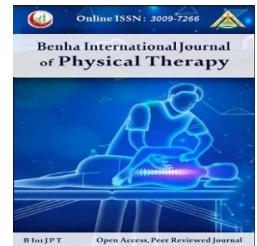# Benha International Journal of Physical Therapy

Original research

Arabic Version, Validity and Reliability of the Modified Start Back Screening Tool for Patients with Non-Specific Neck Pain.

*Taha Hassan Ahmed[1] *, Salwa Fadl[2], Mohamed Ezzat Mohamed[3].*

[1]*Physical therapist at Mataria Teaching Hospital, B.Sc., in Physical Therapy Cairo University, Egypt.*
[2]*Professor of Physical therapy for Musculoskeletal Disorders and Their surgeries, Faculty of Physical Therapy Cairo University, Egypt.*
[3]*Lecturer of Physical therapy for Musculoskeletal Disorders and Their surgeries, Faculty of Physical Therapy Cairo University, Egypt.*

*Correspondence to:

***Taha Hassan Ahmed**; Physical therapist at Mataria Teaching Hospital, B.Sc., in Physical Therapy Cairo University, Egypt.*

Email:
taha.hassan18@gmail.com

Telephone:
01005114280

Abstract

Background: Modified STarT Back Screening Tool (mSBST) was validated in Dutch and Thai versions for adults with non-specific neck pain to provide risk stratification groups, but no Arabic version was developed on mSBST. **Purposes:** to translate mSBST into Arabic version, test validity and test reliability on patients with non-specific neck pain. **Methods:** translation of modified STarT Back into Arabic version at Cairo University Center for Foreign Languages and Specialized Translation, Faculty of Arts, Cairo University. A number of 135 non-specific neck patients of both males and females aged 18 and older from different out-patients clinics in Egypt were recruited. All patients completed questionnaires (Numeric pain rating scale NPRS-AR, Neck disability index NDI-AR, Pain catastrophizing scale-PCS-AR, Tampa scale of kinesiophobia TSK-AR, EuroQol -5D-5L-AR, General perceived effect scale GPE, Modified STarT Back mSBST–AR) with an interval time of 3 days. **Results:** Arabic version of mSBST demonstrated excellent face and content validity. Correlations between total score of mSBST-AR and other questionnaires (NPRS-AR, NDI-AR.PCS-AR,TSK-AR,EQ-5D-AR,GPE) were moderate positive significant correlation (p < 0.001). Correlations between psychosocial sub-score and questionnaires were moderate positive significant correlation (p < 0.001). Cronbach's alpha for mSBST-AR was 0.747 that means mSBST-AR had acceptable internal consistency and showed excellent test-retest reliability. The psychosocial sub-score showed excellent test-retest reliability. **Conclusion:** Arabic version of mSBST is valid and reliable and can be used in both research and clinical settings to classify individuals with non-specific neck pain in Egypt.

Key words: Neck pain, Reliable, Valid.

INTRODUCTION:

Neck pain is defined as pain in the neck with or without pain referred into one or both upper limbs that lasts for at least 1 day [1,2]. Globally, neck pain is the fourth largest musculoskeletal disorder causing disability [3]. Neck pain was found to be the second most prevalent Work related musculo-skeletal disorders after Low Back Pain [4]. People with neck pain may also have accompanying headache or shoulder pain, but neck pain is the primary complaint [5].

In 2017, the Global Burden of Disease study calculated that neck pain had: an age-standardised point prevalence of 3,551/100,000 people, with a 95% uncertainty interval (UI) from 3,140 to 3,978; and an annual incidence of 807/100,000 people (95% UI 714 to 913). Both

the incidence and prevalence of neck pain increased with age and were greater among females than males. The prevalence of neck pain did not change substantially between 1990 and 2010 [2].

There are several factors that indicate an increased risk of developing neck pain. The most important of these prognostic factors are: trauma, work-related factors (low job satisfaction, poor perceived work support, and high work stress levels), psychological factors (self-perceived depression, poor psychological health) and smoking [6,7].

