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Validity and reliability of the Turkish version of the Manchester-Oxford Foot Questionnaire for hallux valgus deformity evaluation

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Objective: The aim of this study was to evaluate the reliability and validity of the Turkish version of the Manchester-Oxford Foot Questionnaire (MOXFQ) in patients affected by hallux valgus in order to assess the accuracy of this cross-cultural adaption.

Methods: Thirty female volunteers aged between 18 and 55 years were included in the study. Subjects with hallux valgus were asked to complete the MOXFQ and the Short-Form 36 Health Survey (SF-36). After receiving permission from the author, the MOXFQ was translated into Turkish twice and then back translated to English, after which its compatibility was evaluated. The Turkish version of the MOXFO was applied twice, 1–3 days apart, to the study subjects. Internal consistency and test-retest reliability were assessed using Cronbach's alpha and intraclass correlation coefficient (ICC), respectively. Construct validity was assessed with the use of Spearman's rank correlation coefficient, using a priori hypothesized correlations with SF-36 domains.

Results: Subjects achieved similar scores at the first and second administration of the questionnaire (<0.001). The internal consistency reliability was acceptable for all MOXFQ domains (pain, walking/standing, social interaction), with Cronbach's alpha coefficients ranging from 0.775 to 0.779. The assessment of test-retest reliability revealed satisfactory values, with ICCs ranging from 0.91 to 0.96. Construct validity was supported by the presence of all the hypothesized correlations, with SF-36 within its physical parameters.

Conclusion: The Turkish version of the MOXFQ is a valid and reliable tool for evaluating foot pain and functional status in patients affected by hallux valgus.

Keywords: Foot; Hallux valgus; MOXFQ; quality of life; validity.

Level of Evidence: Level II, Diagnostic study.

Hallux valgus is a pathological condition which is seen primarily in women that affects the big toe[1–3] and can develop due to many potential causes.[4] It is a painful and progressive structural foot deformity that is increasingly frequent today and severely restricts the patient's daily activities, distorts the aesthetic appearance of the foot,

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and can limit the mobility of the big toe if not treated.[5] Most studies of patients with hallux valgus have focused on reducing deformity and complications.[2,6,7] The pain caused by hallux valgus leads to functional deficiencies by creating gait disorder that can affect the patient's quality of life (QOL).[5,8] Evaluating the QOL in hallux valgus is important in determining the benefits of treatment.

In order to prevent the disruption of some aspects of the patients' QOL, there is a need for clinical studies to evaluate the treatments of this disorder.[6] In the assessment of ankle- and foot-related problems, there are several tools in the literature, each of which is geared towards different conditions and/or different patients and age groups, and assesses the problems using different parameters. The Foot Function Index,[9] Foot and Ankle Outcome Score,[10] Foot Posture Index,[11] Foot and Ankle Ability Measurement,[12] and American Orthopaedic Foot and Ankle Society (AOFAS) clinical rating scale (which also includes exclusive scales for the toe and forefoot), are commonly used tools.[13] To assess treatment effectiveness, it is important for patients to complete a questionnaire specific to the disorder. In clinics, area- or disorder-specific questionnaires are essential methods for reporting the severity of the functional problem, developing treatment methods, and creating a common scientific language.[2] Although there is a need for more research on the relationship between foot problems and functional inability, it is generally accepted that foot and leg problems contribute to functional impairment and thus can affect the QOL of affected individuals.[14,15]

The Manchester-Oxford Foot Questionnaire (MOXFQ) is a practical, valid, and reliable questionnaire that accurately assesses patients with hallux valgus.[5,16–19] The MOXFQ is a recently devised patient-reported outcome measure developed with patients, so that it adequately records their perception of their symptoms. Accordingly, MOXFQ is an appropriate scale for the assessment of pain as well as functional and social influence on walking, standing, and QOL of individuals with hallux valgus.[20] This questionnaire is therefore very useful and can be used in clinical trials and for making comparisons between groups undergoing different treatment options.

