Validation and reliability of the Munich Shoulder Questionnaire for Turkish patients with shoulder dysfunction

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Abstract

Introduction. Shoulder dysfunction is one of the most important upper extremity problems that limit the quality of life of individuals. Munich Shoulder Questionnaire (MSQ) is a self-assessment tool that allows an easy follow-up and evaluation for clinicians. The aim of this study was to describe the process applied to translate MSQ into Turkish and to test its validity and reliability.
Methods. The questionnaire involves socio-demographic data, as well as objective and subjective items for shoulder dysfunction. The study investigated 180 patients with shoulder dysfunction. Cronbach's alpha was used to assess internal consistency. Test-retest reliability was evaluated by the intra-class correlation coefficient. Pearson's correlation coefficient served to examine the convergent validity. The SPSS 23.0 software was used for the statistical analysis.
Results. The patients' average age equalled 44.3 ± 11.6 years. In most cases (76.7%), the diagnosis was shoulder impingement syndrome. The Cronbach's alpha coefficients of the MSQ objective and subjective sections were 0.73 and 0.96, respectively. The MSQ total score was positively correlated with the Disabilities of the Arm, Shoulder and Hand questionnaire total score ($r = 0.70$; $p < 0.01$) and the Shoulder Pain and Disability Index total score ($r = 0.65$; $p < 0.01$).
Conclusions. The Turkish version of MSQ is a valid, reliable, and responsive instrument for evaluating shoulder dysfunctions. In addition, MSQ-Turkish is satisfactory for evaluating shoulder dysfunctions and its use is recommended to follow up conservative, manipulative, and surgical treatments.
Key words: shoulder dysfunction, functional efficiency, validation, reliability, Turkish version

Introduction

Shoulder pain and the associated problems with the shoulder complex are the third leading musculoskeletal dysfunctions in primary care health service [1]. Chronic shoulder pain is an important problem because few patients return within 6 months of oncoming [2]. The patient's perception of changes in their own healthiness is the primary detail of the effect of treatment [3, 4]. The main focus of the treatment is the improvement of the quality of life, controlling pain, functionality, and wellness. In the assessment of shoulder dysfunction, such details should be considered as shoulder pain, movement restriction, duration of the disease, and patients' statements concerning their pain severity and type. Shoulder pain and dysfunction can occur in various musculoskeletal anomalies, e.g. rotator cuff dysfunction, cervical spine injury, scapular problems. They may cause various problems, such as a need for treatment, reduced work capacity, and diminished functional efficiency.

Patient-reported outcomes generally provide the patient's perspective [5, 6]. They have become popular and are increasingly used. Recently, many shoulder-specific questionnaires have been developed. All of the shoulder-specific patient-reported outcome tools have been tested in native English-speaking populations. According to our knowledge, 8 validations and translations of shoulder-specific questionnaires have been performed in Turkish [7–17]. Many of these

questionnaires include objective measurements. However, these do not always reflect the results of surgery and conservative treatment. There is a need for studies including objective and subjective parameters to evaluate individuals in terms of physical, social, and functional aspects. The Munich Shoulder Questionnaire (MSQ) is a forward-looking tool for self-assessment of shoulder dysfunction. It was primarily designed for an effectual follow-up of shoulder dysfunction patients, also evaluated with the Constant shoulder score, Shoulder Pain and Disability Index (SPADI), and Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire, consisting of 30 items. MSQ is based on functional efficiency with subjective and objective items for shoulder function [18].

A standard questionnaire should allow to follow up patients with manageable effort. An ideal questionnaire for outcome measurement of shoulder problems and functional efficiency should meet the following requirements: (a) self-assessment; (b) focus on details; (c) a short time to complete (30 minutes or less); and (d) quantifiable results. MSQ can be completed at home or at the office, and typical functional abilities to be evaluated are explained with pictures, which makes the questionnaire easy to follow. As a result, we preferred to translate MSQ into Turkish as it is less costly, practical, and comprehensive. Besides, objective (normal joint movement and muscle strength) and subjective (pain, daily life activity, sport and leisure time activities) parameters are presented in a single form to create the advantage

in terms of ease of use and time. With these properties, MSQ may be preferred during follow-up of the results of conservative and/or surgical treatment and clinical research.

