ARTICLE | OPEN ACCESS

Medical Science

Authors' Affiliation:
[1]Physical therapist, Sabya General Hospital, Jazan, Saudi Arabia
[2]Department of Physical Therapy, College of Applied Medical Sciences, Taif University, Taif, Saudi Arabia
[3]Department of Biomechanics, Faculty of Physical Therapy, Cairo University, Cairo, Egypt

[*]Corresponding Author
Department of Physical Therapy, College of Applied Medical Sciences, Taif University, Taif,
Saudi Arabia
Email: f.alshehri@tu.edu.sa
ORCID: 0000-0001-7031-1996

Contact List
Abdulrahman M Hakami   ahakami16@moh.gov.sa
Fahad H Alshehri   f.alshehri@tu.edu.sa
Hosam Alzahrani   halzahrani@tu.edu.sa
Rania Almeheyawi   ralmeheyawi@tu.edu.sa
Ibrahim Saeed Aljulaymi i.aljulaymi@tu.edu.sa
Hatem H Allam   Hatem.lamiaa@gmail.com
Lamia K Elsayyad   Dr.elsayyadlamiaa@gmail.com
Marwa M Eid   m.eid@tu.edu.sa

ORCID List
Abdulrahman M Hakami   0000-0003-4154-2140
Fahad H Alshehri   0000-0001-7031-1996
Hosam Alzahrani   0000-0002-4383-115X
Rania Almeheyawi   0000-0003-0984-1749
Ibrahim Saeed Aljulaymi 0009-0007-1313-7128
Hatem H Allam   0000-0002-0802-8062
Lamia K Elsayyad   0000-0003-4710-8775
Marwa M Eid   0000-0002-2703-6033

DISCOVERY
SCIENTIFIC SOCIETY

Cross-cultural adaptation, validity, and reliability of the Arabic version of the shoulder disability questionnaire

Abdulrahman M Hakami[1], **Fahad H Alshehri**[2*], **Hosam Alzahrani**[2], **Rania Almeheyawi**[2], **Ibrahim S Aljulaymi**[2], **Hatem H Allam**[2], **Lamia K Elsayyad**[3], **Marwa M Eid**[2]

ABSTRACT

Background: Following low back and knee discomfort, shoulder pain (SP) is the third most common musculoskeletal problem, with an estimated global prevalence of 1.0%–4.8%. The (Shoulder Disability Questionnaire (SDQ)) is used to investigate pain in patients with shoulder- related disabilities, and it represents a promising psychometric property but has no Arabic version. *Aim:* To implement a cross-cultural approach to create an Arabic version of the SDQ and evaluate its psychometric properties in patients with nonspecific SP. *Methods:* 231 people were diagnosed with nonspecific SP. They completed the SDQ-Arabic, which was translated using global standards. The structural validity (Exploratory Factor Analysis (EFA)), reliability (internal consistency (Cronbach alpha)), and (intraclass correlation coefficients (ICC)) were assessed. *Results:* Using EFA, the involvement psychosocial component and activity subscale were also identified. The existence of internal consistency was supported by the results of subscales 1 and 2 (α=0.960 and 0.950), respectively, with (α= 0.977) as a total score. The construct validity was satisfactory, and the test was applicable (EFA>0.4). *Conclusions:* This study provides clinicians with an Arabic version of the SDQ that has been successfully adapted. The SDQ-Arabic tool is valid for patients with shoulder-related disabilities with non-specific SP assessment.

Keywords: Disability, Shoulder Pain, Validity, Reliability, Cross-Cultural Adaptation

1. INTRODUCTION

According to its presentation in primary care, (shoulder pain (SP)) is considered the third most common musculoskeletal pain after low back and knee pain, with an estimated global prevalence ranging between 1.0% and 4.8% (median 2.4%)

(Lucas et al., 2022). This tends to be higher in women than men and higher in high-income nations than in upper-middle-income, lower-middle-income, and low-income countries (Lucas et al., 2022). Moreover, many physical factors, such as heavy lifting loads, tedious movements in challenging positions, and vibrations, affect the range of symptoms and disabilities (Charles et al., 2018). The etiology of SP includes pathologies from many origins, such as the neck, glenohumeral joint, acromioclavicular joint, rotator cuff, and other soft tissues near the shoulder girdle (Linaker and Walker-Bone, 2015). The rotator cuff is the most common source of SP, accounting for more than two-thirds of all cases (Naunton et al., 2020). Patients are diagnosed with nonspecific SP when they experience pain of unknown cause or are not consequent to a clear structural, pathoanatomic, or pathophysiological origin (Liu et al., 2022). If the symptoms of SP and its complications persist for > six months, the patient can be diagnosed with chronic SP (Thapa et al., 2016).