However, the MOXFQ must be translated via a verified procedure that includes reliability, validity, and sensitivity tests applicable to different language groups. Additionally, it must be culturally adaptated in order to allow comparison between studies conducted in different countries.[2]

The aim of this study was to assess the validity and reliability of the Turkish version of the MOXFQ for hallux valgus deformity evaluation.

Patients and methods

This study was conducted at Hacettepe University, Faculty of Health Sciences, Department of Physical Therapy and Rehabilitation, Prosthesis Orthotics and Biomechanics Unit.

The necessary permission and approval for conducting the study were received from Hacettepe University, Faculty of Medicine, Medical, Surgical and Drug Research Ethics Committee.

Thirty female volunteers with hallux valgus deformity between the ages of 18 and 55 years were included in the study. Inclusion criteria were as follows: no cognitive, mental, or psychological problems; no systemic diseases such as rheumatoid arthritis; no surgery or neurological problems; and degree of deformity of 2 or greater according to the Manchester scale.[21]

The Manchester scale was developed by Garrow in order to determine the degree of hallux valgus deformity in individuals. This scale defines the degree of hallux valgus as absent,[1] mild,[2] moderate,[3] or severe.[4] It is used as a clinical tool consisting of photographs of feet with fours levels of hallux valgus[22] (Figure 1).

The validity and reliability study of the scale has been

Fig. 1. Manchester scale: **(a)** no deformity (grade 1); **(b)** mild deformity (grade 2); **(c)** moderate deformity (grade 3); **(d)** severe deformity (grade 4).[22]

previously confirmed.[21] Individuals who scored 2 and above were included in the present study.

The MOXFQ, used to analyze validity and reliability, was written by Dr. Jill Dawson, who provided permission for translating the MOXFQ from English to Turkish for the purposes of the present study. This questionnaire, which determines the QOL of individuals with hallux valgus, has 3 separate sections: walking/standing,[5] foot pain,[7] and social interaction.[4] It consists of 16 questions, each of which has 5 different answer choices, which are scored between 0–4, with 4 representing a very severe condition.[2] In the questionnaire, each section is scored between 0 and 100. The other scale used was the Short-Form 36 Health Survey (SF-36), which consists of 36 questions regarding general health condition. This questionnaire provides 8 separate scale scores: physical functioning (PF), role physical (RP), general health (GH), vitality (EV), bodily pain (PAIN), social functioning (SF), role emotional (RM), and mental health (MH). These separate scale scores are then aggregated into 2 main scores, the physical composite score (PCS) and the mental composite score (MCS). The higher the score, the better the perceived health level. The SF-36 has been validated for use in Turkey.[23]

The MOXFQ was translated from English to Turkish by two academic physiotherapists. After choosing the most appropriate phraseology, back translation of the scale to English was done by a Turkish language expert who was a certified translator.

The back translation of the scale was found to have no difference in meaning, and the language validity of the scale was approved. The Turkish version of the MOXFQ was administered twice, 1–3 days apart, to study subjects. By the comparison of the first and second results, invariance in the answers over time was determined. Subjects did not have any difficulties in completing the MOXFQ scale. The SF-36 was administered at the same time.

Internal consistency was analyzed using Cronbach's alpha analysis. Reliability analysis was performed by using Pearson's product-moment correlation analysis from test-retest and item-total item correlation analysis.[24]

Intraclass correlation coefficient (ICC) was used for assessment of test-retest reliability. ICC values range from 0 to 1, with values between 0.60 and 0.80 indicating good reliability, and values above 0.80 indicating perfect reliability.

Construct validity was analyzed using Spearman's correlation coefficient for statistical analysis of the correlation between the MOXFQ and SF-36 scores.

Experimental power analysis upon completion of the study[25] with α=0.05, values quality of life in women with hallux valgus deformity, using the significance test the difference between the 2 averages; predetermined power was 100% to be -14.5 unit (group 35.8±9.9, 50.3±5.2 other) change in SF-36 scores between groups.

