran, 2018. BAHMI reliability was also assessed through the internal consistency and the test–retest methods. **Results:** The BAHMI draft included 40 items. Seven items were excluded during psychometric evaluation phases. Exploratory factor analysis revealed a five-factor structure for BAHMI which explained 42.636% of the variance of its total score. The correlation coefficient between the scores of BAHMI and Hashem-Dabaghian and colleagues' questionnaire was –0.7 ($P < 0.0001$). BAHMI mean score was significantly different among patients with different levels of agreement on herbal product use ($F = 19.16$, $P < 0.0001$). Cronbach's alpha, intraclass correlation coefficient, standard error of measurement, and smallest detectable change of BAHMI were 0.864, 0.888, ±13.46, and 10.2, respectively. No participant obtained the minimum and maximum possible BAHMI scores. **Conclusion:** The 33-item BAHMI is a valid and reliable instrument for the assessment of belief and attitude about herbal medicine among patients with CVD. The findings of this study can be used for health policy-making and planning.

KEYWORDS: *Attitude, belief, cardiovascular disease, herbal medicine, psychometric evaluation, theory of planned behavior*

INTRODUCTION

Cardiovascular disease (CVD) is the first leading cause of death in the world[1] and in Iran.[2] Patients with CVD usually receive numerous medications.[3] Yet, a large number of them resort to the herbal products (including both medicinal plants and herbal medicines), following the recommendations of lay people and without medical prescriptions.[4,5]

Access this article online

Quick Response Code:

Website: www.nmsjournal.com

DOI: 10.4103/nms.nms_57_21

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Submitted: 13-Jun-2021 **Revised:** 22-Oct-2021 **Accepted:** 30-Oct-2021
Published: 29-Jul-2022

How to cite this article: Gholami M, Tagharrobi Z, Sharifi K, Sooki Z. Development and psychometric evaluation of the belief and attitude about herbal medicine inventory among Iranian patients with cardiovascular disease. Nurs Midwifery Stud 2022;11:137-45.

A systematic review reported that the rate of herbal product use among patients with CVD was between 2% and 46% in different countries.[6] This rate is 38%–70.1% in Iran.[7-10] Simultaneous use of herbal products and conventional cardiac medications may result in drug interactions, which may cause irreparable adverse effects.[11,12] Therefore, healthcare providers, particularly nurses, need to carefully assess patients for the use of herbal products,[13] identify at-risk patients, and provide them with quality education about appropriate use of herbal products and their potential therapeutic and adverse effects.[14] There are a wide variety of factors behind a behavior such as using herbal products. Belief and attitude are the most important factors affecting the intent to engage in a given behavior and the actual engagement in it.[15,16] Therefore, belief and attitude assessment can help nurses collect information about patients' health-related behaviors.

Health and belief assessment necessitates appropriate instruments. The most appropriate measurement instruments are those which are developed based on behavior-related theories.[17] One of these theories is the theory of planned behavior (TPB). This theory explains that the most important factors behind engagement in a behavior are intention, attitude, subjective norms, and perceived behavioral control.[17]

Formerly, instruments are developed to assess belief and attitude about herbal medicine among diabetic patients,[18] different ethnic groups and employees,[19] and older adults.[16] Although some of these instruments were TPB-based,[16,19] none of them targeted patients with CVD. Moreover, studies in Iran into belief and attitude about herbal products were conducted using researcher-made or translated questionnaires which contained limited number of items on belief and attitude[20,21] and did not cover the different aspects of belief and attitude.[21,22] In addition, they were conducted on either the general population[20] or patients without non-cardiac conditions.[10,21-23] Furthermore, despite the significant effects of culture on belief and attitude, there is no culturally appropriate instrument for the assessment of belief and attitude about herbal product use in Iran. Thus, the present study was conducted to fill these gaps.

Objectives

The aim of this study was the development and psychometric evaluation of Belief and Attitude about Herbal Medicine Inventory (BAHMI) among Iranian patients with CVD.

Methods

This methodological study was conducted in 2018 in two phases, namely, BAHMI development and BAHMI psychometric evaluation.

During two study phases, all of the data were gathered by the first author who was a nursing graduate student and had received educations about questionnaire development. The gathered data were reviewed, assessed, and analyzed by the research team during several sessions.

