




Reliability and Validity of Persian Translation of Morisky Medication Adherence Scale (4-Item Version) in Asthmatic Patients

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Abstract

Background: Non-adherence to medication is a significant health problem that affects disease control and increases hospitalization and mortality. One method of evaluating patients' medication adherence is utilizing standard questionnaires, such as the Morisky Medication Adherence Scale (MMAS).

Objectives: This study evaluated the reliability of the Persian-translated version of the MMAS among asthma patients.

Methods: After the English to Persian translation, back-translation was done, examining the word appropriateness to Iranian culture. A panel of experts in related fields evaluated the questionnaire. The final questionnaire was assessed in 62 asthma patients.

Results: The participants' mean age was 49.62 ± 11.39 years (range: 30 - 72), and the mean duration of asthma was 9.05 ± 6.79 years (range: 1 - 35). The reliability of the questionnaire for four items was 0.637 (95% confidence interval: 0.465 - 0.765; $P < 0.001$). A significant percentage (29.03%) of the subjects had low drug adherence, and only 30.6% had high adherence. There was no significant correlation between drug adherence and asthma duration ($P = 0.441$).

Conclusions: This study shows that drug adherence is linked to asthma control and the quality of life in asthma patients. The Persian translation of the 4-item MMAS is valid to assess adherence to treatment in asthma patients.

Keywords: Asthma, Surveys and Questionnaires, Medication Adherence, Treatment Adherence and Compliance, Iran

1. Background

Asthma is the hypersensitivity of the bronchi to specific allergens that causes narrowing of the airways and asthma symptoms. Asthma is a multifactorial disease that comprises airway obstruction, overactive bronchi, and inflammation, all of which interfere with the clinical manifestations, diagnosis, severity, and response to treatment of the disease (1).

Patient adherence to treatment is one of the most critical factors in controlling the disease. Guidelines recommend that patients be evaluated for adherence to the medication regimen, technique for using inhaled medications, the effectiveness of drugs, and their side effects at each visit. Studies have shown that approximately 50% of patients stop taking medicine 6 months after starting the medication (2). This condition can lead to increased hospitalization and long-term mortality. Therefore, physicians and researchers require tools to assess drug adherence. Numerous strategies have been developed in this regard, such as tablet count, drug

re-application rate, drug use diary, biological markers, and electronic monitoring devices. Over the past five decades, it has been estimated that 20 - 50% of patients do not use their drugs as prescribed. The World Health Organization reported a rate of 50% for non-adherence to treatment in patients with chronic diseases in developed countries, which is probably higher in developing countries (3).

There are various methods to assess patient adherence to treatment, one of which is the Morisky Medication Adherence Scale (MMAS). The Morisky questionnaire was introduced in 1986 to assess drug adherence. This questionnaire is self-reported and is used for many diseases, such as hypertension, acquired immunodeficiency syndrome, psychiatric diseases, diabetes, cancer pain, heart problems, mood disorders, osteoporosis, thromboembolic diseases, and asthma (4).

In 2001, Erickson et al. conducted a study to evaluate drug adherence in 100 asthma patients using the MMAS questionnaire, which demonstrated a good and reliable agreement between the results of drug adherence

according to the questionnaire and the data derived from a pharmacy (5).

2. Objectives

To the best of our knowledge, no study has evaluated the reliability of the Persian version of the MMAS among asthma patients. Therefore, the current study aimed to assess the 4-item MMAS reliability among asthma patients and its association with patients' features.

3. Methods

3.1. Study Design and Sampling

The current research was a cross-sectional study. The sample size to obtain a sufficient number to evaluate the reliability and validity of the questionnaire was calculated at 40 patients. Patients were enrolled consecutively and included adults (over 18 years) diagnosed with asthma. The justification for the sample size was given according to Hutcheson and Sofroniou (6), who reported that the sample size needed to be 10 times the number of items in the questionnaire. The present study consecutively enrolled 60 patients with asthma to increase the validity of the results. Written informed consent was obtained from all the study subjects. The research purpose was explained fully, and the information was kept confidential. The study protocol was approved by the Ethics Committee of Shiraz University of Medical Sciences, Shiraz, Iran (ethics code: [IR.SUMS.MED.REC.1398.234](#)).

3.2. Diagnosis of Asthma

Asthma diagnosis was according to patient history, spirometry findings, and the Global Initiative for Asthma (7). The symptoms and history of patients with asthma included coughing, wheezing, overnight symptoms, and the severity of symptoms during physical activity or excitement, with varying symptoms over time. An increase in the forced expiratory volume in one second (FEV1) of more than 12% and more than 200 mL of the initial level after a bronchodilator (BD) is included for spirometric evaluation. Additionally, the expected ratio of FEV1/forced vital capacity before and after BD favors asthma instead of chronic obstructive pulmonary disease (COPD), and asthma-COPD overlap.

