



Research Paper:

Persian Translation and Cross-Cultural Adaptation of the Kerlan-Jobe Orthopaedic Clinic Shoulder and Elbow Score in Overhead Athletes



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Conflict of interest

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ABSTRACT

Background and Objectives: The Kerlan-Jobe Orthopaedic Clinic Shoulder and Elbow Score (KJOC-SES) is a reliable and sensitive tool used to measure the performance and function in overhead athletes with shoulder and elbow injuries. This study aimed to culturally adapt and validate the KJOC-SES questionnaire in the Persian language.

Materials and Methods: A total number of 341 healthy competitive overhead athletes took part in this cross-sectional study and completed the KJOC-SES questionnaire. To assess the reliability of the KJOC-SES, 41 professional volleyball players filled out the questionnaire at the baseline and after a 4-week interval, during the off-season. Also, we compared the scores of KJOC-SES with those of the sports/performing arts module of disabilities of the arm, shoulder, and hand and the 12-item short-form health survey to test the construct validity. Moreover, we investigated the internal consistency and the concurrent validity of all measures.

Results: The KJOC-SES was correlated with the sports/performing arts module of the disabilities of the arm, shoulder, and hand ($r=-0.559$, $P<0.001$), and the 12-item short-form health survey ($r=-0.505$, $P<0.001$). The KJOC-SES had an excellent internal consistency (the Cronbach alpha=0.92). Also, the intra-class correlation coefficients of test-retest reliability for the 10 items of KJOC-SES were excellent (ICC=0.82, $P<0.001$). The new score correctly stratified overhead athletes by the injury category ($P<0.001$).

Conclusion: The KJOC-SES is a valid and reliable tool for assessing the shoulder and elbow injuries in Iranian overhead athletes.

Keywords: Kerlan-Jobe, Shoulder, Elbow, Cross-cultural adaptation, Validation, Persian language



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↑ What is "already known" in this topic:

Self-reported questionnaire of Kerlan-Jobe Orthopaedic Clinic Shoulder and Elbow Score has more validity and reliability to measure the performance and function in overhead athletes with shoulder and elbow injury.

→ What this article adds:

Persian version of the KJOC-SES appeared to be a valid and reliable tool for assessing the shoulder and elbow injuries in Persian overhead athletes.

1. Introduction

The upper extremity, especially the shoulder, is the most common area of injury in athletes playing throwing and overhead sports, such as volleyball, handball, and water polo. About 59.5% of all shoulder injuries result from throwing and 73% of such injuries occur in pitchers [1]. Also, 28% of young throwers in throwing sports have reported a history of elbow pain [2]. Repetitive overhead throwing exerts a high valgus and the extension loads to the athlete's shoulder and elbow and often leads to acute or chronic injury, progressive structural change, and long-term problems, in overhead athletes [2]. These pressures gradually reduce the elasticity of static stabilizers. At the onset of the lesion, dynamic stabilizers can compensate for these mild instabilities by increasing the muscle activity. But, over time, the structures are damaged, and the system becomes overburdened [3].

In recent years, the use of validated tools has been growing to evaluate treatment outcomes in clinical trials [4]. Studies have shown that self-reported measurements have more validity and reliability than objective measures [5-7]. The most important criterion for measuring treatment outcomes from the patient's point of view is to achieve a preinjury functional level when returning to activity. Thus, patients can judge their performance better than anyone. In recent years, research has increasingly used patient-reported outcomes. The performance of throwing and overhead athletes is evaluated with commonly used functional outcome measurement tools, such as the American shoulder and elbow surgeons questionnaire; the Mayo elbow performance score; and the Disabilities of the Arm, Shoulder, and Hand (DASH) [8]. Other previously known performance assessment tools include the Conway-Jobe scale and the Timmerman-Andrews score [8-13].

Alberta et al. [14] developed a self-reported questionnaire for Kerlan-Jobe Orthopaedic Clinic Shoulder and Elbow Score (KJOC-SES) to measure the performance and function in overhead athletes with shoulder and elbow injury. This tool accurately assesses an athlete after injury, treatment, or surgery and provides a performance-based outcome measure in this high-demand population. Alberta et al. used the DASH and sports/performing arts module of DASH (DASH-S) questionnaires as valid tools to self-reportedly assess the total upper extremity in athletes. One feature of the KJOC-SES questionnaire is that it screens the athletes for the severity of the injury. This questionnaire can be used in different populations

of professional, academic, and recreational athletes [14]. This study aimed to carry out a cross-cultural adaptation and validation of the KJOC-SES questionnaire in Persian and assess its reliability and validity. Moreover, DASH-S and the 12-item short-form health survey (SF-12) questionnaires were used to determine the criterion and construct validity of this questionnaire, respectively.