The purpose of this study was to translate and linguistically adapt MSQ to the Turkish language and test the validity and reliability of the Turkish version of MSQ among shoulder dysfunction patients. Also, the ultimate goal was to facilitate international research in shoulder problems, as well as to support physicians in their clinical practice.

Subjects and methods

Participants

The study was conducted with 188 patients with shoulder problems receiving outpatient treatment in the Department of Physical Therapy and Rehabilitation, Hasan Kalyoncu University. They agreed to participate in the study and were provided with written and oral information on the study before evaluation. Eight patients were later excluded from the analysis as they did not complete the questionnaire (Figure 1); thus, 180 patients were included in the study. They all met the inclusion criteria: age of 18–65 years, having unilateral or bilateral shoulder dysfunction, ability to read and complete the self-assessment questionnaire. Individuals with neurological, psychological, or cardiovascular diseases or injuries were excluded. To measure the test-retest reliability and responsiveness, 50 and 30 subjects, respectively, were randomly selected by using the simple random sampling method.

We searched the US National Institutes of Health database (https://clinicaltrials.gov, ID: NCT03956147) for trials that were conducted with no published results.
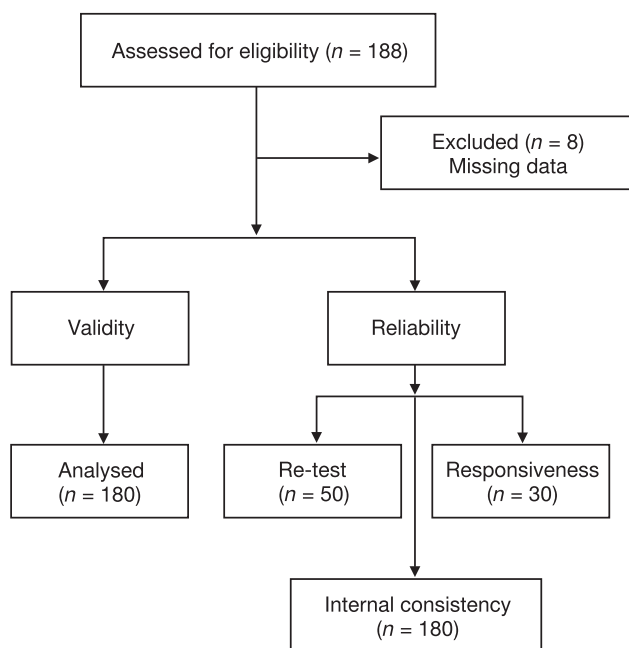

Figure 1. The patient flow diagram

Translation procedure

In this study, 2 independent translators, physiotherapists with 25- and 10-year experience, whose mother language was Turkish, translated the original English version into Turkish. Needed corrections were made in accordance with their views. To verify the content and approve the scale, an expert review form was developed and used by the researchers. The expert review form intended to measure the appropriateness of the scale factor construction, therefore, face va-

lidity in the context of meanings, conceptualizations, experiences, and the applied terminology related to items and factors of the scale. With the consideration of the views and suggestions of 3 experts, a preliminary form of the questionnaire was prepared. After a discussion, they created a consensus version (the MSQ-Turkish), which was also checked for possible cross-cultural differences. Both Turkish translations were compared for inconsistencies. Finally, the MSQ-Turkish was translated back into English blindly and independently by 2 professional translators whose mother tongue was English. Neither of these 2 professionals had any medical knowledge or knew anything about MSQ. The back-translated version was checked with the original version [16]. Some changes in the statements 'range of motion' and 'recreational activities/sports' were made to confirm that the questionnaire was more understandable for Turkish speaking patients. The expression 'ounce' is not used in the Turkish language and so it was translated as 'gram'. 'Miniature golf' and 'boccia' are not widely played in Turkey so in that statement, only 'bowling' and 'frisbee' were provided. The word 'briefcase' was translated as 'çanta'; 'scrubbing pots and pans' was translated as 'tencere ya da tava ovma'; 'mowing the lawn' was translated as 'süpürme'; and 'intolerable' was translated as 'tamamen'. The patients understood these expressions more easily. This version was finalized after slight changes reached by consensus. The final Turkish version was tested and no further modifications were required.