Phase I: BAHMI development phase

The draft of BAHMI was developed using Waltz *et al.*'s[24] four-step approach. In the first step, the intended concept was identified. In the second step, the aims of measurement were determined in the three main TPB subscales, namely, the measurement of control beliefs, behavioral beliefs, and normative beliefs. These aims were determined based on the definition of belief and attitude in TPB.[17] In the third step, the items of BAHMI were generated through literature search and using the items of the existing relevant instruments. The generated items were combined, refined, revised, and allocated to the aforementioned three subscales. In the fourth step, the wording of the items was revised based on TPB constructs,[25] and the method of item scoring was determined based on the manual for developing TPB-based questionnaires.[25] Item scoring was done on a seven-point scale from "complete disagreement" (scored 1) to "complete agreement" (scored 7). Negatively worded items were reversely scored. Twelve patients with CVD were recruited with maximum variation (respecting their age, gender, education level, and socio-economic status) and interviewed by the first author to more precisely determine the perceived advantages, disadvantages, barriers, and facilitators of using herbal products. Based on the results of the interviews, the BAHMI items were revised and further developed.

Phase II: BAHMI psychometric evaluation

Step I: Face and content validity assessment

BAHMI quantitative and qualitative content validity and quantitative face validity were assessed by 10 experts in nursing, instrument development, complementary and alternative medicine, and health education. For qualitative content validity assessment, the experts were asked to comment on the readability, appropriate wording, adequacy, and scoring of the items and then, the inventory was revised based on their comments. Quantitative content validity was assessed through calculating relaxed content validity

ratio ($CVR_{relaxed}$)[26] and content validity index (CVI).[27] $CVR_{relaxed}$ was calculated based on item essentiality[26] and was judged according to Lawshe's table.[27] Item CVI was also calculated based on the relevance, clarity, and simplicity of the items[27] and was judged according to the index of Bausell and Waltz.[24] The total CVI of the inventory ($S\text{-}CVI_{average}$) was also calculated through averaging item CVIs.[27]

For quantitative face validity assessment, the experts rated the importance of each item on a five-point scale and then item impact score was calculated.[26] Items with impact scores more than 1.5 were maintained.[26] Qualitative face validity of BAHMI was assessed by 10 patients with CVDs who were different from each other respecting their age, gender, education level, socioeconomic status, and CVD type. Each item was read (by the first author) to them, and they were asked to determine possible ambiguities in it. Items which were ambiguous for them were revised by the research team.

Step II: Construct validity and floor and ceiling effect assessment

BAHMI construct validity was assessed through exploratory factor analysis and the known-groups method. The sample size for exploratory factor analysis is recommended to be 100–300, irrespective of the number of the intended instrument items.[28] Accordingly, we consecutively recruited 200 patients with CVD from the Heart Clinic of Shahid Behesthi Hospital, Kashan, Iran, and asked them to answer BAHMI through face-to-face interviews held by the first author. Sampling was done from April 21 to June 22, 2018. Selection criteria were age over 18, Iranian nationality, ability to communicate verbally, definite medical diagnosis of CVD by a cardiologist, continuous CVD treatments for at least 3 months before the study, having no known cognitive disorders, and consent for participation. Reluctance to stay in the study and refraining from answering BAHMI items were considered as exclusion criteria. Beside BAHMI, recruited patients also answered a demographic questionnaire with nine items on their age, gender, marital status, education level, occupation, monthly income, place of residence, CVD type, CVD diagnosis date, and the length of receiving CVD treatments. Collected data were used for exploratory factor analysis with principal components method and varimax rotation. The number of factors was determined through scree plot and eigenvalues greater than 1. Minimum factor loading was also considered to be 0.4. If an item was loaded on two factors or more, it was allocated to the factor for which it had the greatest factor loading.

BAHMI construct validity was also assessed through the known-groups method. Accordingly, study participants were grouped into seven groups based on their responses to a question about their agreement on using herbal products for the prevention, alleviation, or treatment of CVD-associated problems. This question was scored on a seven-point Likert scale from 1 to 7. Then, these seven groups were compared with each other respecting their BAHMI scores.

Floor and ceiling effects were also assessed.[27] Accordingly, the rate of participants with the minimum and maximum possible BAHMI scores was calculated to determine floor and ceiling effects.