Shoulder pain can obstruct the quality of life owing to functional disabilities. Which complicates daily work, social activities, sleep, and autonomy. Consequently, it may contribute to the development of psychological problems such as depression, anxiety, and pain catastrophizing, which are known to influence pain experiences and disability levels (Den-Boer et al., 2022; Oh and Lee, 2022). Many questionnaires were developed to investigate the disabilities of patients with SP, including the (Shoulder Disability Questionnaire (SDQ)) (Croft et al., 1994). The SDQ evaluates functional limitations and contains 22 items taken from the Sickness Impact Profile, classified into 14 categories used to measure disabilities in patients with SP. The SDQ items related to activities are essential for patients, physiotherapists, physicians, and psychologists (Hall et al., 2019; Monticone et al., 2019). The SDQ categories describe activity and participation impairments and the range of shoulder limitations.

The SDQ is a practical measure, as it is easy to administer and score and is widely used in primary care (Thoomes-de-Graaf et al., 2016). The SDQ is designed to cover many conditions, including SP, adhesive capsulitis, variously sized rotator cuff tears, and chronic nonspecific SP patients (Hall et al., 2019; Monticone et al., 2019; Thoomes-de-Graaf et al., 2016). The responsiveness of the SDQ has been previously described in a comparatively homogeneous population of patients (Desai et al., 2010; Monticone et al., 2019). Based on previous literature, many international versions of the SDQ are available and have been validated, including the Turkish Ozsahin et al., (2008), Korean Choi et al., (2015), Spanish Alvarez-Nemegyei et al., (2005), and Italian Monticone et al., (2019) versions. Currently, there is no Arabic version available. Because psychometric properties are influenced by social, environmental, and clinical aspects, they must be evaluated prior to utilizing the SDQ in Arabian patients (Monticone et al., 2019). Thus, this study aimed to design an Arabic version of the SDQ cross-culturally and examine its psychometric properties in patients with nonspecific SP.

2. MATERIALS AND METHODS

Study Settings and Participants

The questionnaire was sent to 231 patients with nonspecific SP from different regions of Saudi Arabia using an electronic method (WhatsApp). Individuals diagnosed with nonspecific SP who were 18 years of age or older included in the study. On the other hand, participants were excluded if they were diagnosed with specific SP, frozen shoulder, shoulder instability, and SP because of cervical problems or cognitive impairment. An informed consent form was created and signed by the participants.

Shoulder Disability Questionnaire

The 22 items of the SDQ inquire about symptoms related to SP during the last 24 hours and evaluate restrictions in daily activities, including physical, emotional, and social aspects. The final score is calculated by summating the 22 items and lies in the range (0–22). As the final score increases, the level of disability increases and vice versa (Thoomes-de-Graaf et al., 2018).

Translation and Cross-Cultural Adaptation

According to international guidelines, the SDQ was cross-culturally adapted into Arabic to confirm content consistency and ensure validity between the original and Saudi Arabian versions. The SDQ was forward-translated from English into Arabic, considering the meaning of the original questionnaire. Two translators independently translated the original questionnaire. The first translator was a linguistics professor unfamiliar with the scale, and the second was a physical therapist in private practice. The translators tried to utilize language that was suitable for the patient's reading level, culture, and age. The two translators worked together to settle complex terms. Two multilingual, fluent English speakers completed a reverse translation of the original questionnaire to ensure that

the Arabic version was compatible with the original design. To avoid information bias, the two translators had different medical backgrounds and were aware of the explored concepts.

A bilingual group of four translators reviewed both the forward and backward versions. The committee addressed potential questions and answers. They also took into account the conceptual equivalents of the two versions. The completed questionnaire was randomly distributed to a subset of patients who met the inclusion and exclusion criteria to ensure that it appropriately reflected each item's intended meaning and potential replies. Patients were requested to complete the survey via WhatsApp before each subsequent therapy session, with the exception of the initial visit. Each and every patient marked items whose meaning was unclear or confused. The committee of experts revised and re-evaluated all items. At the end of this step, the version was named the SDQ-Arabic.

