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ORIGINAL ARTICLE

Validity and Reliability of an Arabic version of the migraine screen questionnaire in the primary care setting for identifying hidden migraine

Alaa M. Alaqeel[1]*, Suzan S. Alqeel[2], Ahmed I. Andijani[3], Eyad A. Demyati[4]

ABSTRACT

Background: Migraine is a common chronic and disabling condition, diagnosed late in most patients. Late diagnosis is mainly due to the lack of early diagnostic criteria that could be used in primary healthcare. We aimed to evaluate the validity and reliability of the Arabic version of the migraine screen questionnaire (MS-Q) as a screening tool for migraine in the primary care setting.

Methods: This study had three stages. Stage 1 involved the translation of the MS-Q from English to Arabic and back-translation from Arabic to English. In stage 2, the test-retest reliability of the questionnaire was assessed. In stage 3, the questionnaire was validated against the diagnosis made by expert physicians based on the International Classification of Headache Disorders, 3rd edition (ICHD-3), in 308 patients attending primary healthcare centers in Saudi Arabia.

Results: Of the 400 screened participants, 308 (77%) were eligible for the study (mean age, 29.9 ± 8.9 years). The Cronbach α coefficient ranged from 0.81 to 0.83 (95% CI), which considered accepted. The Pearson correlation coefficient showed a high intraclass correlation (95% CI, 0.77-0.82). The receiver operating characteristic curve analysis between MS-Q and ICHD-3 scores showed an area under the curve of 0.97 (95% CI, 0.94-0.99), with a sensitivity of 0.95 and specificity of 0.99.

Conclusion: The Arabic version of the MS-Q is an easy-to-use, straightforward, valid, and reliable tool for primary care diagnosis of migraine.

Keywords: Headache, migraine, Arabic, questionnaire.

Introduction

Headache disorders are rated among the 10 most disabling conditions worldwide [1]. Some of these disorders, including tension headache, migraine, cluster headache, and chronic daily headache syndrome, can cause substantial levels of disability [2]. Tension headache and migraine are the most frequent types of headache [3,4].

Migraine is a neurologic disease characterized by the pre- and post-attack periods. Despite being a common chronic and disabling condition [3,4], its detection in primary care is insufficient, with correct diagnosis only in approximately 50% of patients [5].

Primary care has an important role in the early diagnosis of health disorders. While specialist care is required for the successful management of chronic migraine, it is vital that primary care physicians are able to accurately diagnose this condition and initiate appropriate therapy in all patients [6]. In the primary care setting, physicians usually diagnose migraine on the basis of the criteria developed by the International Classification of Headache Disorders, 3rd edition (ICHD-3). However, it was reported that only half of primary care physicians are aware of this classification and use it in daily clinical practice [6]. Despite this limited knowledge,

Correspondence to: Alaa Mustafa Alaqeel
*Family medicine resident, King Fahad Medical City, Sulaimania, Riyadh, Saudi Arabia.
Email: Aq.alaa@hotmail.com
Full list of author information is available at the end of the article.
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physicians expressed a considerable interest in migraine and reported devoting more time to patients with this disorder, as compared with the mean time per visit for other conditions.

Considering the impact of migraine on the patient's quality of life, as well as the socioeconomic burden of the disease, there is an increasing need to develop a novel approach to its early diagnosis. Recently, new instruments for early diagnosis of migraine have been designed. The Migraine Screen Questionnaire (MS-Q) is a self-administered tool for the detection of migraine. It is quick to complete by patients and allows an easy identification of symptoms suggesting migraine to be later confirmed by clinical diagnosis. As such, the MS-Q becomes a novel instrument that can optimize the management of patients with migraine, offering an important saving of time [7]. The objective of this study was to develop a conceptually equivalent Arabic-language version of the MS-Q that could be used with high reliability, validity, and sensitivity (aiming at 95%) in the Arabic-speaking population.

