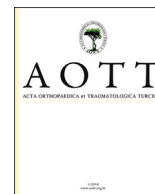




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Cross-cultural adaptation of Kerlan-Jobe Orthopaedic Clinic shoulder and elbow score: Reliability and validity in Turkish-speaking overhead athletes[☆]

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ABSTRACT

Objective: Kerlan-Jobe Orthopaedic Clinic Shoulder and Elbow Score (KJOC-SES) is a subjective assessment tool to measure functional status of the upper extremities in overhead athletes. The aim was to translate and culturally adapt the KJOC-SES and to evaluate the psychometric properties of the Turkish version (KJOC-SES-Tr) in overhead athletes.

Methods: The forward and back-translation method was followed. One hundred and twenty-three overhead athletes completed the KJOC-SES-Tr, the Disabilities of the Arm, Shoulder, and Hand (DASH), and the American Shoulder and Elbow Surgeons Evaluation Form (ASES). Participants were assigned to one of the following subgroups: asymptomatic (playing without pain) or symptomatic (playing with pain, or not playing due to pain). Internal consistency, reliability, construct validity, discriminant validity, and content validity of the KJOC-SES-Tr were tested.

Results: The test–retest reliability of the KJOC-SES-Tr was excellent with an interclass coefficient of 0.93. There was a strong correlation between the KJOC-SES-Tr and the DASH and the ASES, indicating that the construct validity was good for all participants. Results of the KJOC-SES-Tr significantly differed between different subgroups and categories of athletes. The floor and ceiling effects were acceptable for symptomatic athletes.

Conclusion: The KJOC-SES-Tr was shown to be valid, reliable tool to monitor the return to sports following injuries in athletes.

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Introduction

Overhead athletes are considered a specific group within the population of athletes, who have high demands on the upper extremities due to repetitive shoulder elevation and external rotation. A high incidence of sports-related shoulder and elbow injuries are documented in this group of athletes.^{1,2} Therefore, in order to screen accurately sportive performance and functional status, to monitor treatment and rehabilitation effectiveness, and to evaluate

return to the respective sport after injuries in overhead athletes, the self-reported outcome score should be adapted to the athletic demands. Clinically, the athletes often do not have restrictions in activities of daily life; however, they often notice the symptoms during high levels of athletic activity such as training or competitions.³

Recently, the Kerlan-Jobe Orthopaedic Clinic Shoulder and Elbow Score (KJOC-SES) has been designed specifically as a subjective assessment tool to measure functional status of the upper extremities in overhead athletes.³ The KJOC-SES has been developed and validated for English-speaking overhead athletes for the assessment of performance and function, and has been used to document treatment efficacy of various disorders in baseball players.³ Recently, the Italian and Korean version of the score has also validated.^{4,5} Research to date has investigated treatment outcomes in labral lesions, shoulder instabilities, and ulnar collateral ligament reconstruction in both professional and recreational athletes using the KJOC-SES.^{6–16} Although the KJOC-SES has been

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widely used in English-speaking populations, the original language of the questionnaire inherently makes it difficult to apply to the non-English populations. Subjective scoring systems, such as questionnaires, may be used in populations with languages other than the ones in which they were developed. Several health-related tools are currently available for the Turkish-speaking population; some are disease specific and others, as in the case of musculo-skeletal issues, are joint specific. Concerning shoulder and elbow issues, the Disabilities of the Arm, Shoulder and Hand (DASH) scoring system and the American Shoulder and Elbow Surgeons Evaluation Form (ASES) have previously been translated into Turkish and validated.^{17,18} However, these scales are only used for the general population and do not incorporate the specific needs of athletes.

There is a high demand for internationally adaptable and accessible self-reported scoring systems. Therefore, the primary aim of this study was to translate the KJOC-SES from English to Turkish to enable use of the questionnaires in Turkish overhead athletes. The secondary aim of this study was to examine the reliability and validity of the Turkish version of KJOC-SES (KJOC-SES-Tr).

Materials and methods

Participants

A total of 123 overhead athletes participated in this study. The eligibility criteria were (1) 18 years or older; (2) currently active or not playing sports due to arm trouble; (3) ability to read and write in Turkish. Each participating athlete was asked to check the category that best described their current self-reported functional status according to three subgroups: (1) playing without any arm trouble, (2) playing, but with arm trouble, or (3) not playing due to arm trouble.