2. Materials and Methods

Research design

This cross-sectional constructive study was carried out during the athletes' rest season, between June and August 2017. Using a non-probability convenient sampling method, the samples were selected from the clubs and sports centers in Tehran, Qazvin, and Zanjan provinces, Iran to represent the appropriate population. We evaluated available throwing and overhead athletes working in volleyball, handball, and water polo. Also, the inclusion criteria were being literate; playing at the levels of a national club, university, or high school; and giving informed consent to participate in the study [14]. The exclusion criteria were the reluctance of athletes to participate or remain in the study; the occurrence of a new injury at test-retest reliability interval; the incomplete answering of the questionnaire; the history of surgery in the shoulder girdle or elbows; the history of fractures in the shoulder girdle or elbows; the history of intra-articular injections, seizures, or cognitive disorders that prevent a valid consent or objective/subjective evaluation; and a significant obstruction that prevents competition because of injury [14]. The appropriate sample size was estimated as 20, using the formula of the ratio of the number of samples to the number of variables [15]. In this study, this ratio was calculated based on 24. Therefore, given the number of 14 variables, the number of sufficient samples was 336. Finally, a total of 341 samples were selected from the available throwing and overhead athletes working in volleyball, handball, and water polo sports; the athletes were entered the study after making sure they were active in the sport.

Translation process

Initially, we contacted the constructor group of the questionnaire and gained permission for cross-cultural adaptation and validation of the Persian version of KJOC-SES. Then, the translation stages were carried out based on the translation method used by the American Committee of Orthopedic Surgeons [16]:

Forward translation: Two native Persian-speaking translators with 20 years of experience translated the original version of the KJOC-SES questionnaire into Persian. The emphasis was on conceptual equivalence, not a literal translation. Also, the words and terms were chosen in a manner to make the questionnaire intelligible to anyone with the ability to read and write.

Synthesis: The outcome of each translation was reviewed and merged, in a panel, including the research team and the translators. Eventually, a final version referred to as the “synthesized translation” was obtained.

Backward translation: The synthesized version was translated back into English (backward translation) by two native English-speaking translators, who were blinded to the original version of the questionnaire. Again, the backward-translated versions were translated back into Persian, in a meeting attended by the research team.

The research team and two translators compared the backward translation with the original version of the questionnaire. However, the translated version did not significantly differ from the original version. Then, the translated version was sent to the constructor of the questionnaire. Subsequently, the constructor confirmed that the translated version was conceptually consistent with what the constructor intended, and the Persian version could be used to assess the problem.

Content/Face validity

The final Persian version was given to a selected sample group of 20 throwing and overhead athletes to evaluate its possible defects, including inappropriate phrasing, unsuitable words, ambiguity or difficulty to understand the content, and time to complete the questionnaires. Then, the defects in the Persian version were corrected. In this stage, the participants were different from those taking part in the validity and reliability testing of the questionnaire. Also, the questionnaire was distributed among 20 faculty members with the experience of working with athletes, in the departments of Physical Therapy and Physical Education. Besides, we examined the fluency of the text, the order of questions, the concept of questions and answers, and the degree of conformity with Iranian culture. The results obtained at this stage were quantitatively reported for content validity, using the Content Validity Ratio (CVR) and Content Validity Index (CVI).

Construct/Criterion validity and internal consistency (reliability)

We visited the clubs and sports centers in the absence of competitions and asked the athletes to sign a consent form and participate in the study. Then, the Persian version of the KJOC-SES, DASH-S, and SF-12 questionnaires were distributed among them. They were asked to carefully answer the questions and respond to all of the questions. Out of 385 questionnaires distributed among athletes, 341 were completed and returned to the researcher. Also, demographic information was recorded through the KJOC-SES questionnaire. We calculated the correlation between the scores of KJOC-SES and DASH-S to assess the criterion validity. Moreover, exploratory and confirmatory factor analyses were used to evaluate the construct validity. To investigate the discriminant validity, we compared the overall score of the questionnaire in several groups, including healthy, inactive/active athletes, passive athletes, healthy and injured athletes, and athletes with eleven or fewer years of experience. The reliability of the questionnaire was determined by measuring internal consistency and test-retest reliability.