Step III: Concurrent validity assessment

After construct validity assessment, BAHMI concurrent validity was assessed using a questionnaire on attitude about herbal medicine developed by Hashem-Dabaghian *et al*.[10] They developed their 13-item questionnaire to assess Iranian pregnant women's attitudes toward herbal therapies. The five subscales of their questionnaire are efficacy (4 items), safety (2 items), accessibility and affordability (3 items), preference for taking herbal therapies over conventional therapies (2 items), and desire to use herbal therapies (2 items). Item scoring is done on a five-point Likert scale, resulting in a possible total score of 13–65. Higher scores show more negative attitudes toward using herbal therapies. Hashem-Dabaghian *et al*.[10] confirmed the acceptable validity and reliability of their questionnaire with a Cronbach's alpha of 0.78. Items 5 and 11 of their questionnaire are specific to pregnant women and hence were adapted in the present study. The content validity of the questionnaire was assessed and confirmed in the present study by seven instructors from Kashan University of Medical Sciences, Kashan, Iran. Its reliability was also confirmed with a Cronbach's alpha of 0.8. Our participants answered this questionnaire and then Spearman's correlation analysis was used to evaluate the correlation between the scores of this questionnaire and the scores of BAHMI.

Step IV: Reliability assessment

The internal consistency of BAHMI and all its subscales was assessed through Cronbach's alpha calculation using the data collected from all participants. For stability assessment, 20 patients were randomly selected from the study sample and were asked to re-answer BAHMI 1 week after their first BAHMI answering. Then, intraclass correlation coefficient (ICC) was

$$SEM_{agreement} = SD \times \sqrt[2]{1 - ICCagreement}$$
$$SDC = 1.96 \times \sqrt{2 \times SEM)}$$

Figure 1: $SEM_{agreement}$ and SDC calculations

calculated to determine the correlation between the test and the retest scores. The standard error measurement of agreement ($SEM_{agreement}$) was also calculated using the formula shown in Figure 1, in which *SD* was the standard deviation of the sum scores of test and retest.[27] After that, the smallest detectable change (SDC) was calculated with a confidence level of 95% using the formula shown in Figure 1[29]:

Data analysis

Data analysis was done through the SPSS software (v. 16.0). Normality of the data was tested through the Kolmogorov–Smirnov test. Numerical variables were described using central tendency and dispersion measures, whereas categorical variables were described using absolute and relative frequencies. The appropriateness of factor analysis model was tested using the Kaiser–Meyer–Olkin and the Bartlett's tests. Known groups were compared via the one-way analysis of variance. All analyses were done at a significance level of less than 0.05.

Ethical considerations

This study was approved by the Institutional Review Board and the Ethics Committee of Kashan University of Medical Sciences, Kashan, Iran (codes: 26.06.1396.9698 and IR.KAUMS.NUHEPM.REC.1396.15). Sampling was started after obtaining necessary permissions from the aforementioned university and providing them to the nursing office of the study setting. Written informed consent was obtained from all participants, and study instruments were individually completed for each participant in a private room. All participants were ensured that their personal data would be managed confidentially and they could voluntarily withdraw from the study.

Results

Phase I: BAHMI development

The draft of BAHMI contained 40 items in the three subscales of behavioral beliefs, normative beliefs, and control beliefs. These subscales contained 14, 12, and 14 items, respectively.

Phase II: BAHMI psychometric evaluation

Step I: Face and content validity assessment

In this step, some items (such as "Herbal therapies are effective in alleviating or treating CVD symptoms") were divided into two items. Some items (such as "I trust in the effectiveness of medically prescribed herbal therapies") overlapped with other items and were excluded, and some items were revised. For instance, the item "The use of herbal products is scientifically approved" was revised as "The use of herbal products is supported by scientific evidence."

Content validity assessment revealed that two items had $CVR_{relaxed}$ values less than the minimum critical value for 10 experts, as recommended by Lawshe (i.e. 0.62).[27] Thus, these two items were excluded. The CVI values of all items respecting relevance, clarity, and simplicity were 0.8–1, whereas the minimum acceptable value is 0.78.[24] The $S\text{-}CVI_{average}$ values of the BAHMI respecting relevance, clarity, and simplicity were 0.93, 0.95, and 0.94, respectively. The impact scores of all items were more than 1.5. None of the items was modified during face validity assessment. Finally, the 38-item BAHMI was subjected to further psychometric evaluation.