Approximately half of all individuals will experience a clinically important neck pain episode over the course of their lifetime [8] there is substantial heterogeneity in the reported prevalence rates of neck pain; however, most epidemiological studies report an annual prevalence ranging between 15% and 50% [8] with one systematic review reporting a mean rate of 37.2% [8].

In 2008, the Task Force on Neck Pain proposed a classification of people with neck pain into four categories [5]. This classification is based on the Quebec Task Force classification of whiplash [9].The only difference between both classifications is that the Quebec Task Force also defined a Grade 0, which means that there was a trauma present but no pain. In the Task Force on Neck Pain classification, Grade I to III neck pain is regarded as non-specific neck pain. Grade I and II neck pain are distinguished by the amount of interference with activities of daily living. A person with Grade III neck pain (also called cervical radiculopathy) also has objective neurologic signs (such as decreased deep tendon reflexes, weakness or sensory deficits) and positive findings on provocation and reduction tests. People with Grade IV neck pain suffer from major pathologies, and this grade corresponds with specific neck pain [5].

The Start Back Tool (Subgrouping for Targeted Treatment; SBST) is a self-reported prognostic questionnaire, which can be used by primary care providers. SBST was validated to identify individuals with LBP in primary care with prognostic indicators for persistent disabling pain. SBST is a useful component of stratified care, where patient prognostic subgroups are matched with appropriate treatment plans [10].

A few studies were performed on the modified SBST. One of the studies is the Dutch version that found that the SBT is modified to fit patients with neck pain in Dutch primary care. The researchers found that the construct validity is sufficient, the overall agreement indicated excellent reproducibility for the "low-risk" group and fair reproducibility for the "medium-risk" group and a good content validity [11]. There is also another Thai study on the modified SBST found that acceptable internal consistency and test-retest reliability of the mSBST-TH. Therefore, the mSBST-TH can be used in both research and clinical settings to classify Thai individuals with NP into subgroups: low, moderate, and high risk for chronicity [12].

Although an Arabic version of the SBST found that the SBT-Ar demonstrated good face, content and construct validity[13], but no Arabic version was performed on the modified SBST for neck.

Since the modified SBST focuses on stratifying or subgrouping the neck pain patients according to the prognosis unlike the neck pain and disability scale (NPAD) [14] and neck disability index (NDI) [15]. So, the aim of this study was to translate, test validity (face, content and construct) and reliability (internal consistency and test retest) of Arabic version of mSBST among Egyptian patients with non-specific neck pain.

METHODS
Participants:
135 non-specific neck pain patients who were included in this study, conducted from the out-patients clinics in Cairo, Egypt (from March 2023 to June 2024). Patients with non-specific neck pain (grade I - III) [11], and who were 18 years or older, could speak, read and write in Arabic, were included. Patients were excluded if, found red flags indicating a possible specific underlying pathology (grade IV), for example, an infection, a fracture, cauda equina or a tumour [11].All participants signed a written consent form after receiving full information about the purpose of the study,

procedure, possible benefits, privacy, and use of data.

Translation:

The English version of the questionnaire was sent to the Cairo University Center For Foreign Languages and Specialized Translation, Faculty of Arts, Cairo University to translate the questionnaire into Arabic version. English to Arabic expert translator with more than 10 years' experience in translation received the English version and told the researchers to come and receive the Arabic version after one week.

After one week, the Arabic version was received, stamped and certified by the Cairo University Center for Foreign Languages and Specialized Translation and has the signature of the expert.

Procedures :

Measurements:

1ˢᵗ setting:

Patients filled out a questionnaire consisting of demographic variables, such as age and gender, and the mSBT-AR-Neck. In addition, the patients were asked to fill out the Arabic versions of the following questionnaires : the 11-point numeric rating scale to assess the pain level (NPRS-AR) [16] **(appendix 1)**, the neck disability index to assess the level of disability (NDI-AR) [17] **(appendix 2)**, the Tampa scale of kinesiophobia (TSK) to assess fear of movement [18] **(appendix 3)**, the pain catastrophising scale (PCS) to assess the level of catatrophising [19] **(appendix 4)**, the EuroQol -Arabic (EQ-5D-5L) to assess quality of life [20] **(appendix 5).**

Treatment:

Patients had 2 sessions between the 1ˢᵗ setting and the 2ⁿᵈ setting with duration of the session was about 45:60 minutes. Patients received physical therapy program including electrical stimulation for pain, form of heat, exercises and home program.