Statistical analysis

The SPSS V. 24 was used to analyze the data. The Kolmogorov-Smirnov test was used to assess the distribution of quantitative variables. In all statistical analyses, the significance level was set at $P < 0.05$. The CVI and CVR coefficients were used to quantitatively assess content validity. Also, the Waltz and Bausell method was used to evaluate the CVI. The CVI index of lower than 0.79 was omitted because the minimum acceptable value for the CVI index is 0.79. To determine the CVR, experts were asked to examine each question on a three-part range of “necessary”, “useful but not necessary”, and “not necessary”. Then, the answers were calculated based on the following formula: $CVR = (N_e - N/2) / (N/2)$.

The internal consistency and test-retest reliability of the questionnaire were measured using the Cronbach alpha coefficient and the relative reliability index (ICC). Also, the Pearson correlation coefficient was used to determine the criterion validity. The Kaiser-Meyer-Olkin test and the Bartlett test were used to find out the construct validity, and ANOVA was used to determine the discriminant validity.

3. Results

Out of 385 questionnaires that were distributed among athletes doing volleyball, handball, and water polo sports, 341 questionnaires were completed and the re-

Table 1. Demographic characteristics of the participants (N=341)

| Variable | | No. (%) |
|-------------------|---|-----------|
| Gender | Female | 298 (86) |
| | Male | 45 (13) |
| Dominant hand | Right | 288 (84) |
| | Left | 27 (8) |
| | Both | 26 (8) |
| Sports | Volleyball | 273 (80) |
| | Female | 273 (100) |
| | Male | 0 (0) |
| | Handball | 52 (15) |
| | Female | 23 (42) |
| | Male | 29 (58) |
| | Water polo | 16 (5) |
| | Female | 0 (0) |
| | Male | 16 (100) |
| | Professional athletic experience (year) | ≤ 11 |
| Female | | 34 (64) |
| Male | | 19 (36) |
| ≥ 10 | | 288 (100) |
| Female | | 262 (91) |
| Male | | 26 (9) |
| Competitive level | National | 124 (36) |
| | Female | 81 (65) |
| | Male | 43 (35) |
| | Club | 207 (61) |
| | Female | 205 (99) |
| | Male | 2 (1) |
| | Academic/High school | 10 (3) |
| | Female | 10 (100) |
| Male | 0 (0) | |

sults were used in the study. Out of 341 athletes (Mean±SD age: 18.93±5.30 year; age range: 13-42 year), 45 were men (Mean±SD age: 25.18±5.76 years; age range: 17-37 year) and 296 were women (Mean±SD age: 17.98±4.53 year; age range: 13-42 year). Tables 1 and 2 report the demographic characteristics and clinical features of the participants, respectively.

Face validity assessment

After asking the samples, it turned out that in response to question 5 of the injury history section the word “therapy” conceptually needed to be rewritten, hence, it was changed to “therapy/rehabilitation”. Also, in the physical performance section, the question “How difficult is it for you to warm-up and relax before a race or practice?” was changed to “How long does it take for your body to warm-up before the match or practice?” In answer to question 4 in the section of physical performance, the statement “It usually dislocates with a pop sound” was changed to “I have instability”. Also, in question seven of the level of competition section, the sentence “I have lost my power completely and I have become a runner and a delicate athlete” changed to “I have lost my power completely and have become a fitness athlete”.

Content validity assessment

According to the descriptive indexes of KJOC-SES, DASH-S, SF-12, and Visual Analog Scale (VAS) for 341 athletes, the minimum acceptable CVR is 0.42, based on the number of specialists. In this study, the CVR of all questions was greater than 0.42. Also, the CVI of all questions was greater than 0.79, indicating that the questions in the Persian version of the KJOC-SES prospectus were appropriate; Table 3 shows the results. Based on the results, all questions met the three conditions of “relevance”, “simplicity”, and “clarity” and they were also necessary.

Construct/Criterion validity and internal consistency (reliability)

In this study, a Cronbach alpha coefficient of 0.92 was found to measure the internal consistency of the questions in KJOC-SES. Also, the correlation between each question’s score and the total score of KJOC-SES was between 0.518 (question 1) and 0.828 (question 9). Table 4 presents the correlation coefficients between KJOC-SES and the 10 questions of the questionnaire. The results showed a significant relationship between the 10 questions and the KJOC-SES questionnaire. However, question one showed a moderate correlation with the questionnaire; this may result from the content of this question about “warming up before exercise”.