Results

Mean age of study participants was 41.1±10.03 years, mean height was 165.03±5.74 cm, and mean body weight was 70.17±10.71 kg. Left hallux valgus angle was 32.67±8.36° and right was 29.20±7.71°. According to the Manchester scale, 21.6% of individuals were grade 2, 66.6% grade 3, and 11.6% grade 4.

When the results of the first and second administrations of the MOXFQ questionnaire were examined, they were found to be similar (Table 1).

When the test-retest results were examined in terms of reliability, it was concluded that the MOXFQ scale has perfect reliability (Table 1). Cronbach's alpha for internal consistency of the scale was 0.7755 for the first administration of the test and 0.7792 for the second administration. For the 3 items of the MOXFQ subscale, Cronbach's alpha was calculated as 0.9126 (range: 0.8248–0.9574) for walking/standing, 0.9637 (range: 0.9251–0.9825) for pain, and 0.9111 (range: 0.8219–0.9567) for social interaction. When the results obtained from the reliability assessment were examined, it was concluded that the scale was valid.

Table 1. Results of first (I) and second (II) administrations of the MOXFQ measuring test-retest reliability.

	MOXFQ I	MOXFQ II	ICC	95% CI
	Mean±SD	Mean±SD		
Walking/standing	62.97±21.56	61.67±20.88	0.9126	0.8248–0.9574
Pain	54.83±18.64	55.50±17.44	0.9637	0.9251–0.9825
Social interaction	33.13±27.23	34.79±26.09	0.9111	0.8219–0.9567
	1. Consistency in measurement Alpha 0.7755		2. Consistency in measurement Alpha 0.7792	

MOXFQ: Manchester-Oxford Foot Questionnaire; ICC: Intraclass correlation coefficient; SD: Standard deviation.

Table 2. Correlation between SF-36 and first (I) and second (II) administrations of MOXFQ.

SF-36 subscales		MOXFQ Walking/standing I/II		MOXFQ Pain I/II		MOXFQ Social interaction I/II	
Physical function	r	-0.187	-0.184	-0.413	-0.368	-0.044	-0.027
	p	0.323	0.329	0.023*	0.046*	0.819	0.887
Role physical	r	-0.307	-0.398	-0.482	-0.431	-0.127	-0.19
	p	0.099	0.029*	0.007**	0.017*	0.505	0.316
Pain	r	-0.317	-0.355	-0.566	-0.504	-0.158	-0.227
	p	0.087	0.054	0.001**	0.005**	0.404	0.227
General health	r	-0.448	-0.519	-0.68	-0.738	-0.221	-0.291
	p	0.013*	0.003**	0.000**	0.000**	0.24	0.119
Vitality/tiredness	r	-0.448	-0.576	-0.287	-0.32	-0.151	-0.291
	p	0.013*	0.001**	0.124	0.085	0.427	0.118
Social function	r	-0.305	-0.408	-0.386	-0.342	-0.172	-0.315
	p	0.101	0.025*	0.035*	0.064	0.363	0.09
Role emotional	r	-0.17	-0.235	-0.342	-0.295	-0.095	-0.182
	p	0.369	0.211	0.065	0.114	0.618	0.336
Mental health	r	-0.214	-0.216	-0.306	-0.293	-0.195	-0.274
	p	0.256	0.252	0.101	0.116	0.302	0.143
Physical component summary	r	-0.359	-0.411	-0.612	-0.585	-0.117	-0.359
	p	0.052	0.024*	0.000**	0.001**	0.539	0.467
Mental component summary	r	-0.291	-0.381	-0.308	-0.293	-0.198	-0.359
	p	0.119	0.038*	0.097	0.116	0.294	0.052

MOXFQ: Manchester-Oxford Foot Questionnaire; SD: Standard deviation.
Moderate correlation values (r>0.4) are shown in bold typeface.
*Correlation is significant at the 0.05 level (two-tailed).
**Correlation is significant at the 0.01 level (two-tailed).