Methods

This was a cross-sectional study conducted from February 2019 to February 2020 at the Central Second Health Cluster including family medicine and employee health clinics at King Fahad Medical City and other affiliated primary care centers in Riyadh, Saudi Arabia. Our Study population were participants of either gender, aged 18 years or older, who attended a primary care center for any reason were considered eligible for the study. Patients unable to complete the questionnaire or to provide informed consent to participate in the study were excluded.

The study sample included 400 consecutive patients. It was estimated that for the sensitivity of the Arabic version of the MS-Q questionnaire to reach 93% and produce a 95% confidence interval with a precision of 3, a sample size of 277 would be sufficient. Participants were selected using simple random sampling. The sample size was calculated using the following formula: $n = Z2\alpha\ P\ (1\text{-}P)\ /\ d^2$.

The study was conducted in primary care clinics admitting about 10 consecutive patients per day. The MS-Q was distributed to each participant before entering the clinic. Regardless of the MS-Q result, doctors will check their suspicion of a diagnosis of migraine according to their clinical judgment and IHS diagnostic criteria. The (diagnosis of migraine according to clinical judgment- ICHD-3) was recorded as [In accordance to your clinical judgment and to the recent ICHD-3 criteria for the diagnosis of migraine (International Diagnosis of Migraine Criteria), does the patient currently present a diagnosis of migraine?] with the following possible answers: (yes or no). All participant doctors received training on ICHD-3 migraine criteria, and a contact phone number was set up to clarify any questions concerning the study.

The MS-Q consists of five questions related to the frequency and characteristics of headache, as well as to the presence or absence of migraine-related symptoms. Each negative answer (no) scores 0 points, and each positive answer (yes), 1 point. The cutoff value for the suspicion of migraine is 4 points or higher, while a score below 4 indicates no suspicion of migraine [8].

We collected sociodemographic and clinical data for all participants, including age, gender, marital status, previous diagnosis of migraine (yes/no), and the reason for the current visit.

Translation, construct validity, and reliability of the Arabic version of the MS-Q

Stage 1: The MS-Q was translated from the source language (English) to the target language (Arabic) independently by two bilingual translators. The two versions were then combined, revised, and back translated into English by other certified English translators, who were blinded to the source documents. Five bilingual experts (staff members of King Fahad Medical City) examined the Arabic version of the questionnaire until consensus on its content and construct was reached.

We conducted a pilot study including a sample of 10 subjects (not included in the large-scale study) to examine the clarity of the tool.

Stage 2: was carried out by recruiting a total of 400 consecutive patients attending the primary care clinics. After signing the informed consent form, patients were interviewed and physically examined as a part of their routine management. The Arabic version of the MS-Q was initially self-administered to patients. The overall score was calculated from the patients' responses to each of the five items of the questionnaire. Illiterate patients and those with a lower education level were assisted by principal investigators in case any item required an explanation. The re-test session was scheduled after 4 to 5 weeks, provided that patients were in a stable clinical condition.

All patients were subjected to International Headache Society criteria validation. After giving the Arabic version of the MS-Q, primary care physicians used ICHD-3, developed by the Headache Classification Committee of the IHS. All patients who completed the questionnaire were interviewed by trained physicians regardless of their MS-Q score. Physicians were blinded to the patient's MS-Q score.

Statistical analysis

Data from the questionnaires were coded and entered digitally into (spreadsheet) for further analysis. Data were expressed as means ± SD or number (%). The Cronbach α coefficient was calculated and used to measure the internal consistency of the Arabic version of the MS-Q. Intraclass correlation coefficients, together with either Pearson correlation or Spearman rank-order coefficients,

