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The Turkish adaptation of the Adherence to Asthma Medication Questionnaire

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ABSTRACT

Background: This study was conducted to adapt the Adherence to Asthma Medication Questionnaire (AAMQ-13) into Turkish.

Methods: The research was conducted in the pulmonology outpatient clinic of a state hospital in Nigde/Turkey. The sample consisted of 229 volunteers with asthma for at least one year. First, language and content validity were assessed. After evaluating the language validity and content validity of the questionnaire, internal consistency, split-half reliability, and construct validity were examined. Questionnaire and demographic data were analyzed using numbers, percentages, dependent and independent groups t-tests, correlation analysis.

Results: The AAMQ-13-TR has a Cronbach's alpha (α) score of 0.90 ($p < 0.001$). It has a split-half reliability coefficient of 0.86. The confirmatory factor analysis (CFA) shows that the factor structure of the AAMQ-13-TR agrees well with the two-factor model of the original questionnaire.

Conclusions: This study presented sources of evidence of validity of AAMQ-13-TR in Turkish population.

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KEYWORDS
Medication adherence; asthma; questionnaire; scale; nurse

Introduction

Asthma is a controllable disease that affects the respiratory system. It is characterized by recurrent episodes of shortness of breath and wheezing. Its severity and frequency vary from patient to patient (1–3). It affects more than 300 million people worldwide, causing an estimated 461,000 deaths in 2019 (3,4). Treatment options for asthma encompass inhalable anti-inflammatory medications and bronchodilator drugs, which are employed on an as-needed basis (1,4,5). Uncontrolled asthma and exacerbations are still a common problem despite medications, inhalers, and evidence-based management guidelines (1,4,6,7). Non-adherence to medication is a contributing factor to poorly controlled asthma. Numerous studies conducted worldwide have consistently demonstrated the impact of medication non-adherence on asthma control. Research findings indicate that adherence to asthma medication falls within the range of 14–50% (8,9). Medication adherence is typically defined as the extent to which patients adhere to or follow medical recommendations and take their prescribed medications as directed by their healthcare providers (10,11). Adherence to medication in asthma patients is affected by various sociodemographic characteristics and healthcare-related factors. These factors include economic status, age, literacy, cultural beliefs, complexity of medication regimens, and clinical characteristics of patients (12,13). Poor adherence to inhaled medications leads to inadequate asthma control, increased hospitalizations, and a higher risk of mortality (14). Poor adherence to medication is linked to lower levels of asthma control and significantly impacts treatment outcomes (15). The reasons for poor medication adherence can vary among individuals with the same disease. Therefore, non-adherence to asthma medications is caused by two reasons: intentional (personal convictions) and unintentional. Intentional factors include patient beliefs that asthma medications are unnecessary or may lead to adverse effects, resulting in poor adherence to asthma treatment. Unintentional factors include forgetting to take medication or not having access to medication (16,17).

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Nonadherence to asthma medication can have significant consequences for both patients and the environment (18,19). From the patient's perspective, failing to adhere to their prescribed asthma medications can lead to poorly controlled asthma symptoms, exacerbations, and decreased overall quality of life. Patients may experience more frequent hospitalizations and emergency room visits due to impaired asthma self-management. This situation disrupts the daily lives of patients and puts an additional financial burden on the healthcare system (18). Additionally, when patients dispose of unused or expired medications improperly, they can have environmental consequences. Medications that are discarded inappropriately can end up in water supplies, potentially impacting aquatic ecosystems and posing risks to wildlife and human health (20). Therefore, proper disposal of medications is essential to mitigate these environmental concerns. Low adherence to asthma medications results in obstructive sleep apnea and psychological dysfunction (21).