Also, deleting any question from KJOC-SES did not significantly affect the Cronbach alpha coefficient, indicating a high correlation between the questions of KJOC-SES. To test the test-retest reliability, we used the correlation coefficients of the ICC and absolute reliability index (SEM), which were 0.82 and 8.54, respectively. According to the results, the ICC has a very good level. Also, the SEM was less than 10% of the maximum score obtained from KJOC-SES and had a very good level. To calculate the validity of KJOC-SES, we investigated three validity aspects, including criterion validity, construct validity, and discriminant validity. The scores of the Persian version of KJOC-SES were compared with those of the Persian version of DASH-S to evaluate the criterion validity. The Pearson correlation coefficient of 0.55 was obtained between these two questionnaires ($P<0.001$). Therefore, there was a negative and moderate correlation between the KJOC-SES and DASH-S questionnaires. On the other hand, the SF-12 questionnaire, exploratory factor analysis, and confirmatory factor analysis were used to assess the validity of the study structure and determine the components of the KJOC-SES questionnaire. To evaluate the construct validity, we compared the scores of the Persian version of KJOC-SES with those of the Persian version of SF-12. The correlation between these two questionnaires was obtained using the Pearson correlation coefficient ($P<0.001$). According to the results, there was a moderate correlation between the KJOC-SES and SF-12 questionnaires. The Pearson correlation coefficients of 0.487 and 0.570 were obtained between the Persian version of KJOC-SES and the physical and mental health subscales of the SF-12, respectively. Thus, the mental health subscale of SF-12 is more strongly correlated with KJOC-SES.

Next, we used the Kaiser-Meyer-Olkin test to find out the adequacy of sampling in factor analysis. The Kaiser-Meyer-Olkin test index was 0.98, indicating the appropriate sampling rate. Therefore, the data were suitable for factor analysis. Also, the Bartlett test was used to determine the correlation between the studied items. The results were significant ($P=0.001$). A significance level of less than 0.05 in the Bartlett test rejects the assumption that the correlation matrix is known. To evaluate the discriminant validity, we compared the total scores of KJOC-SES in three groups of athletes, based on the injury history, including playing without pain, playing with pain, and not playing because of pain. The results of ANOVA showed a significant difference ($P=0.0001$, $t=47.806$) between the three groups in the mean scores of KJOC-SES (Table 5).

Table 2. Clinical features of the participants (N=341)

| Clinical Variable | | No. (%) |
|----------------------|---------------------------------|----------|
| History of injury | With injury | 90 (26) |
| | Without injury | 251 (74) |
| History of treatment | With a history of treatment | 90 (26) |
| | Rest | 52 (58) |
| | Surgery | 5 (6) |
| | Rehabilitation | 20 (22) |
| | Rest + rehabilitation | 12 (13) |
| | Rest + surgery + rehabilitation | 1 (1) |
| | Without a history of treatment | 251 (74) |

Table 3. Relative Content Validity (CVR) and Content Validity Index (CVI) of the KJOC-SES Questionnaire

| Questions | CVR | CVI |
|-----------|-----|------|
| Q1 | 0.8 | 0.85 |
| Q2 | 1 | 0.94 |
| Q3 | 0.8 | 0.92 |
| Q4 | 0.8 | 0.90 |
| Q5 | 0.8 | 0.88 |
| Q6 | 0.9 | 0.96 |
| Q7 | 0.8 | 0.98 |
| Q8 | 0.8 | 0.93 |
| Q9 | 0.8 | 0.97 |
| Q10 | 0.8 | 0.94 |

4. Discussion

The present study performed the process of the translation and cultural adaptation of the KJOC-SES questionnaire into Persian, based on the translation method used by the American Orthopedic Surgeons Association Performance Committee. Also, the Persian version of this questionnaire was produced, considering the retention of the content. The validity and reliability of the Persian version of KJOC-SES were also evaluated. Moreover, To match the questionnaire with Iranian culture, some words were removed from the

original questionnaire and some were added. Eventually, some sentences were changed to make them clearer.