2ⁿᵈ setting:

Three days after the 1ˢᵗ set, patients filled out Arabic version of mSBT neck **(Appendix 6)** to assess the reliability of the questionnaire, and numeric pain rating scale (NPRS) and general perceived effect scale (GPE) to assess pain and recovery respectively, and the answer options on the GPE range from 1="fully recovered" to 7="worse than ever". 3 days were short enough to prevent substantial improvement, and were long enough to reduce recall bias.
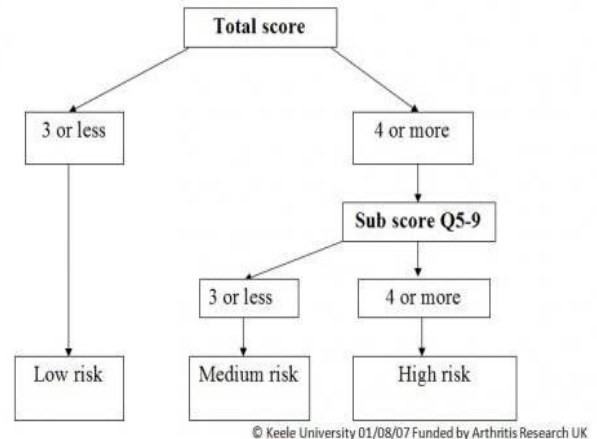
Method of calculation of modified start back screening tool for non-specific neck patients

Statistical Analysis:

Descriptive statistical analysis on the sample was performed using means and standard deviations for numerical data and using frequency and percentage for categorical data. Clarity index and expert proportion of the clearance were used for face validity. Index of content validity (CVI), scale content validity indices (S-CVI) and expert proportion of relevance were used to test the content validity. Construct validity was investigated through the correlation between mSBST with NDI, TSK, PCS, NPRS and GPES using Pearson correlation coefficients. Cronbach's alpha was used to measure the internal consistency reliability. Test–retest reliability was measured using intraclass correlation coefficient (ICC). Measurement error was expressed in the standard of measurement (SEM) and the minimal detectable change (MDC). $SEM = SD \sqrt{(1-ICC)}$. The SDC was calculated as $1.96 \times \sqrt{2} \times SEM$ The level of significance for all statistical tests was set at $p < 0.05$. Statistical analysis was conducted through the statistical package for social studies (SPSS) version 25 for windows (IBM SPSS, Chicago, IL, USA).

RESULTS

Subject characteristics

135 subjects with non-specific neck pain participated in this study. Their mean ± SD age,

weight, height and BMI were 46.21 ± 11.07 years, 80.38 ± 12.30 kg, 168.10 ± 9.60 cm and 28.34 ± 2.73 kg/m² respectively. 77 (57%) of subjects were females and 58 (43%) were males **(Table 1)**.

Table 1. *General characteristics of the subjects.*

	Mean ±SD	Minimum	Maximum
Age (years)	46.21 ± 11.07	18	75
Weight(kg)	80.38 ± 12.30	56	111
Height (cm)	168.10 ± 9.60	148	192
BMI (kg/m²)	28.34 ± 2.73	19.25	33.80
	N	%	
Sex distribution			
Females	77	57	
Males	58	43	

Clinical characteristics of subjects:

mSBST

The mean ± SD mSBST total score of subjects was 5.72 ± 2.29 and the mean ± SD mSBST psychosocial subscore was 3.60 ± 1.45.

The risk profile of subjects based on mSBST showed that 24 (18%) of subjects has low risk, 30 (22%) had medium risk and 81 (60%) of subjects had high risk **(Table 2)**.