Adapting the Adherence to Asthma Medication Questionnaire (AAMQ-13) to Turkish is a valuable initiative for assessing medication adherence among asthma patients and guiding nursing interventions. This study may guide healthcare professionals in understanding the factors affecting asthma medication compliance in Turkish patients. In this way, it may provide opportunity to develop effective interventions for medication adherence in asthma. By using a culturally adapted tool like the Turkish version of AAMQ-13, nurses can systematically assess patients' adherence to asthma medications. Nurses can identify patients' potential barriers and create targeted support and education programs to improve medication adherence. This, in turn, can contribute to better asthma management, reduced exacerbations, and improved overall health outcomes for asthma patients in Turkey. Furthermore, a validated Turkish version of AAMQ-13 could facilitate research and data collection on asthma medication adherence. It provides a deeper understanding of the subject and the development of evidence-based interventions to increase compliance rates among Turkish asthma patients.

The AAMQ-13 was chosen for adaptation to Turkish culture due to its brevity, simplicity, and efficiency, making it a practical tool for assessing medication adherence and guiding nursing interventions within a clinical setting.

This study was conducted to adapt the AAMQ-13 into Turkish.

This study sought answers to the following questions:

1. Does the AAMQ-13-TR have adequate internal consistency?
2. Does the factor structure of the AAMQ-13-TR agree well with the two-factor structure of the AAMQ-13?

Methods

Study design and participants

This was a methodological study conducted to adapt the AAMQ-13 into Turkish. The research was conducted in the pulmonology outpatient clinic of the Ömer Halisdemir University Training and Research Hospital in Nigde/Turkey. Data were collected between 15 May 2023 and 15 November 2023.

Population and sample

A common rule of thumb for scale adaptation research is to have a sample size 5–10 times the number of items in the scale (22). The AAMQ-13 consists of 13 items. Therefore, the target sample was 130 participants. But in the literature, it is generally stated that for exploratory factor analysis, 50 is very poor, 100 is poor, 200 is fair, 300 is good, 500 is very good, and 1000 is excellent (23). So the sample size of the study was aimed to exceed 200 people in order not to negatively affect the results of the exploratory factor analysis. Therefore, the sample for this study included 229 patients with asthma.

The study inclusion criteria were as follows: (1) having had asthma for at least one year, (2) being over 18 years of age, (3) volunteering to participate in the study, (4) being literate in Turkish, and (5) having no communication problems.

The study exclusion criteria were refusing to participate in the study, had an asthma attack, had other chronic respiratory diseases, malignant disease, and dementia or any condition affecting cognition. We excluded 21 patients with chronic respiratory diseases other than asthma.

As a result, purposive sampling method, one of the non-probability sampling methods, was used as the data collection method.

Data collection tools

General Demographic Characteristics Questionnaire

The General Demographic Characteristics Questionnaire was developed by the researchers. The questionnaire consisted of eight items on age, gender,

place of residence, marital status, education, occupation, disease duration, and tobacco use.

Adherence to Asthma Medication Questionnaire (AAMQ-13)

The AAMQ-13 was developed by Nassar et al. The instrument consists of 13 items rated on a five-point Likert-type Scale (1 = always, 2 = often, 3 = sometimes, 4 = rarely, and 5 = never). The total score ranges from 13 to 65, with higher scores indicating better adherence to asthma medications (13–29 = poor adherence, 30–47 = moderate adherence, and 48–65 = excellent adherence). It mainly covers two aspects, including Belief and Barrier. The instrument has a Cronbach's alpha (α) score of 0.87 (2).

Procedure

Translation of the AAMQ-13

"Blind back translation" is recommended for scale translations into the target language (24). In this study, three different translators and researchers translated and based on their feedbacks, the researchers revised the scale items. Two different translators with a good command of both languages back-translated the Turkish version to English. Thus, the language validity of the survey was established. In addition, the items were presented to expert opinion for the content validity of the survey. Experts consist of internal diseases nursing faculty members, internal disease physicians, and internal diseases nurses. To evaluate the content validity of the survey items, the researchers evaluated the content validity ratio (CVR) using the Lawshe method. Content validity index (CVI) and between-subject variation (CVG) and inter-individual coefficient of variation (CVG) were used to test the interrater agreement.