The validity of the scale was investigated by construct validity and criterion validity. The SF-36 was conducted for validity of the MOXFQ. A medium level of correlation was found between SF-36 RP, GH, EV, PCS, and MCS with MOXFQ walking/standing, as well as between SF-36 PF, SF, and PCS with MOXFQ pain ($p<0.05$). Moreover, a strong correlation was found between SF-36 GH and EV with MOXFQ walking/standing, SF-36 RP, PAIN, GH, and PCS ($p<0.01$). No significant correlation was found between the SF-36 subscales and MOXFQ social interaction ($p>0.05$) (Table 2).

Discussion

This study was performed to investigate the reliability and validity of the Turkish version of the MOXFQ scale in evaluating parameters related to hallux valgus deformity. It was concluded that the Turkish version of the MOXFQ is a reliable, consistent, and valid scale for evaluating the QOL of women with hallux valgus deformity.

Disease-specific disability scales have become an important complement to traditional outcome measures such as physical or radiographic evaluation. The common use of these assessment instruments in clinical practice requires the language and cultural adaptation and validation of questionnaires already accepted in the scientific community. The development of multiple language versions of current validated questionnaires plays a key role in standardizing outcome measurement and increasing the statistical power of clinical studies.[2]

Patient-reported outcome measures should be preferred in order to minimize possible clinician bias.

Although there is a need for more research on the relationship between foot problems and functional inability, it is generally accepted that foot and leg problems contribute to functional impairment and thus can affect the QOL of individuals.[15,16] In our study, a strong relationship was found between the SF-36 general health and vitality subscales and the MOXFQ walking/standing parameter, and between the SF-36 physical role, pain, general health and physical composite score. Previously, in a study where the MOXFQ and EuroQol EQ-5D Index results were compared, it was shown that both were effective measures of pain, mobility, and activity.[26] The strong relationship between the SF-36 pain, physical role, physical composite core and MOXFQ in our

study supports this finding. However, in an Italian validity and reliability study of the MOXFQ,[2] a relationship was found between the SF-36 and MFXFQ social interaction; in our study, no such relationship was found, conforming with previous reports in the literature.[5,16]

Our study shows that the MOXFQ is more sensitive than the SF-36 in characterizing social interaction. In the studies of Dawson et al.,[18] AOFAS and EQ-5D parameters were shown to have a greater effect than the related SF-36 areas. Further evidence for the responsiveness of

Appendix Manchester-Oxford Ayak Anketi (MOAA) (MOXFQ)