Step II: Construct validity and floor and ceiling effect assessment

During the 2-month course of sampling, 235 eligible patients referred to the study setting. However, 30 refused participation and 5 withdrew from it. Thus, data analysis was done on the data collected from 200 patients. On average, they aged 56.91±10.64 years and had been diagnosed with CVD 99.62±108.85 months before the study. Most of them were female (60%), married (91%), and had elementary education (76%). Hypertension and myocardial infarction were, respectively, the most common CVDs among them [Table 1].

The results of the KMO test showed sampling adequacy (test value = 0.82), and Bartlett's test showed that the inter-item correlation matrix was appropriate for factor analysis ($\chi^2 = 2522$, $P < 0.0001$). In the exploratory factor analysis, five items (i.e., items 12, 15, 17, 28, and 29) were excluded and five factors were extracted which labeled behavioral beliefs, normative beliefs, perceived personal barriers, perceived general barriers, and reality-based beliefs. These factors explained 42.636% of the total variance of the BAHMI total score [Tables 2 and 3]. Scree plot also confirmed that BAHMI contained five factors with eigenvalues more than 1 [Figure 2].

In the known-groups method, the results of the one-way analysis of variance revealed at least one significant difference among the seven predetermined groups,

respecting the mean score of the 33-item BAHMI ($F = 19.16$, $P < 0.0001$). Table 4 shows the results of the Gabriel *post hoc* test for pairwise between-group comparisons.

In floor and ceiling effect assessment, no one possessed the minimum and the maximum possible BAHMI scores (i.e., 33 and 231).

Table 1: Participants' characteristics (n=200)

Characteristics		*N* (%)
Gender	Male	80 (40)
	Female	120 (60)
Marital status	Married	182 (91)
	Single	3 (1.5)
	Divorced	1 (0.5)
	Widowed	14 (7)
Educational level	Illiterate	61 (30.5)
	Primary	76 (38)
	Guidance school	22 (11)
	Diploma	34 (17)
	University	7 (3.5)
Employment status	Employee	12 (6)
	Retired	37 (18.5)
	Housewife	107 (53.5)
	Self-employed	31 (15.5)
	Farmer	7 (3.5)
	Unemployed	6 (3)
Income (Iran Rial)	<5,000,000	32 (16)
	5,000,000–10,000,000	42 (21)
	10,000,000–20,000,000	103 (51.5)
	> 20,000,000	23 (11.5)
Place of residence	Urban areas	172 (86)
	Rural areas	28 (14)
CVD type[a]	Hypertension	120 (60)
	Myocardial infarction	61 (30.5)
	Coronary artery disease[b]	42 (21)
	Heart failure	25 (12.5)
	Valvular heart disease	14 (7)
	Cardiac dysrhythmia	12 (6)
	Rheumatic heart disease	2 (1)
	Embolism	2 (1)
	Non-specified	24 (12)

[a]The sum score of all CVDs is more than 100% because of comorbidity

[b]Coronary artery disorders other than myocardial infarction

Step III: Concurrent validity assessment

The mean scores of BAHMI and Hashemi-Dabaghian and colleagues' questionnaire were 153.55±27.23 and 25.89±7.95, respectively. Spearman's correlation analysis revealed that the scores of these two instruments were significantly correlated ($r = –0.7$, $P < 0.0001$).

Step IV: Reliability assessment

The Cronbach's alpha value of BAHMI was 0.864, whereas the Cronbach's alpha values of its behavioral beliefs, normative beliefs, perceived personal barriers, perceived general barriers, and reality-based beliefs were 0.868, 0.825, 0.647, 0.561, and 0.177, respectively. Test–retest stability assessment revealed an ICC of 0.888 (95% CI: 0.72–0.96, $P < 0.001$). $SEM_{agreement}$ was ±13.46 and SDC was 10.2 with a confidence level of 0.95.

Discussion

Findings revealed that with acceptable validity and reliability in the target population, the 33-item BAHMI can determine the score of belief and attitude about using herbal products in the range of 33–231.