Data collection

The researchers collaborated with pulmonary nurses to recruit participants. They obtained informed consent from all participants. Each participant filled out the Turkish version of the AAMQ-13 (AAMQ-13-TR) in the training room of the hospital.

Validity of the questionnaire

CVI and between-subject variation (CVG) were used to test the interrater agreement. The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy was used to determine whether the sample was adequate, while Bartlett's test of sphericity was used to determine whether the correlation between the items was adequate for factor analysis.

Reliability of the questionnaire

Data were collected from the participants at once, so split-half reliability was examined. The researchers used the split-half method to evaluate the scale's reliability, dividing it into two halves based on odd (seven items) and even numbers (six items). They calculated the correlation value between the two halves.

Data analysis

Exploratory factor analysis of the questionnaire

Exploratory factor analysis accounts for the relationship between items and factors. All items were loaded on two factors, as in the original scale. Rotation of the factors was performed with the varimax rotation process.

Confirmatory factor analysis of the questionnaire

The confirmatory factor analysis (CFA) of the Turkish version of AAMQ-13 was performed using the Statistical Package for Social Sciences (SPSS) Statistics for Windows, IBM version 25.0 (IBM Corp., Armonk, NY) and the Analysis of Moment Structures (AMOS version 43.0) at a significance level of 0.05. The data were analyzed using the SPSS Statistics Standard Concurrent User version 26 (IBM Corp., Armonk, NY). Root-mean-square deviation (RMSEA), comparative fit index (CFI), goodness-of-fit index (GFI), and adjusted goodness-of-fit index (AGFI) were used for CFA. Split-half and Guttman's correlation values were assessed for reliability. Cronbach's alpha reliability coefficient was used for internal consistency.

Analysis of the questionnaire scores according to descriptive characteristics

Number (n), percentage (%), mean (M), standard deviation (SD), median (M), minimum (min), and maximum (max) values were used for descriptive statistics. Normality was tested using the Shapiro–Wilk test. For normally distributed data, an independent t-test was used for two independent groups, while an analysis of variance (ANOVA) was used for more than two groups. The Bonferroni test was used for post-hoc comparisons. Pearson's correlation coefficient was used to determine the relationship between numerical variables.

Ethical considerations

Written consent was obtained from Razan Nassar to adapt the AAMQ-13 into Turkish. Verbal and written

consent was obtained from all participants. Permission was obtained from the hospital. The study was approved by the ethics committee of Niğde Ömer Halisdemir University (No: E-86837521-050.99-342323, No: 06, Date: 03.04.2023).

Results

Characteristics

The sociodemographic and medical of characteristics of the participants are presented in Table 1.

Content validity analysis

The questionnaire was developed by Nassar et al. (2). First, the items were translated into Turkish. Second, the Turkish version was translated back to English. Third, language and content validity were examined. Fourth, the psychometric properties were analyzed using internal consistency, split-half reliability, item reliability, and construct validity.

The CVI is used to assess expert opinions on items. Each item should have a CVI of ≥ 0.80. An item with a CVI value of 0.80 and below should be excluded (25).

Table 1. The sociodemographic and medical characteristics of the asthma patients ($n = 229$).

	Statistics
Age (year)	
Mean ± SD	46.31 ± 15.5
Median (min–max)	45 (19–85)
Gender, *n* (%)	
Man	73 (31.9%)
Woman	156 (68.1%)
Place of residence, *n* (%)	
City	141 (61.6%)
District	29 (12.7%)
Village	59 (25.8%)
Marital status, *n* (%)	
Married	169 (73.8%)
Single	60 (26.2%)
Education (degree), *n* (%)	
Primary school	112 (48.9%)
High school	66 (28.8%)
Bachelor's or higher	51 (22.3%)
Occupation, *n* (%)	
Civil Servant	23 (10%)
Retired	19 (8.3%)
Worker	38 (16.6%)
Farmer	21 (9.2%)
Unemployed	88 (38.4%)
Other	40 (17.5%)
Disease duration (year), *n* (%)	
1–5	82 (35.8%)
6–10	90 (39.3%)
>10	57 (24.9%)
Tobacco use, *n* (%)	
Yes	68 (29.7%)
No	161 (70.3%)

Summary statistics were presented as mean ± standard deviation and Median (minimum and maximum) for numerical data. Numbers (percentages) were used for categorical data.