were used to evaluate the test–retest reliability. The Cronbach α coefficient was used to measure the internal consistency of the Arabic MS-Q. Coefficients with values higher than 0.7 were considered acceptable. The receiver operating characteristic (ROC) curves analysis between the MS-Q and the ICHD-3 scores was performed. To assess the extent of the rise of the ROC curve to the upper left-hand corner, the area under the curve (AUC) was measured. In general, a steeper rise of the curve corresponded with better test results. The AUC of 1 represents perfect agreement, and of 0.5, the lowest possible agreement. In this study, we adopted the classification of AUC values used by Erman et al. [12]. In this classification, 0.9 to 1 is considered excellent; 0.8 to 0.9, very good; and 0.7 to 0.8, good. The sensitivity and specificity of the test, positive and negative predictive values, as well as positive and negative likelihood ratios were calculated. In general, a likelihood ratio of less than 1 indicates that the test result is associated with the absence of disease, whereas a likelihood ratio above 1 indicates that the test result is associated with the presence of disease. The likelihood ratios below 0.1 and above 10 are considered to provide strong evidence for ruling out or ruling in the diagnosis, respectively. A p value of less than 0.05 was considered to be significant. Standard statistical software was used for data management and analysis: SPSS version 21.0 (IBM, Armonk, New York) and SigmaPlot version 13 (Systat, San Jose, CA).

Results

Of the 400 screened participants, 308 (77%) were eligible for the study. The mean age of participants was 29.9 ± 8.9 years. Detailed data on gender, marital status, and previous diagnosis of migraine in the study group are presented in Table 1.

***Table 1**. Sociodemographic characteristics of participants.*

Parameter		Number (%) of patients
Gender	Male	132 (42.9)
	Female	176 (57.1)
Marital status	Married	145 (47.1)
	Single	163 (52.9)
Previous diagnosis of migraine	Yes	39 (12.7)
	No	269 (87.3)

The reliability and internal consistency of the Arabic version of the MS-Q for each question was assessed using the Cronbach α coefficient. The Cronbach α coefficient ranged from 0.81 to 0.83 (95% CI), which considered accepted. The Pearson correlation coefficient showed a high intraclass correlation (95% CI, 0.77-0.82). Detailed data are presented in Table 2.

The ROC curve between the MS-Q and ICHD-3 scores showed an AUC of 0.97 (95% CI, 0.94-0.99), with a sensitivity of 0.95 and specificity of 0.99 (Figure 1).

Physicians diagnosed migraine in 74 of the 308 participants (24%). According to questionnaire responses, the positive predictive value was 71 (95.9%) (true positive) of the total 74 patients with doctor's diagnosis, and only 4 cases showed a false positive result for questionnaire-based diagnosis (0.04%). On the other hand, physicians detected no migraine in 234 of the 308 participants (76%). According to the questionnaire responses, the negative predictive value was 230 (98.2%) of the total 234 participants (p <0.0001) (Table 3). The likelihood ratio above 10 was considered as indicating the diagnosis of migraine.

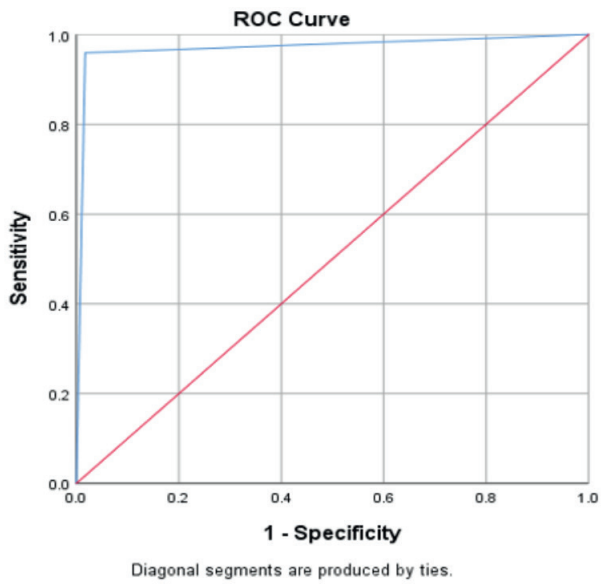

***Figure 1.** Receiver operating characteristic curve for sensitivity and specificity of the Arabic version of the Migraine Screen Questionnaire.*