Munich Shoulder Questionnaire

MSQ is a 30-item patient-reported survey. It includes 3 parts: introduction and the objective and subjective assessment sections. The first part consists of one page which is planned to collect demographic data about the patient and their shoulder. The second part is designed to assess the objective function/dysfunction (6 items). The initial 5 questions evaluate the shoulder range of motion: flexion, abduction, internal rotation, external rotation; and the range of the hand. Each question offers answers from 0 to 10 points, resulting in a total score ranging from a minimum of 0 to a maximum of 50 points (16% of the total MSQ). The sixth point refers to the power of the shoulder in 90° of abduction and 20° of quested to lift flexion. The patient is asked to carry the weight of an object of daily living, such as a 500-g water plastic bottle or bag. Then, the participant lifts the weight to the horizontal plane and keeps it for 5 seconds. This is repeated step by step with increasing weights until 12 kg. Each 500-g unit translates into 2 points, and the maximum number of points is 24 for this question (8% of the total MSQ). Altogether, the objective part overall score ranges from 0 to 74 points (24% of the total MSQ). The last part is planned for subjective functions (24 items). Six of the items relate to pain. There are 9 details concerning work and activities of daily living, 6 details referring to sports and recreation activities, and 3 details for the social and emotional quality of life. The outcomes of this section range from 0 to 240 points (76% of the total MSQ). Its raw score ranges from 0 to 314. For comparability, the raw numbers are divided by 314, giving a percentage ranging from 0% to 100%, with higher scores representing a better function of the shoulder in MSQ [18].

Disabilities of the Arm, Shoulder and Hand questionnaire

DASH is a 30-item self-report measure of disability (physical functioning) and symptoms related to musculoskeletal disorders of the upper limbs [19, 20]. Of these items, 21 refer

to physical function, 6 describe symptoms, and 3 concern social/role function. A 5-point Likert scale is used for each item, with 1 denoting no difficulty and 5 standing for extreme difficulty. The disability/symptom score is easily calculated because it is converted to a scale ranging from 0 (excellent) to 100 (worst). Higher scores indicate more disability. Work, sports, and art are scored separately [20].

Shoulder Pain and Disability Index

SPADI is a self-report index designed to evaluate pain and disability in cases with shoulder pain of musculoskeletal, neurogenic, or unsolved sources. It comprises 13 items and 2 parts: pain (5 items) and disability (8 items). A 10-cm visual analogue scale is used to rate each item. For the pain scale, 0 stands for no pain and 10 denotes the worst pain imaginable. Disability is scored between 0 (no difficulty) and 10 (very difficult). Patients sign activities as not applicable if they do not perform them (these are excluded from the total evaluation). At the end of the index, total scores are converted to a 0–100 scale. A higher SPADI score indicates more pain [21, 22].

Sample size justification

The sample size was determined on the basis of statistical power analysis procedures performed by using the PASS 2005 software (NCSS, Kaysville, UT, USA). With an assumption of 3 items for the smallest section, the expected Cronbach's alpha (CA) value of 0.70 or higher (H1: CA1 = 0.70), the acceptable reliability of at least 0.55 (H0: CA0 = 0.55), $\alpha = 5\%$, and $\beta = 20\%$, the estimated sample size was 146 participants. This number was increased by 20% and 180 patients were eligible to participate in the study.

Statistical analysis

In this study, we used the IBM SPSS Statistics ver. 23.0 for statistical analyses. We checked the missing values for each questionnaire before further analysis. To assess the internal consistency, the reliability of the objective and subjective sections of the MSQ, Cronbach's alpha coefficients were calculated. Values equal to or greater than 0.70 were considered acceptable [23, 24]. Test-retest reliability was assessed by the intra-class correlation coefficient (ICC), with values greater than 0.80 considered as perfect agreement. Responsiveness was examined by using the Wilcoxon signed-rank test between pre-treatment and post-treatment scores.

Convergent construct validity was assessed with Pearson's correlation coefficients of the MSQ section, and total scores were compared with those for the DASH and SPADI total scores. Pearson's correlation coefficients were interpreted as follows: excellent relationship: $|r| \geq 0.91$; good: $0.90 \geq |r| \geq 0.71$; fair: $0.70 \geq |r| \geq 0.51$; weak: $0.50 \geq |r| \geq 0.31$; little or none: $|r| \leq 0.30$. The *p*-value of 0.01 was assumed as the level of significance [25].

Ethical approval

The research related to human use has complied with all the relevant national regulations and institutional policies, has followed the tenets of the Declaration of Helsinki, and has been approved by the Hacettepe University Non-Interventional Clinical Research Ethics Committee (decision No.: HEK 12/224-13).