The CVR of each item was calculated by the experts using the Lawshe technique. None of the items had a CVR of ≤0. The statistical significance of the CVR values of the items was analyzed using the content validity criterion (CVC). The questionnaire had a CVC of 0.800. Each item had a CVR greater than the CVC value, suggesting that all the items could be kept in the questionnaire. The questionnaire had a CVI of 0.846, which was greater than the CVC, indicating that the content validity of the questionnaire was statistically significant ($p < 0.05$) (Table 2).

Exploratory factor analysis

The KMO was 0.907, for which Bartlett's test of sphericity was significant ($\chi^2 = 1620.162$, $p < 0.05$), indicating that the data set was suitable for factor analysis. The factor analysis suggested an explanatory power of 40%–60% (22). The items accounted for 59.15% of the total variance.

In our study, the "behavior" subscale had factor loadings of 0.614–0.813, while the "barrier" subscale had factor loadings of 0.522–0.857 (Table 3). The Asthma Medication Questionnaire (AAMQ-13) had a Cronbach's alpha score of greater than 0.70. This result shows that the survey is quite reliable (26,27). Therefore, we can state that the two subscales are able to measure subproperties. The KMO criterion is a test obtained by using correlation and partial correlation coefficients, which shows the suitability of the data for factor analysis. A KMO should be greater

Table 2. Content validity for the Turkish version of the AAMQ scale.

Item No	Content validity ratio
1. I think I do not need my medication	0.800
2. I think my medication is not effective	0.800
3. I alter the dose (use less or more than the prescribed dose)	0.800
4. I stop taking my medication out of fear of potential side effects	0.800
5. I do not take my medication because I dislike using corticosteroids	1.000
6. I stop taking my medication when I am feeling well	1.000
7. I take my medication only when I feel breathless	0.800
8. I stop taking my medication because I have multiple medications to take	0.800
9. I forget taking my medication	1.000
10. I cannot afford my medication	0.800
11. I stop taking my inhaler because I did not understand my doctor/pharmacist instructions on how to use it	0.800
12. I do not take my inhaler as I find it difficult to use it	0.800
13. I stop taking my inhaler because I am afraid of becoming addicted to it	0.800
Number of experts = 10	
Content validity criterion (critical point = 0.800)	
Content validity index = 0.846	

than 0.60 (28). Bartlett's test of sphericity examines the relationship between the variables in the data matrix (29). A significant partial χ^2 statistic suggests that the scores are normal (30). Therefore, these results indicate that the questionnaire is reliable.

A total correlation of greater than 0.20 suggests that the item is essential for the question. The total correlation values range from 0.521 to 0.748, indicating that the questionnaire is valid.

Table 3. The factor loading of the items for the Turkish version of the AAMQ scale.

Factor	Item No	Factor loadings 1	2	Total correlation	Variance explained %	Cronbach's alpha
Behavior	1	0.813	–	0.609	29.99	0.862
	2	0.747	–	0.587		
	3	0.639	–	0.628		
	4	0.645	–	0.687		
	5	0.676	–	0.631		
	6	0.664	–	0.684		
	7	0.614	–	0.627		
Barrier	8	–	0.659	0.712	29.16	0.864
	9	–	0.522	0.529		
	10	–	0.678	0.521		
	11	–	0.802	0.617		
	12	–	0.857	0.708		
	13	–	0.764	0.748		
Questionnaire					59.15	0.909
KMO = 0.907 *DF* = 78 χ^2=1620.162 $p < 0.001$						

KMO: Kaiser–Meyer–Olkin test; *Df:* degrees of freedom

Table 4. Goodness of fit indices for Turkish version of the AAMQ scale.