The draft of BAHMI was developed based on TPB as well as using Waltz *et al.*'s approach and the manual for developing TPB-based questionnaires[25]; thus, compared with other instruments in this area,[10,20,22,23] BAHMI covers a wider range of beliefs and attitudes. Theory-based instrument development helps generate more appropriate items and guarantees the validity of the intended instrument.[24,25]

The content validity of BAHMI was assessed by experts in different specialties. $S\text{-}CVI_{average}$ value for all three criteria of relevance, simplicity, and clarity was more than 0.90. Content validity assessment is a key component of instrument development.[29] It ensures as wide as possible coverage of all important aspects of the intended concept. The higher the experience and the knowledge of the experts who assess content validity, the sounder the process of content validity assessment will be.[24] Moreover, an $S\text{-}CVI_{average}$ of more than 0.9 is considered as great content validity. Study

Table 2: Eigenvalues and the amount of variance explained by each of the extracted factors

Factors	Number of items	Eigenvalue	Explained variance (%)
Factor 1 (behavioral beliefs)	9	8.195	13.718
Factor 2 (normative beliefs)	10	2.543	11.419
Factor 3 (perceived personal barriers)	5	2.066	6.377
Factor 4 (perceived general barriers)	4	1.796	5.590
Factor 5 (reality-based beliefs)	5	1.601	5.533
Total BAHMI	33	—	42.636

Table 3: Items, factors, and item factor loadings of BAHMI

	Items*	Factors				
		1	2	3	4	5
1	Herbal therapies can help alleviate disease symptoms.	0.788				
2	Herbal therapies can help eliminate disease symptoms.	0.724				
3	Herbal therapies are effective in preventing diseases.	0.733				
4	Herbal therapies are effective in preventing the aggravation of disease symptoms.	0.679				
5	Herbal products are useful for health.	0.664				
6	The use of herbal products is supported by scientific evidence.	0.644				
7	Compared with conventional medications, herbal products more rapidly alleviate disease symptoms.	0.427			**0.760**	
8	Simultaneous use of herbal and conventional therapies helps better manage the disease.		0.407			
9	The use of herbal therapies makes me calm.	0.622				
10	I trust in the effectiveness of herbal therapies in alleviating the symptoms of my disease.	0.632				
11	I prefer herbal products over medical visit for the elimination of trivial ailments.	0.433				
12	I prefer to test herbal products in case of the ineffectiveness of conventional therapies.					
13	Compared with conventional medical and surgical therapies, herbal products are associated with fewer side effects.		0.558			
14	Herbal products are natural and harmless.		0.561			
15	Compared with conventional therapies, herbal products have worse smell and taste.					
16	The use of herbal products has a long history and has frequently been experienced.					0.471
17	Herbal products are allowed if recommended by physician.					
18	I trust in the effectiveness of herbal products recommended by nurses.		0.459			
19	I believe in the effectiveness of herbal products recommended by educated persons in the area of herbal therapies.		0.440			
20	I will use herbal products if advertised by mass media such as radio, television, magazines, and social networks.		0.489			
21	I use herbal products recommended by friends or colleagues.		0.621			
22	I use herbal products recommended by patients with the same diseases.		0.749			
23	I use herbal products recommended by my family members, particularly those with older ages.		0.748			
24	I use herbal products recommended in religious texts.		0.640			
25	Obtaining quality and hygienic herbal products is simple.				0.559	
26	Patients need to consult their physicians for the use of herbal therapies.					0.462
27	Patients need to use herbal therapies under the supervision of traditional medicine specialists.					0.414
28	Access to herbal products is easy.					
29	Compared with conventional therapies, obtaining herbal products carries lower costs.					
30	A patient who wants to use herbal products needs to have adequate knowledge about their appropriate use, effects, and adverse effects.					0.585
31	Access to traditional medicine specialists is difficult.			0.687		
32	Preparation of herbal products for use (such as boiling, brewing, etc) needs knowledge and skill.			0.491		
33	Preparation of herbal products for use is difficult and time-consuming.			0.671		
34	It is difficult to determine whether traditional healers are licensed and trusty.			0.593		
35	Herbal therapies are diverse and patients have the right to decide on the desired type.					0.455
36	Identification of the existing fake herbal products in the market is difficult.				0.616	
37	Lack of insurance coverage for herbal products is a barrier to their use.				0.539	
38	Access to trusty herbal product sellers and stores is difficult.			0.540		

*The minimum acceptable factor loading was 0.4. Factors loadings less than 0.4 are not presented

*Items which loaded on two factors or more were allocated to the factor for which they had the greatest factor loading