Statistical Analysis

Descriptive statistics comprised the mean, median, and standard deviation (SD) for interval variables. When we discuss the survey's acceptability, we mean the amount of time required to complete it. Parallel Analysis (PA) was conducted using Factor software (Version 10.9.02 for Windows, Tarragona) prior to doing exploratory factor analysis (EFA) using Mplus program (version 6.0). This was done to estimate the approximate number of questionnaire subscales that needed to be collected. The relative importance of each item on the aforementioned subscales was assessed using the ordinal data from Muthen & Muthen (Los Angeles, CA; 1998–2010). Next, the structural validity was evaluated.

Reliability Assessment

A measure of a questionnaire's internal consistency can be found by evaluating its reliability or how effectively each question covers various elements of an overall concept. As per Vanti et al., (2013), we assess the questionnaire using Cronbach alpha (α). Reliability analyses were done on each subscale following the factor analysis identification of them.

Construct Validity Assessment

Using hypothesis testing, the concept validity was assessed. Different hypotheses were developed for each subscale. A factor analysis was performed to assess the internal structure of the scale. With this approach, we may see if we can narrow down on a few variables that best capture the connections between the original components. If only one element accurately summarizes every item, the overall score—which is the sum of all item scores—may represent satisfaction. If, conversely, more elements are needed, each relating to a distinct aspect of the satisfaction itself (e.g., satisfaction with the therapy itself vs. satisfaction with the environment in which the therapy is obtained), then it can be assumed that satisfaction is a complicated concept. The total score was divided into more detailed components (subtotals) (Vanti et al., 2013).

3. RESULTS

Participants Characteristics

In total, 231 participants completed the SDQ-Arabic. The mean age of the participants was 29.53±8.846. Of them, 198 were male (85.7%) and 33 were female (14.3%) (Figure 1). Among the participants, 41.99% were from Central Saudi Arabia. 38.1 Of the participants, 38.1% experienced pain between three and six months of age. A summary of the participants' characteristics is presented in (Table 1 and Figure 1).

Translation and Cross-Cultural Adaptation of the SDQ

The SDQ was translated from English into Arabic. Back-translation of the questionnaire was also performed without major linguistic or grammatical problems. The results of the pretest phase showed that the SDQ-Arabic items regarding language and cultural concepts were understandable.
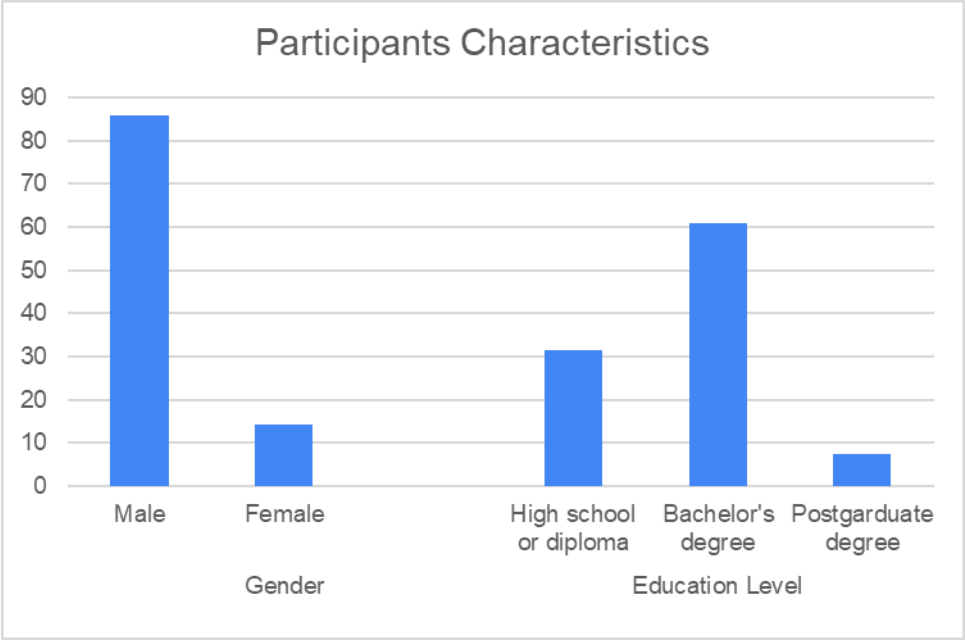
Figure 1 Participants characteristics; gender and education level.