Questionnare	(χ^2/df)	RMSEA	SRMR	IFI	CFI	GFI	TLI
Model	2.313	0.076	0.056	0.949	0.948	0.915	0.935

Confirmatory factor analysis

Within the scope of CFA, χ^2/df, RMSEA, SRMR, IFI, TLI, CFI, and GFI were used to evaluate the factor validity of the models. The root mean square error of approximation is least affected by sample size. However, RMSEA fit index criteria are inconsistent. A cutoff value close to 0.06 or 0.08 is generally acceptable. IFI, TLI, CFI, and GFI fit indices exceeding 0.90 indicate an adequate model fit. In this study, RMSEA was ≤ 0.05, IFI, TLI, and CFI were ≥0.90, and GFI was ≥0.85 (Table 4).

The model for the AAMQ-13-TR consists of four subscales (χ^2= 143.428; *df* = 62). The fit indices show that the model is at an acceptable level of fit.

Confirmatory factor analysis

A CFA was conducted for the AAMQ-13-TR. Figure 1 shows the model. Each of the path coefficients of the subscales on 12 items is statistically significant ($p < 0.05$), indicating that the "behavior" subscale consists of seven items (1, 2, 3, 4, 5, 6, and 7) while the "barrier" subscale consists of six items (8, 9, 10, 11, 12, and 13).

All subscales have a highly statistically significant effect on the items. The pathway coefficients of the "behavior" and "barrier" subscales on the AAMQ-13-TR are statistically significant ($p < 0.05$). The "barrier" subscale has the smallest effect, while the "behavior" subscale has the greatest effect.

Correlation between the total scale and subscale scores

Participants had a mean "behavior" subscale score of 29.52 ± 5.89. They had a total mean score of

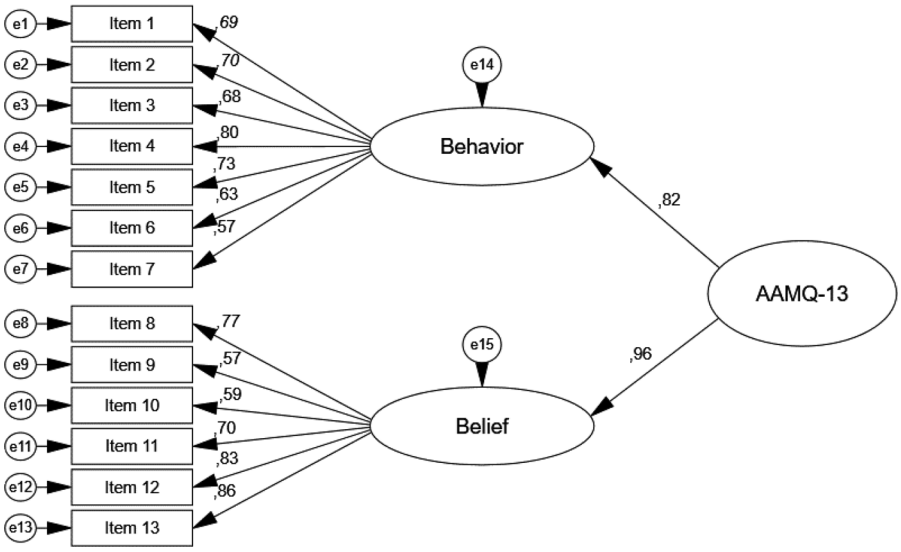

Figure 1. Standardized two-factor structural model of the AAMQ scale ($n = 242$).