3.3. Translation

To determine the validity and reliability of this questionnaire, at first, English to Persian translation was done by two translators who translated it independently from English to Persian. The next step, back-translation,

was taken by another individual, independent of the first two, without reading the original. Then, a comparison was made to the questionnaire's original version, and the Persian version was approved following examining the appropriateness of its words to the Iranian culture. A pilot study was carried out with 20 subjects. They introduced vague points, and the final version was prepared in Persian after alterations. These 20 questionnaires from the pilot study were not considered in the final results.

3.4. Data Collection

The demographic and clinical information, including name, age, gender, duration of asthma diagnosis, history of allergic rhinitis, history and amount of smoking (e.g., cigarettes, hookah, and pipe), and other addictions, was obtained from the patients. Additionally, a pulmonary function test was taken from the patients. A SensorMedics Corporation Spirometer (ZAN 500 body plethysmograph, nSpire Health Inc., Longmont, Co, United States) was used for spirometry, and interpretation was made based on the American Lung Association/European Lung Association Working Group (8).

The MMAS questionnaire consists of the four following questions:

1. Do you ever have problems remembering to use your (name of health condition) drugs?
2. Do you ever forget to use your (name of health condition) drugs?
3. When you feel better, do you sometimes stop using your (name of health condition) drugs?
4. Sometimes, if you feel worse when you use your (name of health condition) drugs, do you stop using them?

The scores of the MMAS-4 range from 0 to 4; each yes answer gets 1 score, and each no answer gets 0 score. Scores of 3 or 4, 1 or 2, and 0 show low, medium, and high adherence, respectively.

3.5. Validity

In this study, 20 individuals were interviewed regarding their perceptions of the above-mentioned cases and the questions were corrected to the desired outcome. In quality content validity, 10 experts were asked to comment on writing, grammar, and scoring problems. Ambiguous questions were corrected to finally obtain the panel of experts' approval.

3.6. Reliability

Cronbach's alpha coefficient was applied to assess the questionnaire's internal consistency and reliability. The value of this coefficient is strongly dependent on the number of questions. With an increase in the number

of questions, the probability that the alpha coefficient will be higher becomes greater; consequently, it is usually recommended that the number of questions be less than 10 or a minimum of 7 (9, 10). Therefore, in this questionnaire, which inevitably has few questions, even a small amount of alpha is appropriate and acceptable.

3.7. Statistical Analysis

Quantitative and qualitative data were presented as mean \pm standard deviation, frequency (n), and percentage (%). The data normality was evaluated by the Shapiro-Wilk test, and the Mann-Whitney U test was applied to perform analytical statistics. One-way analysis of variance and Tukey post-hoc tests compared quantitative variables. Fisher's exact test or chi-square test compared qualitative variables. The Spearman's correlation coefficient was also applied. The significance level of 5% was considered, and statistical analyses were performed using SPSS software (version 22.0).

4. Results

A total of 62 asthma patients participated in this cross-sectional study, and most of them (77.4%) were women. The age range of the participants in the study was 30 - 72 years, with a mean score of 49.62 ± 11.39 years. Table 1 shows participants' sociodemographic characteristics and pulmonary function. The duration of asthma in these patients varied from 1 to 35 years, with a mean score of 9.05 ± 6.79 years. Table 1 shows a summary of drug adherence levels in this study. Based on these results, a significant percentage of patients (29.03%; n = 18) were at a low level of drug adherence. Moreover, 25 (40.32%) and only 19 (30.65%) cases had moderate and high adherence, respectively. The results showed no significant difference in mean age ($P = 0.804$), gender ($P = 0.883$), educational level ($P = 0.889$), and illness duration ($P = 0.776$) among the three groups at three levels of compliance (Table 1).

The validity of the questionnaire was measured as face validity and content validity. For this purpose, a panel of experts claimed that all the questionnaire questions were acceptable regarding face validity and content. Cronbach's alpha was applied to evaluate the questionnaire's reliability. The questionnaire's reliability for the four questions was 0.637 and significant (95% confidence interval: 0.465 - 0.765; $P < 0.001$). Table 2 shows the alpha level for each question. Questions 1, 2, and 3 are more important than question 4. Spearman's correlation coefficient was applied to assess the correlation between the level of drug adherence and disease duration, in which no significant correlation was observed ($P = 0.441$).

5. Discussion

This study aimed to check the validity of the Persian version of the MMAS-4. Overall, the results are encouraging, indicating that the translated version of the MMAS-4 used in this study has adequate reliability among Iranian asthma patients. To the best of our knowledge, to date, there has been no study to validate a specific scale to evaluate medication adherence in Iranian asthmatic patients. The estimated dependability in this study ($\alpha = 0.637$) was similar to the original MMAS-4, with a Cronbach's alpha of 0.61 (4).