Informed consent

Informed consent has been obtained from all individuals included in this study.

Results

As shown in Table 1, the proportion of males and females in the study sample was almost equal. The mean age of the 180 patients was 44.3 ± 11.6 years (range: 24–65). Most of the participants were diagnosed with shoulder impingement syndrome (76.7%).

Table 1. Socio-demographic characteristics
of the study population (*n* = 180)

Characteristics	Descriptive statistics
Gender, male, *n* (%)	78 (43.3)
Age, years, mean ± *SD*	44.3 ± 11.6
Highest education years, mean ± *SD*	11.9 ± 2.8
Body mass index, kg/m², mean ± *SD*	27.6 ± 6.5
Diagnosis, *n* (%)	
Shoulder impingement syndrome	138 (76.7)
Rotator cuff tendonitis	22 (12.3)
Adhesive capsulitis	10 (5.5)
Supraspinatus tendonitis	10 (5.5)

Data quality

All eligible data of patients were accepted for the study. There were no missing values across the questionnaires of interest.

Reliability

Cronbach's alpha coefficients for the 2 sections of MSQ were as follows: 0.73 for the objective section, 0.96 for the subjective section. The alpha coefficients value varied between 0.74 and 0.92 across the subsections of the subjective section (Table 2).

Table 2. Cronbach's alpha coefficients of the objective
and subjective sections of the Munich Shoulder Questionnaire

Sections	Cronbach's alpha	95% CI
Objective section	0.73	0.67–0.79
Subjective section	0.96	0.95–0.97
Pain	0.77	0.71–0.82
Work and activities of daily living	0.92	0.90–0.94
Recreational activities and sports	0.91	0.88–0.93
Social life	0.74	0.66–0.80

Test-retest

MSQ test-retest reliability was evaluated by using ICC with 50 patients. The ICC values were as allows: 0.97 for the objective section, 0.94 for the subjective section, 0.91 for the total MSQ (Table 3). The ICC values varied between 0.84 and 0.95 across the MSQ subsections.

Table 3. MSQ test-retest reliability (*n* = 50)

MSQ sections	ICC	95% CI
Objective	0.97	0.94–0.98
Subjective	0.94	0.86–0.97
Total	0.91	0.84–0.95

MSQ – Munich Shoulder Questionnaire
ICC – intra-class correlation coefficient

Responsiveness

Responsiveness was assessed by the Wilcoxon signed-rank test with 30 patients. A significant difference between improvement scores in the comparison of pain and disability status of the patients before and after treatment was shown by using MSQ (Table 4).

Table 4. Responsiveness ($n = 30$)

MSQ sections	Before	After	t	p
	Mean ± *SD*	Mean ± *SD*		
Objective	44.7 ± 11.4	48.8 ± 8.2	–2.41	0.023
Subjective	131.0 ± 36.3	116.1 ± 19.1	2.59	0.015
Total	175.8 ± 28.6	164.9 ± 15.9	2.36	0.025

MSQ – Munich Shoulder Questionnaire

Convergent validity

Table 5 presents Pearson's correlation coefficients between the MSQ section scores and the DASH and SPADI total scores. All correlation coefficients were significant at the 0.001 level. Negative correlations were observed between the objective section score and the DASH and SPADI total scores. There were strong correlations between the subjective section score and the DASH and SPADI total scores. The MSQ total score was positively correlated with the DASH total score ($r = 0.70$; $p < 0.001$) and the SPADI total score ($r = 0.65$; $p < 0.001$).

Table 5. MSQ convergent validity
(Pearson's correlation coefficients)

MSQ sections	DASH total score		SPADI total score	
	r	p	r	p
Objective	–0.45	< 0.001	–0.52	< 0.001
Subjective	0.75	< 0.001	0.74	< 0.001
Total	0.70	< 0.001	0.65	< 0.001

MSQ – Munich Shoulder Questionnaire, DASH – Disabilities of the Arm, Shoulder and Hand questionnaire, SPADI – Shoulder Pain and Disability Index

Discussion

MSQ-Turkish is a valid and reliable method to evaluate pain, daily living activities, social life, and work life with subjective items. In addition, functional efficiency and mechanical characteristics of the musculoskeletal system like muscle strength and endurance are assessed with objective items. Conservative treatments, surgery, manual therapy such as mobilization and manipulation, steroid injections, and taping techniques are the preferred methods for the treatment of shoulder problems and functional inefficiency [1, 26]. Detailed examination of treatment success is related to the scope of the evaluation method. MSQ can be preferred during follow-up of the results of conservative, manipulative, and/or surgical treatment and clinical research.