56.49 ± 9.54. The total score is obtained by summing the number of items. There are no reverse-scored items. The total score ranges from 13 to 65. There was a positive correlation between the total scale and subscale scores ($p < 0.05$; Table 5). Two hundred and sixteen participants had excellent adherence to asthma medication (94.3%), while thirteen participants had moderate adherence to asthma medication (5.7%).

Reliability analysis

Split-half reliability. The split-half method was used to assess the reliability of the questionnaire. In scale adaptation or development studies, split-half reliability is a statistical method used to measure the consistency of scores in a test. Split-half reliability is assessed by dividing the scale items into two halves (even items and odd items) and then calculating scores for each half. The consistency between the two halves is calculated using the correlation coefficient (r). In split-half reliability analysis, Spearman–Brown and Guttman Split–Half coefficients of 0.70 and above are interpreted as indicators of a strong and significant relationship between the two halves. A scale is reliable if the correlation coefficient is significant (31,32).

The items were divided into two halves based on odd (seven items) and even numbers (six items). The first half had a Cronbach's alpha score of 0.862, while the second half had a Cronbach's alpha score of 0.864. The questionnaire had a Guttman Cronbach's alpha score of 0.799. The split-half results indicate that the questionnaire is very reliable (33). The questionnaire has a Cronbach's alpha score of 0.90.

The effect of sociodemographic characteristics on AAMQ-13-TR scores

Participants living in districts had a significantly lower mean AAMQ-13-TR score than those living in the city center ($F = 3.598$ $p = 0.029$). Participants living in districts had a significantly lower mean AAMQ-13-TR "barrier" subscale score than those living in the city center ($F = 4.218$ $p = 0.016$). Single participants had a significantly lower mean AAMQ-13-TR "behavior" subscale score than their married counterparts ($t = 2.171$ $p = 0.031$). The other sociodemographic characteristics had no effect on participants' AAMQ-13-TR scores ($p > 0.05$) (Table 6).

Table 5. The descriptive statistics for Turkish version of the AAMQ scale.

	M ± *SD*	*M* (*min–max*)	Behavior	Barrier
Behavior	29.52 ± 5.89	31 (7–35)	**1**	
Barrier	26.97 ± 4.46	28 (10–30)	***r* = 0.692** ***p* < 0.001**	**1**
AAMQ-13-TR	56.49 ± 9.54	60 (13–65)	***r* = 0.941** ***p* < 0.001**	***r* = 0.895** ***p* < 0.001**

r: Pearson's correlation coefficient; Summary statistics are given as mean ± standard deviation and median (minimum and maximum) value. Bold sections are statistically significant ($p < 0.05$).

Discussion

This study was conducted to adapt the AAMQ-13 into Turkish in order to determine the medication adherence of people with asthma.

This study was found that T-the questionnaire had a CVI of 0.846, which was greater than the CVC, indicating that the questionnaire had statistically significant content validity ($p < 0.05$). In conclusion, the questionnaire has an intelligible language structure and content. Consistent with this study, Huo et al. reported that the CVI of the scale (S-CVI) of the Chinese version of the AAMQ was 0.923, and the CVI of the level of scale entry was 0.857–1.000 (34).

In this study, the KMO was 0.907, for which Bartlett's test of sphericity was significant ($KMO = DF = 78$; $\chi^2 = 1620.162$; $p < 0.001$), indicating sampling adequacy and correlation between the items for factor analysis.

Both "behavior" and "barrier" subscales had a Cronbach's alpha score of 0.86. The total questionnaire had a Cronbach's alpha score of 0.90. These results indicate that the AAMQ-13-TR has high reliability. In this study, the items were divided into two halves, with one half containing odd-numbered items and the other half containing even-numbered items. The first half had a Cronbach's alpha score of 0.862, while the second half had a Cronbach's alpha score of 0.864. The questionnaire had a Guttman Cronbach's alpha score of 0.799.