In response to question five from the field of physical function, the term “scholarship cancellation” was omitted, because scholarship is not a common term in Iranian culture. Similarly, in the Korean version, the term “cancellation of scholarship” was changed to “not well-treated arm injury”. Also, in response to question seven, the term “runner athlete” was omitted from the field of competition. In response to question 5 of the injury history, the word “rehabilitation” was added to the word “therapy”. Also, to

Table 4. Correlation Between KJOC-SES and Ten questions

| Questions | Correlation Coefficient (r) With KJOC-SES | P |
|-----------|---|-------|
| Q1 | 0.518 | 0.001 |
| Q2 | 0.761 | 0.001 |
| Q3 | 0.805 | 0.001 |
| Q4 | 0.776 | 0.001 |
| Q5 | 0.770 | 0.001 |
| Q6 | 0.823 | 0.004 |
| Q7 | 0.814 | 0.001 |
| Q8 | 0.801 | 0.001 |
| Q9 | 0.828 | 0.001 |
| Q10 | 0.767 | 0.001 |

Table 5. Comparison of the mean scores among the three groups with ANOVA

| Mean Comparison | Sum of Squares | Degrees of Freedom | Average of Squares | F | P |
|-----------------|----------------|--------------------|--------------------|--------|-------|
| Intergroup | 32097.013 | 3 | 10699.004 | 47.806 | 0.001 |
| Intragroup | 75197.661 | 336 | 223.803 | | |
| Total | 107294.674 | 339 | | | |

explain the word instability in question four of the field of physical functioning, the phrase “looseness, rattling, dislocation” was added after this word. In the trial run, several athletes had trouble marking the X on the horizontal line, so we added the numbers of 0 to 10 below the horizontal line to increase the perception of responsiveness. During the second run of the new Persian version of KJOC-SES, no explanation was needed to clarify the meaning of the questions. However, the actual scale might have been ignored or exaggerated, because respondents could only answer with cardinal numbers (not decimal numbers) when marking the horizontal line. In this case, our study was similar to the Korean version. Besides, some terms were changed for cultural adaptation. In describing the level of competition in the current sports, the term “Major/Minor League” was changed to “National Team, Hope Team, Premier League, League One, League Two, and League Three”. In the Korean [17] and Italian [18] versions, the terms were changed according to regional characteristics. Also, the whole sentence of question one, i.e. “How long does it take for your body to warm up before the race?” was changed, and in response to question four in the terms of physical performance, the phrase “popping out routinely” was

changed to “I have instability”. In the present study, we obtained the results of internal consistency in the total scores as well as the elimination of each desirable and acceptable question.

The overall Cronbach alpha coefficient of the questionnaire was 0.92, which is higher than that of the original English version of KJOC-SES (0.88) [1], and somewhat similar to the Italian version (0.91) [18] and the Korean version (0.917-0.966) [17]. Also, the correlation between the score of each question and the total score of KJOC-SES was between 0.518 (question 1) to 0.828 (question 9), indicating a high correlation between the Cronbach alpha coefficients. Question one (How long does it take for your body to warm up before the race?) had the least correlation, while question nine (due to the arm problem, your control of throws, services, kicks, and more) had the highest correlation. Question one is about warming up and preparation, thus it is relatively less affected by injury conditions and more dependent on factors, such as daily physical conditions. This may be the cause of the moderate correlation of the question one. In the English version of KJOC-SES [1], all questions (except questions 1 and 5) showed a strong correlation. Therefore,

KJOC-SES has a high internal consistency and each question is consistent with the whole questionnaire.

The results of this study showed that the Persian version of the KJOC-SES questionnaire was valid. Besides, this questionnaire has a significant correlation with DASH-S [19]. The Persian version of KJOC-SES showed a moderate negative correlation with DASH-S. Hence, the correlation between KJOC-SES and DASH-S was not similar to the original [1] and Italian [18] versions. This difference may be attributed to the changes due to the cultural adaptations of the Persian version and the differences in the sports field of the used samples. Also, KJOC-SES was more strongly correlated with the mental health subscale of SF-12, compared with the physical health subscale. Therefore, the KJOC-SES questionnaire includes the psychological feature in addition to the physical aspects. That is, the athletes with a higher total KJOC-SES had greater mental health.

The present study also measured the correlation between the KJOC-SES questionnaire score and VAS to assess the criterion and construct validity. The results showed a strong correlation between these two scales. Thus, athletes with a lower total KJOC-SES have reported more pain on the VAS scale. The better the athlete's shoulder and elbow, the less pain reported by the athlete. The KJOC-SES questionnaire has high discriminatory validity and can accurately classify the athletes, based on the history of injury, specialized activity, and VAS score. This study assumed that the percentage of KJOC-SES is higher in healthy athletes with less than or equal to 10 years of experience than in athletes with more than 11 years of injury. The results showed that KJOC-SES can classify the athletes with different severity of the injury, pain, and athletic backgrounds, with quite different mean scores, in all intergroup comparisons. The results of this study are similar to those of the original version [1] and the study of Weimar et al. [20].