Uygun olanı seçiniz: **SAĞ/SOL AYAK** ***Son 4 hafta içinde:***	***Her soru için uygun kutuyu ✓ seçiniz.***				
	Hiçbir zaman	**Nadiren**	**Bazen**	**Çoğu zaman**	**Her zaman**
1. Ayağımda ağrı var	❑	❑	❑	❑	❑
2. Ayağımdaki ağrıdan dolayı uzun yürüyüşler yapmaktan kaçınırım.	❑	❑	❑	❑	❑
3. Ayağımdaki ağrıdan dolayı yürüdüğüm yolu değiştiririm.	❑	❑	❑	❑	❑
4. Ayağımdaki ağrı nedeniyle yavaş yürürüm.	❑	❑	❑	❑	❑
5. Ağrı nedeniyle durup ayağımı dinlendirmek zorunda kalırım.	❑	❑	❑	❑	❑
6. Ayağımdaki ağrı nedeniyle sert ve engebeli yüzeylerden kaçınırım.	❑	❑	❑	❑	❑
7. Ayağımdaki ağrıdan dolayı uzun sure ayakta kalmaktan kaçınırım.	❑	❑	❑	❑	❑
8. Ayağımdaki ağrıdan dolayı yürümek yerine otobüse veya taksiye binerim.	❑	❑	❑	❑	❑
9. Ayağımdan dolayı mahçubiyet duyarım.	❑	❑	❑	❑	❑
10. Giymek zorunda kaldığım ayakkabılardan utanırım.	❑	❑	❑	❑	❑
11. Ayağımdaki ağrı akşamları daha çoktur.	❑	❑	❑	❑	❑
12. Ayağımda yayılan bir ağrı hissederim.	❑	❑	❑	❑	❑
13. Ayağımdaki ağrı benim iş/günlük aktivitelerimi yapmamı engeller.	❑	❑	❑	❑	❑
14. Ayağımdaki ağrıdan dolayı sosyal yada eğlence aktivitelerimi yapamamaktayım.	❑	❑	❑	❑	❑
15. **Son 4 hafta boyunca** ayağınızda oluşan ağrıyı genellikle nasıl tanımlarsınız?					
Hiç yok ❑	Çok hafif ❑	Hafif ❑	Orta ❑	Şiddetli ❑	
16. **Son 4 hafta boyunca** gece yatakta ayağınızdaki ağrıdan dolayı sıkıntıya girdiniz mi?					
Hiç ❑	Sadece 1 ya da 2 gece ❑	Bazı geceler ❑	Çoğu geceler ❑	Her gece ❑	

the MOXFQ, compared with other outcome measures, was sought in analyses that anchored changes in scores and effect sizes to patients' different responses to a transition item about foot/ankle problems. It was therefore noteworthy that in analyses the MOXFQ performed well, while the generic measures (SF-36 and EQ-5D) performed relatively poorly. Similar analyses conducted within subgroups of patients with foot problems had found that the responsiveness of the MOXFQ was good compared with that of the AOFAS. In our study, it was found that the MOXFQ was more responsive than the SF-36, supporting the view that the MOXFQ is more specific while the SF-36 is a more general assessment tool.[17–19,27]

The generic SF-36 was much less efficient overall than the MOXFQ, with the physical function and pain domains showing a statistically greater degree of change. The SF-36 physical domains performed better than the emotional domains.

Maher et al., in their study in UK, evaluated outcomes after foot surgery; they concluded that the Foot Health Status Questionnaire and the MOXFQ are straightforward, clinician prejudice-minimizing, easy to analyze scales for use in the assessment of foot problems. Moreover, they stated that the MOXFQ is more appealing to patients since it is shorter.[28] In the present study, our findings that individuals did not come across any problems while completing the MOXFQ and that no questions were left unanswered supports this claim.

The Turkish version of the MOXFQ is a valid and reliable scale, as shown by the high completion rate and lack of missing data. Furthermore, when consulting the literature, it has been suggested that the readability of the MOXFQ is superior.[7] This increasingly used scale has previously been translated into 2 other languages.[2,28] Experimental power analysis has been determined to be 100%.[25]

The main limitation of our study was that the general SF-36 scale was used, as there is no foot-specific questionnaire, in evaluating the validity and reliability of the Turkish MOXFQ. Additionally, the relationship of the radiographic measures between the MOXFQ and SF-36 was not evaluated. However, the Manchester scale,[21] which was one aspect of our inclusion criteria, provided a valid representation of hallux valgus angle determined by radiographic measurements. Therefore, this limitation can be ignored.

In conclusion, the Turkish version of the MOXFQ is a valid and reliable tool for evaluating foot pain and functional status in patients affected by hallux valgus. The MOXFQ, devised with input from hallux valgus patients, has previously been demonstrated to have very favorable measurement properties in terms of its reliability and validity. The MOXFQ is a foot-specific questionnaire. Pain as well as functional and social effects related to walking and standing can be evaluated with this questionnaire. Moreover, it is thought that in future studies it will become an essential tool for the evaluation of hallux valgus.

Conflicts of Interest: No conflicts declared.

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