Similar to our study, Huo et al. found that the Cronbach's α value of the Chinese version of the AAMQ was 0.866, the coefficient values for the three domains ranged between 0.702 and 0.798 and the split-half reliability and stability values were 0.794 and 0.772, respectively (34). These results of study were also consistent with study of Nassar et al. The results of our study showed that the questionnaire was highly reliable.

We investigated the effect of sociodemographic characteristics on scores. Unlike Nassar et al., we found that place of residence and marital status affected our participants' AAMQ-13-TR total and subscale scores. Participants living in the city center had a significantly higher mean AAMQ-13-TR total and "barrier" subscale score than those living in districts,

Table 6. The comparison of AAMQ scale of asthma patients scores according to descriptive characteristics.

	Behavior	Test (*p*)	Barrier	Test (*p*)	AAMQ-13-TR	Test (*p*)
Age (year)		$t = -0.157$ $p = 0.876$		$t = 1.230$ $p = 0.220$		$t = 0.477$ $p = 0.634$
<45	29.47 ± 5.33		27.30 ± 3.71		56.77 ± 8.36	
>45	29.59 ± 6.52		26.57 ± 5.20		56.16 ± 10.80	
Gender		$t = -0.390$ $p = 0.697$		$t = -0.459$ $p = 0.647$		$t = -0.456$ $p = 0.649$
Man	29.30 ± 6.04		26.77 ± 4.63		56.07 ± 9.67	
Woman	29.63 ± 5.84		27.06 ± 4.39		56.69 ± 9.50	
Place of residence		$F = 2.402$ $p = 0.093$		**$F = 4.218$ $p = 0.016$**		**$F = 3.598$ $p = 0.029$**
City center	29.78 ± 5.79		27.40 ± 4.12		57.18 ± 9.22	
District	27.31 ± 7.11		24.79 ± 6.69		52.10 ± 13.00	
Village	30.00 ± 5.32		27.00 ± 3.59		57.00 ± 7.73	
Marital status		**$t = 2.171$ $p = 0.031$**		$t = 1.008$ $p = 0.315$		$t = 1.811$ $p = 0.072$
Married	30.02 ± 5.34		27.14 ± 4.28		57.17 ± 8.89	
Single	28.12 ± 7.08		26.47 ± 4.92		54.58 ± 11.01	
Education (degree)		$F = 1.48$ $p = 0.230$		$F = 1.682$ $p = 0.188$		$F = 1.515$ $p = 0.222$
Primary school	29.02 ± 6.63		26.42 ± 4.77		55.44 ± 10.43	
High school	30.56 ± 4.49		27.39 ± 4.19		57.95 ± 8.26	
Bachelor's or higher	29.29 ± 5.70		27.61 ± 4.02		56.90 ± 8.89	
Occupation		$F = 1.517$ $p = 0.186$		$F = 0.994$ $p = 0.422$		$F = 1.166$ $p = 0.327$
Civil servant	29.61 ± 5.70		28.30 ± 2.74		57.91 ± 7.82	
Retired	28.68 ± 8.29		26.42 ± 6.12		55.11 ± 13.20	
Worker	29.21 ± 5.01		26.16 ± 5.64		55.37 ± 10.09	
Farmer	28.05 ± 7.10		26.05 ± 4.84		54.10 ± 10.49	
Unemployed	30.75 ± 5.09		27.30 ± 3.95		58.05 ± 8.35	
Other	28.25 ± 6.22		26.98 ± 3.91		55.23 ± 9.73	
Disease duration (year)		$F = 2.920$ $p = 0.056$		$F = 0.604$ $p = 0.548$		$F = 1.781$ $p = 0.171$
1 – 5	28.29 ± 6.38		26.61 ± 4.62		54.90 ± 9.93	
6 – 10	30.37 ± 5.43		26.98 ± 4.63		57.34 ± 9.49	
>10	29.96 ± 5.66		27.46 ± 3.96		57.42 ± 8.88	
Tobacco use		$t = -0.530$ $p = 0.596$		$t = 0.174$ $p = 0.862$		$t = -0.246$ $p = 0.806$
Yes	29.21 ± 5.74		27.04 ± 4.17		56.25 ± 8.99	
No	29.66 ± 5.96		26.93 ± 4.59		56.59 ± 9.78	