Table 1 Demographic characteristics

Item descriptors	Sample size n = 231
Gender, n (%)	
Male	198 (85.7)
female	33 (14.3)
Age, years, mean ± SD	29.53± 8.846
Weight, kg, Mean ± SD	72.5± 8.5
Height, cm, Mean ± SD	171.5± 8.6
Highest level of education, n (%)	
High school or diploma	73 (31.6)
Bachelor's degree	141 (61.04)
Postgraduate degree	17 (7.36)
The region in Saudi Arabia, n (%)	
Central	97 (41.99)
Western	64 (27.7)
Eastern	14 (6.06)
Southern	50 (21.6)
Northern	6 (2.59)
Where did you receive the services? n (%)	
MOH Primary Healthcare Center	42 (18.18)
Private sectors (Centers or Hospitals)	10 (4.33)
MOH Hospitals	140 (60.61)
University Hospitals	20 (8.66)
Military Hospitals	19 (8.23)
Pain duration, n (%)	
< 3 months	70 (30.5)

Between 3 and 6 months	88 (38.1)
> 6 months	73 (31.4)
Pain irradiating on upper limb, n (%)	
No	141 (61.04)
Yes	90 (38.96)

MOH = Ministry of Health, SD = standard deviation

Reliability Assessment

Reliability was measured using the internal consistency of the SDQ-Arabic. Table 2 shows the internal consistency results. The questionnaire includes two subscales: Subscale 1 measured activity, whereas Subscale 2 measured participation and psychosocial factors. The results showed that the subscales of internal consistency were excellent (Cronbach alpha > 0.90; 0.960 for subscale 1 (activity) and 0.950 for subscale 2 (participation and psychosocial factors)). Furthermore, the internal consistency of the total SDQ-Arabic score was excellent (Cronbach alpha = 0.977). Additionally, the results showed excellent values for the (intraclass correlation coefficient (ICC)) of the SDQ-Arabic subscale 1 (ICC=0.960; 95% CI 0.952–0.967, $p < 0.001$), SDQ-Arabic subscale 2 (ICC=0.950; 95% CI 0.940–0.959, $p < 0.001$), and total score (ICC=0.977; 95% CI 0.972–0.981, $p < 0.001$).

Table 2 Item descriptive statistics and internal consistency of the Arabic version of the Shoulder Disability Questionnaire (SDQ) (N=231)

Item descriptors	Item-to-total correlation	Cronbach alpha if the item is deleted
Subscale#1 (Activity) (α= 0.960)		
01. Because of pain in my shoulder, I move my arm or hand with some difficulty.	0.759	0.958
02. I do not bathe completely because of my shoulder.	0.726	0.959
04. I get dressed more slowly than usual because of my shoulder.	0.843	0.955
05. Because of my shoulder trouble, I fasten my clothing with some difficulty (e.g., buttons, zips, shoelaces, or bra).	0.808	0.956
06. I have trouble putting on a jumper, shirt, blouse, or jacket because of my shoulder problem.	0.820	0.956
07. Because of my shoulder problem, I change position frequently in bed at night.	0.735	0.959
11. Because of my shoulder problem, I do less of the daily household jobs than I would usually do.	0.778	0.957
12. I avoid heavy jobs around the house because of my shoulder trouble.	0.822	0.956
14. Because of my shoulder trouble, I am cutting down on some of my usual sports or more active pastimes.	0.815	0.956
15. Because of my shoulder trouble, I am not doing any of my usual physical recreation or more active pastimes.	0.848	0.955
19. I sleep less well because of my shoulder.	0.821	0.956
22. Because of my shoulder, I have trouble writing	0.828	0.956

or typing.		
Subscale#2 (Participation and psychosocial factors) (α=0.950)		
03. Because of my shoulder trouble, I get dressed with help from someone else.	0.733	0.947
08. I cannot lie on my right side at night because of my shoulder.	0.764	0.946
09. I cannot lie on my left side at night because of my shoulder.	0.731	0.948
10. I stay at home most of the time because of my shoulder problem.	0.823	0.944
13. Because of my shoulder, I do not carry any shopping.	0.796	0.945
16. Because of my shoulder, I try to get other people to do things for me.	0.821	0.944
17. My shoulder makes me more irritable and bad-tempered with people than usual.	0.828	0.943
18. Because of my shoulder, I have more minor accidents (e.g., dropping things).	0.796	0.945
20. Because of my shoulder, I rest more often during the day.	0.803	0.944
21. My appetite is not very good because of my shoulder problem.	0.797	0.945
Recommended values	≥0.25	<α

Abbreviations: α, Cronbach alpha

Cronbach α = 0.70–0.95 means good internal consistency, and Cronbach α ≥0.95 means redundancy in items.