***Table 2**. Reliability and validity of the Arabic version of the Migraine Screen Questionnaire.*

Question	Cronbach α coefficient	Pearson correlation coefficient	*p* value
1. Do you suffer from severe or frequent headache?	0.81	0.82	<0.0001
2. Do you suffer from headache that lasts more than 4 hours?	0.83	0.77	<0.0001
3. Do you feel nausea accompanied with headache?	0.82	0.79	<0.0001
4. Do you feel disturbed by light or noise when you experience a headache?	0.82	0.79	<0.0001
5. Do headaches reduce your practical or intellectual activity?	0.82	0.79	<0.0001

***Table 3**. Agreement between doctor's and questionnaire diagnoses.*

	Doctor diagnosis (%)	
	No migraine	Migraine
Questionnaire diagnosis (%)		
No	230 (98.3%)	3 (4.1%)
Yes	4 (1.7%) (FPV)	71 (95.9%) (PPV)
TOTAL	234	74

Discussion

In this study, we developed a conceptually equivalent Arabic version of the MS-Q. In addition, we evaluated its validity and reliability by applying it to an adult population of male and female patients attending primary healthcare clinics.

The internal consistency of the Arabic version of the MS-Q was shown to be excellent, and each item of the questionnaire highly correlated with the diagnosis of disease. The Cronbach α coefficient also indicated an excellent reliability of the Arabic-language version of the questionnaire. Our results are in agreement with a headache questionnaire developed in Egypt [2] for Arabic-speaking patients with headache, to be used as an epidemiological survey instrument. The intraclass correlation coefficient was 0.903 (95% CI, 0.875-0.925) and the Cronbach α coefficient was 0.775 (95% CI, 0.682-0.837). The Arabic version of the Migraine Disability Assessment Scale (MIDAS) was validated in Lebanese patients with migraine. The internal consistency of the MIDAS calculated by the Cronbach α coefficient was excellent (0.86), as was the intraclass correlation (95% CI, 0.96-0.99; p <0.0001) [3]. Moreover, the internal consistency reliability of the MIDAS was 0.8 among Iranian patients [9]. The Cronbach α, a measure of internal consistency of the MIDAS, was 0.76 in the United States and 0.73 in the United Kingdom [10].

In our study, we constructed the ROC curve to evaluate the sensitivity and specificity of the MS-Q for the detection of migraine. The analysis showed excellent sensitivity and specificity of the test. Our results are comparable to those reported by a Spanish multicenter cross-sectional study conducted in 9,670 patients to validate the MS-Q. The sensitivity and specificity were 0.82 and 0.97, respectively.

Limitations

Our study is not free from limitations. The cross-sectional design captures only a specific point in time and may not be fully representative of the population.

Conclusion

In conclusion, the Arabic version of the MS-Q is an easy-to-use, straightforward, valid, and reliable tool for the identification of migraine in the primary care setting.

Conflict of interest
None.

Funding
None.

Consent to participate
A participant's consent to the study was considered as their agreement to complete the questionnaire and to present for a visit at the clinic for validation of ICHD-3 criteria.

Ethical approval
The study was approved by the Institutional Review Board of King Fahad Medical City and considering the study design, it was declared "Exempt: via Ref # 19-322, Dated: July 18, 2019.

Author details
Alaa M. Alaqeel (MBBCH, MD)[1], Suzan S. Alqeel (MBBCH, MD)[2], Ahmed I. Andijani (MBBCH, MD)[3], Eyad A. Demyati (MBBCH, MD)[4]

1. Family Medicine Resident, King Fahad Medical City, Sulaimania, Riyadh, Saudi Arabia
2. Intern, AlMaarefa University, King Khalid Branch Road, Ad Diriyah, Saudi Arabia
3. Associate Consultant in Family Medicine, King Fahad Medical City, Cluster2, Ministry of Health, Riyadh, Saudi Arabia
4. Consultant in Family Medicine & Community Health Services Department, King Abdullah Bin Abdulaziz University Hospital, Princess Nora Bint Abdulrahman University, Riyadh, Saudi Arabia

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