Independent sample t-test (*t*); ANOVA (*F*); Summary statistics are given as mean ± standard deviation. Bold sections are statistically significant ($p < 0.05$).

likely due to differences in access to healthcare facilities, availability of pharmacies, and potentially greater exposure to environmental factors that may affect medication adherence. Single participants had a significantly lower mean AAMQ-13-TR "behavior" subscale score than their married counterparts. This is probably because the presence of a spouse in a married individual's life can serve as a source of social support and encouragement, which can positively influence medication adherence. Married individuals might have more reminders and assistance from their spouses when it comes to taking their asthma medications, thus leading to higher scores in the "behavior" subscale. Single individuals, on the other hand, may have fewer reminders or support in this regard, potentially resulting in lower scores.

Previous studies have shown that adherence with treatment is poor in asthma patients. Adherence with treatment is very important in improving the quality of life of asthma patients and ensuring asthma control (35,36). Therefore, it is important to evaluate treatment adherence in asthma patients. For this, it is necessary to use a valid and reliable tool. In this study, the AAMQ-13-TR was found to be a valid and reliable tool for assessing treatment adherence in asthma patients.

Conclusion

The AAMQ-13 is used to assess medication adherence in individuals with asthma. The questionnaire has high reliability, good criterion validity, and strong construct validity. Clinically, uncontrolled asthma necessitates long-term adherence to medications and the prescribed treatment plan. Therefore, there is a requirement for a concise, practical, reliable, and valid measurement tool to assess patient adherence, along with international validation of this tool. We adapted the AAMQ-13 into Turkish to help healthcare professionals, including nurses, to determine medication adherence in individuals with asthma. The questionnaire is used to assess whether asthma symptoms are under control and provides information about patients' lifestyles and quality of life. Adapting the AAMQ-13 to Turkish offers several advantages. First, it addresses the need for a measurement tool that is tailored to the local context, including language, cultural nuances, and healthcare practices. This ensures that the questionnaire is more easily understood and relatable to Turkish-speaking asthma patients. Furthermore, adapting the AAMQ-13 into Turkish allows for the assessment of medication adherence in a more accurate and reliable manner within the Turkish healthcare system.

It facilitates the collection of standardized data on adherence, enabling healthcare providers to identify patients who may be struggling with their asthma medications. This, in turn, paves the way for the development of targeted interventions and support strategies to enhance medication adherence. A culturally adapted AAMQ-13 also streamlines the research process for academics and healthcare professionals in Turkey. It allows for consistent data collection and comparison with international studies while taking into account the unique sociodemographic and healthcare characteristics of Turkish patients. In summary, the adaptation of the AAMQ-13 into Turkish is essential for improving the care and management of asthma patients in Turkey. It supports the development of patient-centered interventions and research initiatives that can ultimately enhance medication adherence, asthma control, and the overall quality of care for individuals with asthma in the Turkish context. As a result of the analyses carried out in line with the research questions, it was determined that the survey could be safely applied in Turkish culture.

Limitations

This study has two limitations. First, while there are many measurement tools for medication adherence in asthma in the world, there are no presented sources of evidence of validity measurement tool in Turkey. Therefore, we could not compare our findings. Second, the results are sample-specific and cannot be generalized to all asthma patients in Turkey.

Ethical considerations

The study was approved by the NOHU Ömer Halisdemir University Ethics Committee (E-86837521-050.99-342323). All patients were briefed about the research purpose and procedure. The study was conducted according to the principles of research and publication ethics.

Declaration of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this article.

Author contributions

The authors' contributions are as follows: study design by ÜP and DEİ; data collection by DEİ; manuscript preparation by DEİ and ÜP.

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