Construct Validity Assessment

Structural validity was measured by performing [exploratory factor analysis (EFA) to determine the factor structure of the SDQ-Arabi. Principal component analysis with varimax rotation revealed that the test was functional (EFA >0.4) (Table 3).

Table 3 Exploratory Factor Analysis of the Arabic version of the Shoulder Disability Questionnaire (N=231)

Item descriptors	Component matrix
Subscale#1 (Activity)	
01. Because of pain in my shoulder, I move my arm or hand with some difficulty.	0.798
02. I do not bathe completely because of my shoulder.	0.772
04. I get dressed more slowly than usual because of my shoulder.	0.873
05. Because of my shoulder trouble, I fasten my clothing with some difficulty (e.g., buttons, zips, shoelaces, or bra).	0.845
06. I have trouble putting on a jumper, shirt, blouse, or jacket because of my shoulder problem.	0.855
07. Because of my shoulder problem, I change position frequently in bed at night.	0.775
11. Because of my shoulder problem, I do less of the daily household jobs than I would usually do.	0.815

12. I avoid heavy jobs around the house because of my shoulder trouble.	0.851
14. Because of my shoulder trouble, I am cutting down on some of my usual sports or more active pastimes.	0.844
15. Because of my shoulder trouble, I am not doing any of my usual physical recreation or more active pastimes.	0.875
19. I sleep less well because of my shoulder.	0.852
22. Because of my shoulder, I have trouble writing or typing.	0.861
Subscale#2 (Participation and psychosocial factors)	
03. Because of my shoulder trouble, I get dressed with help from someone else.	0.785
08. I cannot lie on my right side at night because of my shoulder.	0.809
09. I cannot lie on my left side at night because of my shoulder.	0.780
10. I stay at home most of the time because of my shoulder problem.	0.861
13. Because of my shoulder, I do not carry any shopping.	0.839
16. Because of my shoulder, I try to get other people to do things for me.	0.858
17. My shoulder makes me more irritable and bad-tempered with people than usual.	0.866
18. Because of my shoulder, I have more minor accidents (eg dropping things).	0.839
20. Because of my shoulder, I rest more often during the day.	0.845
21. My appetite is not very good because of my shoulder problem.	0.840
Recommended values	> 0.4

Extraction method: Principal component analysis

Rotation method: Varimax with Kaiser Normalization

4. DISCUSSION

The results of this study showed a significant cross-cultural adaptation of the SDQ into Arabic and proved the effectiveness of the translation by offering considerable insight into the psychometric aspects of the Arabic version of the SDQ in patients with nonspecific SP. The Arabic SDQ is divided into two sections and has excellent construct validity and reliability. Furthermore, the validation of the internal consistency and interclass correlation of the two subscales of the questionnaire was conducted. Subscale 1 appeared to measure activity, whereas Subscale 2 evaluated involvement and psychological characteristics. The SDQ-Arabic has shown to be a useful, effective, and easy-to-understand instrument because of its precise terminology and unambiguous reporting of partial responses.

According to a set of recommendations for selecting health measurement instruments based on general agreement (COSMIN) checklist, overall internal consistency should be assessed after the factorial structures of the instruments, in addition to calculating internal consistency for each subscale. Which was created to assess the merit of each research methodologies investigating property measurements of (Patient-Reported Outcome Measures (PROMs)) (Taber, 2018). In the current study, the internal consistency was verified for subscales 1 and 2 (α=0.960 and 0.950), respectively, with (α= 0.977) as a total score. Thus, the internal consistency results in

the current study provide significant evidence of internal consistency for each unidimensional scale in each subscale of the instrument. Similar results were reported by Brindisino et al., (2020), who aimed to develop an SDQ-I.