The MMAS reliability and validity were assessed among diabetes patients after its translation from English to Persian. The content validity and face validity of the translated questionnaire were confirmed since the content validity ratio, content validity index, and impact ratings of all the items were above the stated threshold. Furthermore, the Persian version of the MMAS, similar to the original English version, has strong internal consistency and test-retest reliability.

According to the survey, more than one-third of the cases (29%) had no under-control asthma. A more significant number of cases (43%) without asthma control was identified in a large cross-sectional survey in the United States and five European countries (11). Another significant study on asthma patients in seven European countries demonstrated that nearly half of those with asthma (48%) had a derived Asthma Control Test™ score of 20 (12). Furthermore, according to Nguyen et al.'s study, 36% of Vietnamese outpatients had no asthma control (13).

Individuals with asthma and high blood pressure who had better management of their diseases could change their lifestyle and avoid ailments that aggravated their conditions (14). This finding revealed that successful treatments to strengthen personal control items could help individuals change their lifestyles and improve their self-management abilities (15). As a result, providing the most effective techniques for correct illness evaluation and drug adherence is necessary for optimal disease management. As measured by the scale, adherence can predict asthmatic patients' health outcomes (16). Secondly, when self-reported adherence is assessed, it can be overestimated. Consequently, the results might exaggerate genuine drug adherence among Iranian asthma patients.

Because experts are chosen for content validity studies, sampling bias might arise. As a result, the study's findings might be altered by bringing in other specialists. The sampling strategy for conducting factor analysis in the ongoing investigation was non-random, and the convenience sampling method was adopted.

Table 1. Association of Demographic and Clinical Variables of Asthma Patients with Drug Adherence Level

Variable	Total	Drug Adherence			P-Value ^a
		Low (n = 18)	Moderate (n = 25)	High (n = 19)	
Age (y) ^b	49.62 ± 11.39	51.05 ± 12.55	49.37 ± 11.32	48.59 ± 10.81	0.804
Gender^b					0.883
Male	14 (22.6)	4 (22.2)	5 (20.0)	5 (26.3)	
Female	48 (77.4)	14 (77.8)	20 (80.0)	14 (73.7)	
Educational level^b					0.889
Illiterate	11 (18.2)	3 (16.7)	5 (20.0)	3 (15.8)	
Elementary school	20 (31.8)	6 (33.3)	7 (28.0)	7 (36.8)	
Some high school	10 (15.9)	4 (22.2)	2 (8.0)	4 (21.1)	
High school graduate	14 (22.8)	3 (16.7)	7 (28.0)	4 (21.1)	
University degree	7 (11.3)	2 (11.1)	4 (16.0)	1 (5.3)	
Duration of the disease^b	9.05 ± 6.79	8.65 ± 5.11	9.80 ± 7.34	8.44 ± 7.64	0.776
Spirometry findings^b					
FEV1%	85.95 ± 22.31	89.66 ± 17.20	84.80 ± 23.78	83.94 ± 25.18	0.705
FVC%	92.64 ± 18.84	92.44 ± 15.38	91.76 ± 22.06	94.00 ± 18.11	0.928
MEF 25 - 27%	62.20 ± 30.69	66.44 ± 29.66	61.64 ± 29.76	58.94 ± 33.92	0.760
RV/TLC	121.43 ± 27.60	118.70 ± 24.94	116.01 ± 27.47	131.14 ± 28.99	0.0176
TLC%	101.41 ± 17.72	99.35 ± 20.48	98.26 ± 18.57	107.50 ± 16.79	0.235

Abbreviations: FEV1, forced expiratory volume in one second; FVC, forced vital capacity; MEF, maximal expiratory flow; RV, residual volume; TLC, total lung capacity.

^a Analysis of variance or chi-square test and Fisher's exact test.

^b Values are presented as mean ± SD or No. (%).

Table 2. Reliability and Validity of Persian Translation of Morisky Medication Adherence Scale Questionnaire

Question	Cronbach Alpha	Degree of Importance	Status
Question 1	0.563	3	Accepted
Question 2	0.465	1	Accepted
Question 3	0.541	2	Accepted
Question 4	0.664	4	Accepted
Overall questionnaire	0.637	-	Accepted

Furthermore, only diabetic outpatients were chosen in this study. The aforementioned factors might restrict the applicability of the present study's findings. An interviewer also filled out the questionnaires due to the participants' literacy issues.

5.1. Conclusions

According to the findings, medication adherence is linked to quality of life and asthma control in asthma patients. The MMAS 4-item questionnaire can measure medication adherence in asthma patients.

Footnotes

Authors' Contribution: SM contributed to conceptualization, methodology, formal analysis, investigation, resources, writing, manuscript revision, supervision, and funding acquisition. FS contributed to methodology, formal analysis, investigation, and original draft writing.

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