All participants provided written informed consent. The study was approved by the Ethics Committee (GO 16/220-14).

Translation and cross-cultural adaptation

Translation and cross-cultural adaptation of the KJOC-SES was performed in five stages according to guidelines proposed by Beaton et al.¹⁹ In the first stage, two Turkish individuals; an informed and an uninformed translator, with a good command of the English language were responsible for the literal and conceptual translation of the KJOC-SES. The informed translator was a physical therapist, and the uninformed translator was a retired athlete. Both translators spoke Turkish as their mother tongue and English fluently. In the second stage, the translations were compared and reviewed by a bilingual individual who highlighted any conceptual errors or inconsistencies in the translations and established the first Turkish translation in a reconciliation meeting. In the third stage, two native English speakers with a good command of Turkish, who were unaware of the purpose of the study and had no access to the original English version, separately translated the finalized Turkish translation back to English. In the fourth stage, the back-translated version of the KJOC-SES-Tr was compared to the original English version of the KJOC-SES by a committee comprised of a methodologist, a language professional, and the four translators. The committee evaluated the four translations and finalized the KJOC-SES-Tr. In the final stage, preliminary testing was performed to determine comprehension of the Turkish version. Preliminary testing of the final version of the KJOC-SES-Tr was conducted in 12 overhead athletes in order to determine if the athletes had any difficulties understanding the questions.

The final version of the KJOC-SES-Tr was accepted and administered to a larger population to assess its validity and reliability. To investigate test–retest reliability, the athletes were asked to complete the KJOC-SES-Tr again 7 days after the first completion. To ensure that the repeated answers regarding upper extremity function remained stable, the participants were also asked, “Has your status changed since filling out the initial questionnaire?” during the second round. Only participants with no change in upper extremity functions during the time interval were included in the analysis.

In this study, construct validity of the KJOC-SES-Tr was tested by calculating the correlation between KJOC-SES-Tr scores and DASH and ASES scores. All questionnaires were administered to the athletes in random order. Additionally, structural validity, content validity, and discriminate validity were evaluated.

Instruments

The original KJOC-SES is a 10-item questionnaire, developed as a self-assessed patient-reported outcome measure.³ The KJOC-SES questionnaire includes questions on shoulder and elbow function during sportive performance, impairment, activity limitations, and participation restrictions. The KJOC-SES questionnaire contains a demographics cover sheet and the main questionnaire, including questions evaluated using a visual analogue scale (VAS) from 0 to 100 mm. The total score is calculated as an average of the total scores of the 10 questions. Higher scores are indicative of higher functional response.

Reference questionnaires had been previously translated to Turkish. The validated DASH scoring system^{17,20} and ASES Form¹⁸ were used. The DASH score was used to measure disability status of the upper extremities and is scored in two components: the disability/symptom section and the high performance sports module.²¹ Results were presented in the form of two total scores ranging from 0 to 100; higher scores indicate higher levels of disability. The ASES evaluates subjective shoulder pain and function/disability.²² The total ASES score is derived from a pain question using the VAS in addition to a 10-item function score. The ASES has two subscores; the pain score and the cumulative activities of daily living score that are weighted equally and combined for a total score. A score of 100 indicates good shoulder function.

Statistical analyses

A sample size estimation of 10 participants per item in the KJOC-SES-Tr was performed in accordance with previous suggestions.²³ Descriptive statistics are reported as mean, standard deviation, median, interquartile change, counts, and percentages. Statistical significance was set to $p < 0.05$. All analyses were performed using SPSS Statistics, version 21 software (IBM Corporation, Armonk, NY).

Cronbach's- α coefficients were calculated for internal consistency. A Cronbach's- α below 0.6 indicates poor internal consistency, values from 0.6 to 0.7 indicate reasonable consistency, and values from 0.7 to 0.95 are considered adequate consistency.²⁴

To determine test–retest reliability of the KJOC-SES-Tr, we calculated the intra-class correlation coefficients (ICCs) with corresponding 95% confidence intervals (CI) between scores of the first and second administration of the KJOC-SES-Tr. An ICC value of 0.4 or greater was considered satisfactory, and a correlation less than 0.2 was described as poor. A correlation greater than 0.6 was considered very good, and greater than 0.8 was considered excellent.²⁵ Furthermore, the 95% CI for the ICC and the standard-error-of-measurement (SEM) were calculated. Larger SEM values

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