However, Brindisino et al., (2020) conducted a test–retest reliability test and showed excellent results. The test-retest reliability ensures the ability of the instrument to assess patients (Brindisino et al., 2020). In contrast, the Korean version of the SDQ developed by Choi et al., (2015), the Spanish version developed by Alvarez-Nemegyei et al., (2005), and the Turkish version developed by Ozsahin et al., (2008) showed excellent internal consistency results without instrument unidimensional structure confirmation. Additionally, the excellent results of our study regarding internal consistency showed that the test could assess patient status.

In the SDQ-I, several items associated with sleep disruption (measured by subscale 2) and activity (measured by subscale 1) had a low load factor Brindisino et al., (2020), suggesting the relevance of the SDQ-Arabic content to SP patients. The EFA results showed that all tested items reported high factor loadings (EFA >0.4), indicating the usefulness of the questionnaire. To our knowledge, among all the translated versions of the SDQ, only the Italian version (SDQ-I) has been used to conduct structural validity evaluation by factor analysis, as well as the investigation of the dimensionality of the SDQ (Brindisino et al., 2020). In this study, structural validity was measured by performing EFA to determine the factor structure of the SDQ-Arabic.

Strengths and limitations
The psychometric characteristics of people with non-specific SP were examined in this study, which was the first cross-culturally Arabic-designed version of the SDQ. However, this study has a few limitations. First, data was gathered by electronically transmitting the SDQ (WhatsApp). If the data collection process involved visiting many healthcare facilities, it would be more meaningful. Secondly, it is believed that the nature of survey studies generally influences the overall study results through a number of influencing factors, such as participant aversion, personal bias, and random selection of survey responses. These effects can be reduced in future research by utilizing a larger sample size. Finally, the results may not have been as generalizable as they may have been because this study focused on patients with nonspecific SP. Therefore, other shoulder circumstances are needed to confirm the findings of this research. Additionally, patients were chosen regardless of how long they had SP, allowing the results to be applicable to all patients regardless of how long they have suffered.

5. CONCLUSIONS
SDQ-Arabic is a valid tool for assessing patients with shoulder-related disabilities. This study provides clinicians with a successfully adapted Arabic version of the SDQ. Future research should use modern approaches to analyze psychometric parameters while investigating other fundamental psychometric properties, including content validity, interpretability, and responsiveness.

Acknowledgments
The authors thank all patients for their confidence and collaboration, which made this study possible. Also, thanks to everyone who contributed to editing and revising the manuscript.

Author's contributions
All authors participated equally in this study as follows:
The first and second authors were responsible for data collection and analysis.
The third, fourth, and fifth authors were responsible for interpreting the results gained.
The sixth, seventh, and eighth authors were responsible for revising the translation process and electronic distribution of the questionnaire.
All authors discussed the results and contributed to the final formulation of the manuscript.

Ethical approval
The study was approved by the Medical Ethics Committee of Taif University (Ethical approval code: HAO-02-T-105).

REFERENCES

1. Alvarez-Nemegyei J, Puerto-Ceballos I, Guzmán-Hau W, Bassol-Perea A, Nuño-Gutiérrez BL, Development of a Spanish-language version of the shoulder Disability Questionnaire. J Clin Rheumatol 2005; 11(4):185–187. doi: 10.1097/01.rhu.0000173229.50674.31

2. Brindisino F, Pellicciari, L, Lorusso M, Pennella D, Padua R, Di-Bari M. Cross-cultural adaptation, reliability, and validity of the Italian version of the shoulder Disability Questionnaire. Musculoskelet Sci Pract 2020; 46:102123. doi: 10.1016/j.msksp.2020.102123

3. Charles LE, Ma CC, Burchfiel CM, Dong RG. Vibration and Ergonomic Exposures Associated With Musculoskeletal Disorders of the Shoulder and Neck. Saf Health Work 2018; 9(2):125-132. doi: 10.1016/j.shaw.2017.10.003

4. Choi Y, Park JW, Noh S, Kim MS, Park YH, Sung DH. Reliability, Validity, and Responsiveness of the Korean Version of the Shoulder Disability Questionnaire and Shoulder Rating Questionnaire. Ann Rehabil Med 2015; 39(5):705-17. doi: 10.5535/arm.2015.39.5.705

5. Croft P, Pope D, Zonca M, O'Neill T, Silman A. Measurement of shoulder related disability: results of a validation study. Ann Rheum Dis 1994; 53(8):525-8. doi: 10.1136/ard.53.8.525