Factor 1 (behavioral beliefs) includes nine items (i.e., items 1–6 and 9–11)

Factor 2 (normative beliefs) includes 10 items (i.e., items 8, 13, 14, and 18–24)

Factor 3 (perceived personal barriers) includes five items (i.e., items 31–34 and 38)

Factor 4 (perceived general barriers) includes four items (i.e., items 7, 25, 36, and 37)

Factor 5 (reality-based beliefs) includes five items (i.e., items 16, 26, 27, 30, and 35)

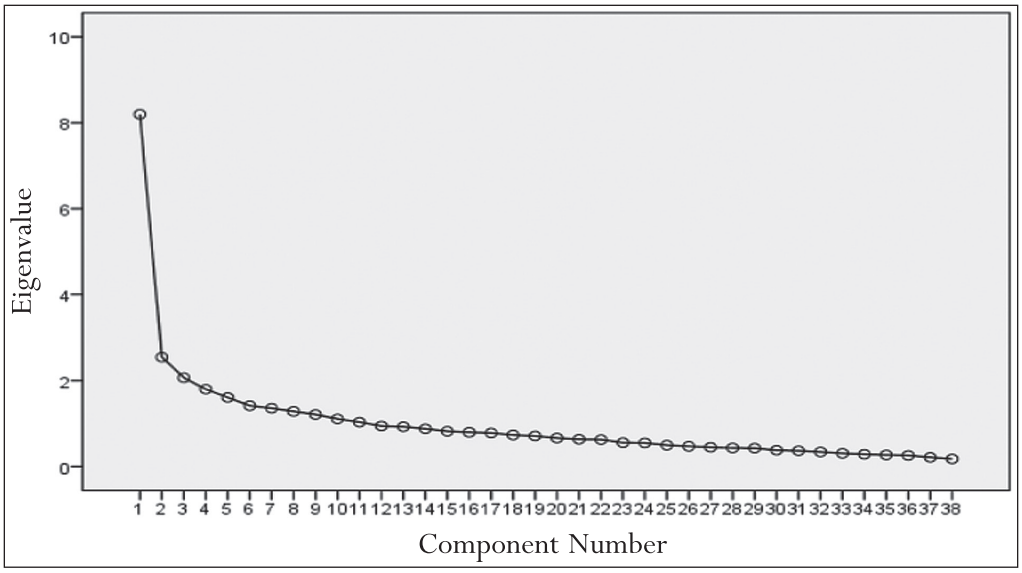

Figure 2: Scree plot

Table 4: Comparison of BAHMI scores among patients with different levels of agreement on herbal product use (*n* = 200)

BAHMI[a]	Level of agreement with herbal product use						The results of analysis of variance[b]
	1 Completely disagree (*n* = 14)	2 Disagree (*n* = 14)	3 Somewhat disagree (*n* = 4)	5 Somewhat agree (*n* = 41)	6 Agree (*n* = 83)	7 Completely agree (*n* = 44)	
Mean± SD	119.85±27.31	126.21±31.26	141.50±19.67	144±21.61	159.22±23.33	172.27±16.61	$F = 19.16$ $P < 0.001$

[a]The frequency of score 4 was equal to zero

[b]Pairwise between-group comparisons using the Gabriel *post hoc* test showed significant differences between groups 1 and 5 ($P = 0.007$), groups 1 and 6 ($P < 0.0001$), groups 1 and 7 ($P < 0.0001$), groups 2 and 6 ($P < 0.0001$), groups 2 and 7 ($P < 0.0001$), groups 3 and 7 ($P = 0.05$), groups 5 and 6 ($P = 0.006$), groups 5 and 7 ($P < 0.0001$), and groups 6 and 7 ($P = 0.029$)

findings also confirmed the face validity of BAHMI. Face validity, which refers to the understandability of the items of an instrument for the target population, improves precision of data collection.[29]