This study has some limitations, such as the low number of volunteer athletes in a particular field, with the specific gender needed to take the test and retest. Besides, most of the throwing and overhead athletes evaluated in this study were from volleyball, owing to the lower prevalence of baseball in Iran, compared with the United States. Also, we did not study the responsiveness of the KJOC-SES questionnaire in a prospective cohort study of a specific sport disorder. Therefore, an accountability study is needed to show the impact of a particular treatment after a specific period.

5. Conclusion

This study prepared the Persian version of the KJOC-SES questionnaire, using standard and systematic methods. Answering a questionnaire is easy for patients and requires a short time. There was no significant problem during translation. The Persian version of the KJOC-SES questionnaire has high validity and reliability in accordance with Iranian culture. Thus, it is a suitable tool for the evaluation of the shoulder and elbow performance in throwing and overhead athletes.

Ethical Considerations

Compliance with ethical guidelines

The study was approved by the Research Committee of the Iran University of Medical science (IR.iu.ms.fmd.rec_1396.9211452206).

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Authors' contributions

Data collection and drafting the article: Samineh Moarref; The design of the study, interpretation of data, final approval of the version to be submitted: Shohreh Noorizadeh Dehkordi; Technical support and supervision for collecting data: Mohammad Akbari; Data analyzing and drafting the article: Najmeh Sedighimehr; Reading and approving the final version of the manuscript: All authors.

Conflict of interest

The authors declared no conflict of interest.

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ترجمه‌ی فارسی و بومی‌سازی پرسشنامه‌ی کلینیک ارتوپدی کرلن-جاب در ورزشکاران رشته‌های پرتابی و بالای‌سر

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چکیده

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مقدمه: پرسشنامه کلینیک ارتوپدی شانه و آرنج کرلن-جاب (KJOC-SES)، یک ابزار قابل اعتماد و حساس برای ارزیابی عملکرد ورزشکاران رشته‌های پرتابی و بالای‌سر با آسیب شانه یا آرنج است. هدف از این مطالعه، ترجمه و تطابق فرهنگی پرسشنامه‌ی آرنج کرلن-جاب به زبان فارسی و بررسی روایی و پایایی نسخه‌ی فارسی آن در ورزشکاران رشته‌های پرتابی و بالای‌سر است.

مواد و روش‌ها: در این مطالعه، ۳۴۱ ورزشکار سالم و فعال رشته‌های پرتابی و بالای‌سر، پرسشنامه آرنج کرلن-جاب را تکمیل کردند. برای بررسی پایایی این پرسشنامه، از ۴۱ بازیکن حرفه‌ای والیبال که در دوره خارج از فصل بازی قرار داشتند، خواسته شد که پرسشنامه را در ابتدای مطالعه و چهار هفته پس از آن، تکمیل کنند. برای بررسی روایی ساختاری پرسشنامه، نمره کل پرسشنامه آرنج کرلن-جاب، با نمره نسخه فارسی پرسشنامه‌های معیار نهایی ناتوانی‌های بازو، شانه و دست (DASH) و نسخه کوتاه-۱۲ (SF-۱۲) مقایسه شد.

یافته‌ها: نتایج این مطالعه نشان داد که نسخه فارسی پرسشنامه آرنج کرلن-جاب با پرسشنامه‌های DASH-S ($r=0/955$; $P<0/001$) و SF-۱۲ ($r=0/505$; $P<0/001$) همبستگی دارد. همخوانی درونی این پرسشنامه نیز عالی بود ($\text{Cronbach's } \alpha: 0/92$) و ضریب همبستگی درون گروهی در پایایی آزمون-باز آزمون برای ده سوال پرسشنامه آرنج کرلن-جاب و برای نمره کل آن عالی بود ($P<0/001$); همچنین این پرسشنامه به‌درستی ورزشکاران را بر اساس آسیب دسته‌بندی کرد ($P<0/001$).

نتیجه‌گیری: با توجه به نتایج به‌دست آمده می‌توان گفت که نسخه فارسی پرسشنامه آرنج کرلن-جاب می‌تواند به‌عنوان یک ابزار پایا و روا در ارزیابی آسیب‌های ناحیه شانه و آرنج ورزشکاران رشته‌های پرتابی و بالای‌سر در ایران مورد استفاده قرار گیرد.

کلیدواژه‌ها:

پرسشنامه KJOC-SES، کرلن-جاب، پایایی و روایی، تطابق فرهنگی، زبان فارسی

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