6. Den-Boer PKW, Schulte G, Muris DMJ, Deckers P, Bemelmans YFL, Schotanus MGM, Winkens B, Ottenheijm RPG. Prognosis of shoulder pain in those with and without a psychological disorder: A prospective cohort study with a six-month follow-up. J Back Musculoskelet Rehabil 2022; 35(6):1191-1201. doi: 10.3233/BMR-220018

7. Desai AS, Dramis A, Hearnden AJ. Critical appraisal of subjective outcome measures used in the assessment of shoulder disability. Ann R Coll Surg Engl 2010; 92(1):9-13. doi: 10.1308/003588410X12518836440522

8. Hall CL, Guo B, Valentine AZ, Groom MJ, Daley D, Sayal K, Hollis C. The validity of the Strengths and Difficulties Questionnaire (SDQ) for children with ADHD symptoms. PLoS One 2019; 14(6):e0218518. doi: 10.1371/journal.pone.0218518

9. Linaker CH, Walker-Bone K. Shoulder disorders and occupation. Best Pract Res Clin Rheumatol 2015; 29(3):405-23. doi: 10.1016/j.berh.2015.04.001

10. Liu J, Sai-Chuen-Hui S, Yang Y, Rong X, Zhang R. Effectiveness of Home-Based Exercise for Nonspecific Shoulder Pain: A Systematic Review and Meta-analysis. Arch Phys Med Rehabil 2022; 103(10):2036-2050. doi: 10.1016/j.apmr.2022.05.007

11. Lucas J, van-Doorn P, Hegedus E, Lewis J, van-der-Windt D. A systematic review of the global prevalence and incidence of shoulder pain. BMC Musculoskelet Disord 2022; 23:1073. doi: 10.1186/s12891-022-05973-8

12. Monticone M, Rocca B, Abelli P, Tecco S, Geri T, Gherlone EF, Luzzi D, Testa M. Cross-cultural adaptation, reliability and validity of the Italian version of the craniofacial pain and disability inventory in patients with chronic temporomandibular joint disorders. BMC Oral Health 2019; 19(1):244. doi: 10.1186/s12903-019-0927-x

13. Naunton J, Harrison C, Britt H, Haines T, Malliaras P. General practice management of rotator cuff related shoulder pain: A reliance on ultrasound and injection guided care. PLoS One 2020; 15(1):e0227688. doi: 10.1371/journal.pone.0227688

14. Oh J, Lee MK. Shoulder pain, shoulder disability, and depression as serial mediators between stress and health-related quality of life among middle-aged women. Health Qual Life Outcomes 2022; 20(1):142. doi: 10.1186/s12955-022-02054-1

15. Ozsahin M, Akgun K, Aktas I, Kurtais Y. Adaptation of the Shoulder Disability Questionnaire to the Turkish population, its reliability and validity. Int J Rehabil Res 2008; 31(3):241-5. doi: 10.1097/MRR.0b013e3282fb7615

16. Taber KS. The use of Cronbach alpha when developing and reporting research Instruments in science education. Res Sci Educ 2018; 48:1273–1296. doi: 10.1007/s11165-016-9602-2

17. Thapa D, Ahuja V, Dhiman D. Management of chronic shoulder pain with restricted mobility - a case series. Indian J Anaesth 2016; 60(11):858-860. doi: 10.4103/0019-5049.193692

18. Thoomes-de-Graaf M, Scholten-Peeters GG, Schellingerhout JM, Bourne AM, Buchbinder R, Koehorst M, Terwee CB, Verhagen AP. Evaluation of measurement properties of self-administered PROMs aimed at patients with non-specific shoulder pain and "activity limitations": a systematic review. Qual Life Res 2016; 25(9):2141-60. doi: 10.1007/s11136-016-1277-7

19. Thoomes-de-Graaf M, Scholten-Peeters W, Karel Y, Verwoerd A, Koes B, Verhagen A. One question might be capable of replacing the Shoulder Pain and Disability Index (SPADI) when measuring disability: a prospective cohort study. Qual Life Res 2018; 27(2):401-410. doi: 10.1007/s11136-017-1698-y

20. Vanti C, Monticone M, Ceron D, Bonetti F, Piccarreta R, Guccione AA, Pillastrini P. Italian version of the physical therapy patient satisfaction questionnaire: cross-cultural adaptation and psychometric properties. Phys Ther 2013; 93 (7):911-22. doi: 10.2522/ptj.20120170