Exploratory factor analysis revealed that BAHMI consisted of five factors, namely, behavioral beliefs, normative beliefs, perceived personal barriers, perceived general barriers, and reality-based beliefs. These factors explained around 43% of the total variance of BAHMI score. The greatest contribution to this variance was related to factors such as behavioral beliefs (13.72%) and normative beliefs (11.42%). Moreover, the other factors each explained more than 5% of the variance. These findings confirm the construct validity of BAHMI. It is believed that each of the extracted factors should explain at least 5% of the variance of the total score.[29] An earlier study into the development of an instrument for assessing attitude and belief about complementary and alternative medicine found that the instrument consisted of the three factors of expected benefits, perceived barriers, and subjective norms, which explained 57% of the total variance of the attitude and belief score.[30] These three factors are almost the same as the four factors of BAHMI. In two other studies, although construct validity was not assessed using factor analysis, the subscales of their belief and attitude instruments were similar to BAHMI subscales.[10,19] Waltz *et al*.[24] considered construct validity assessment essential and beneficial to all measurement instruments and noted that its main focus is on the consistency between the items of the intended instrument and the underlying theory and concept. As a strength of the present study, our findings revealed that the extracted factors were consistent with the concept of belief and attitude about herbal product use.

Known-groups comparison in the present study indicated significant difference among patients with different levels of agreement on using herbal medicine respecting their BAHMI scores. This finding denotes that BAHMI successfully differentiates patients from

different levels of agreement on herbal medicine use and hence confirms its construct validity. In the known-groups method, the intended instrument is applied to people who are different from each other respecting a certain attribute; hence, significant difference among them respecting the score of the intended instrument confirms its construct validity.[31]

Concurrent validity assessment also revealed a significant correlation (r = –0.7) between the scores of BAHMI and the instrument developed in an earlier study.[10] A correlation coefficient of 0.7 is acceptable for concurrent validity confirmation.[29] Furthermore, BAHMI does not have floor and ceiling effects and has appropriate items for the assessment of belief and attitude about herbal product use. If more than 15% of the respondents of an instrument obtained its minimum or maximum possible score or both, that instrument is considered to have floor or ceiling effects or both. The existence of either of these effects denotes inadequate content validity.[29]

Cronbach's alpha of BAHMI was 0.864; this is consistent with the results of some related scales[16] and is higher than the coefficient of some scales, such as the questionnaire developed by Hashem-Dabaghian *et al*.[10] Cronbach's alpha values greater than 0.7[27] or 0.8[24] are indicative of great internal consistency. Of course, the reality-based beliefs subscale of BAHMI had a low Cronbach's alpha[27] and hence this subscale cannot be used independently from the other BAHMI subscales. This subscale pertains to realities and reality-based beliefs, which may require respondent to adopt conservative attitude towards herbal products; hence, its low Cronbach's alpha is justifiable.

We also found that test–retest ICC was 0.888. A correlation coefficient more than 0.7 is acceptable.[29] The test–retest method tests the stability and repeatability of the scores of a given instrument and is among the methods for reliability assessment.[24,27] Therefore, the high test–retest ICC in the present study implies the high reliability of BAHMI.

Study findings showed that $SEM_{agreement}$ and SDC were equal to ±13.46 and 10.2, respectively. Low $SEM_{agreement}$ values support the stability of the intended instrument.[29,32] Given the possible range of the total BAHMI score (i.e., 33–231), an $SEM_{agreement}$ of ±13.46 confirms the stability and the repeatability of the data collected using BAHMI and hence confirms its reliability.

Among the strength of the study were instrument development based on TPB as well as the diversity of the study participants respecting their demographic characteristics and CVD conditions. The main study limitation was sampling from a single heart clinic. Application of BAHMI to patients with other chronic conditions in different settings can provide more reliable data about its generalizability. Moreover, confirmatory factor analysis for BAHMI is recommended.

Conclusion

The 33-item BAHMI is a valid and reliable instrument and can be used for the assessment of belief and attitude about herbal product use among patients with CVD. Through using BAHMI, the healthcare providers, particularly nurses, can identify patients who are at risk of consuming herbal products. Then, they can provide them with quality education about appropriate use of herbal products and their potential therapeutic and adverse effects.

Acknowledgments

The authors express their gratitude toward the Research and Technology Administration of Kashan University of Medical Sciences, all study participants, and Dr. Fattaneh Hashem-Dabbaghian.

Financial support and sponsorship

This article came from the Master's thesis of the first author in medical-surgical nursing. The thesis had been approved and financially supported by the Research and Technology Administration of Kashan University of Medical Sciences, Kashan, Iran [codes: 26.06.1396.9698].

Conflicts of interest

No conflict of interest associated with this work.

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