In the literature, there are 8 valid and reliable Turkish surveys related to the shoulder problem [17]. However, we did not find any method to assess objective and subjective parameters in the same evaluation questionnaire in detail. MSQ is an integrated questionnaire that investigates all findings of shoulder dysfunction. As a result, the Turkish version of MSQ

was found a reliable, internally consistent, and valid patient-reported outcome in Turkish speaking patients with shoulder dysfunction. Also, it has no floor or ceiling effects. Currently, many scoring systems are eligible to evaluate function in patients with upper extremity (especially shoulder) dysfunction and pain, yet there is no consensus among researchers or clinicians about which questionnaire is the most appropriate [1]. The first disadvantage of many testing systems is the obligation of the patient's physical presence for evaluation. Secondly, many patient-reported outcomes give only one certain score, which leads to difficulties in comparing the results in the literature. Using several questionnaires to solve this problem decreases the patients' willingness to participate. For observing the effectiveness and long-term follow-up of the patient after different treatments, the measurements should test the true change interposed by the intervention. MSQ is an original instrument for self-assessment of shoulder dysfunction. It includes the quantitative assessment of the Constant shoulder score, SPADI, and DASH. While the Constant shoulder score mainly evaluates the objective function and the SPADI and DASH only focus on the subjective functions of the shoulder, MSQ includes both [18, 20, 21, 27]. DASH scale is too detailed and its completion takes too much time. Besides, in both DASH and SPADI tools, discrepancies have been spotted between the statements of the patients and the points they marked in visual analogue scale-type questions, which deteriorates their objectivity. MSQ requires no postural symmetry of the patient, and the use of photographs showing the particular positions of the shoulder makes the questionnaire practical and easy to use. Finally, MSQ would provide a comprehensive perspective for clinicians and researchers.

MSQ-Turkish was translated in accordance with international standardized guidelines and with psychometric properties that have been culturally adapted. As in the original MSQ, most of the patients were diagnosed with shoulder impingement syndrome in the MSQ-Turkish study. All available items were included. To our knowledge, among the validated, responsive, and culturally adapted Turkish shoulder-specific scoring systems, the study on MSQ-Turkish involved the largest sample size, which was also bigger than the MSQ developing study.

In the study on the Turkish version of SPADI, significant relationships between sub-items of SPADI pain-disability and DASH scores were shown [10]. Also, moderate correlations were found between DASH-Turkish and sub-items of the Short Form Health Survey SF-36 physical functioning and bodily pain. In the original MSQ, the comparison of the native and the calculated scores indicated a high degree of correlation for the Constant shoulder score, SPADI, and DASH [18]. Similarly, in this study, strong positive correlations were observed between the MSQ-Turkish total and subjective section scores and the DASH and SPADI total scores. There were negative correlations between the objective sections of MSQ-Turkish and DASH and SPADI. This is due to the increase in normal joint movement and muscle strength as a result of decreased pain and disability. These findings were expected since these scoring systems had been previously validated for shoulder functional status/disability. All outcomes show that MSQ items evaluate suitable psychometric properties. In addition, the substance of MSQ is appropriate for Turkish validation questionnaires in overhead athletes [15]. It can determine treatment effects with respect to shoulder dysfunction and support evaluation of return to sport.

As a result, MSQ includes objective (normal joint movement and muscle strength) and subjective (pain, daily life ac-

tivity, sport and leisure time activities) parameters in a single form to create the advantage in terms of ease of use and time gain. With these properties, MSQ may be preferred in patients with all shoulder dysfunctions during follow-up of the results of conservative, manipulative, and/or surgical treatment.

Conclusions

MSQ-Turkish enables evaluation of shoulder dysfunctions with objective and subjective sequences. It is recommended for clinicians and researchers. It can be preferred in randomized controlled trials long-term follow-up and in experimental studies referring to specific shoulder problems. MSQ-Turkish may be the best option in the assessment of shoulder dysfunction patients in Turkey.

Disclosure statement

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Conflict of interest

The authors state no conflict of interest.

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