Neck Disability Index, Tampa Scale of Kinesiophobia, Pain Catastrophising Scale, Numeric Pain Rating Scale and General Perceived Effect Scale

The mean ± SD of NDI, TSK, PCS, NPRS and GPES of subjects was 27.80 ± 10.43, 51.16 ± 8.37, 32.48 ± 13.69. 7.06 ± 1.76 and 3.14 ± 0.78 respectively **(Table 2)**.

Table 2. *Clinical characteristics of subjects.*

	Mean ±SD	Minimum	Maximum
mSBST			
Total score	5.72 ± 2.29	0	9
Psychosocial subscore	3.60 ± 1.45	0	5
NDI	27.80 ± 10.43	2	60
TSK	51.16 ± 8.37	26	67
PCS	32.48 ± 13.69	2	52
NPRS	7.06 ± 1.76	2	10
GPES	3.14 ± 0.78	1	5
Risk profile	N	%	
Low risk	24	18	
Medium risk	30	22	
High risk	81	60	

Face validity

10 experts participated in this study to investigate the validity of Arabic version of mSBST. There were 5 experts holding Ph.D. and 5 experts had master degree Their mean ± SD experience years of the expert panel for face validity was 12.5 ± 4.02 years with minimum of 8 years and maximum of 20 years.

The mean index of clarity of Arabic version of mSBST was 92.22% which is excellent. The index of clarity of Arabic version of mSBST ranged from 90% to 100%. The mean expert proportion of clearance was 97.78%, which is excellent. The expert proportion of clearance ranged from 88.89% to 100%.

Content validity:

The Arabic version of mSBST demonstrated excellent content validity, the scale CVI (S-CVI) was 1. The mean expert proportion of relevance was 100% which is excellent.

Construct validity

The correlations between the total score of mSBST and NDI (r = 0.426), TSK (r = 0.427), PCS (r = 0.449), NPRS (r = 0.511) and GPES (r = 0.366) were moderate positive significant correlation (p < 0.001).

Also, there was a significant correlation between psychosocial subscore and NDI (r = 0.395), TSK (r = 0.345), PCS (r = 0.465), NPRS (r = 0.450) and GPES (r = 0.325) were moderate positive significant correlation (p < 0.001) **(Table 3)**.

Table 3. *Correlation between mSBST with NDI, TSK, PCS, NPRS and GPES:*

	Msbst			
	Total score		Psychosocial subscore	
	R	p-value	r	p-value
NDI	0.426	0.001	0.395	0.001
TSK	0.427	0.001	0.345	0.001
PCS	0.449	0.001	0.465	0.001
NPRS	0.511	0.001	0.450	0.001
GPES	0.366	0.001	0.325	0.001

r value: Pearson correlation coefficient; p value: Probability value

Reliability

Internal consistency of the Arabic version of mSBST:

Cronbach's alpha for the Arabic version of mSBST was 0.747 that means mSBST-AR had acceptable internal consistency.

Test-retest reliability of the Arabic version of mSBST:

The Arabic version of mSBST questionnaire showed excellent test-retest reliability; ICC was 0.989, with 95% CI 0.984-0.992 and 0.24 SEM and MDC was 0.29.

The psychosocial subscore showed excellent test-retest reliability; ICC was 0.974, with 95% CI 0.964-0.982 and 0.27 SEM and MDC was 0.45 **(Table 4).**

Table 4. *Test-retest reliability of Arabic version of mSBST:*

mSBST	ICC	(95% CI)		P value	SEM	MDC
		Lower bound	Upper bound			
MSBST total score	0.989	0.984	0.992	0.001	0.24	0.29
Psychosocial subscore	0.974	0.964	0.982	0.001	0.27	0.45
Q1	0.978	0.969	0.985	0.001	0.06	0.17
Q2	0.989	0.985	0.992	0.001	0.04	0.29
Q3	0.992	0.988	0.994	0.001	0.04	0.25
Q4	0.985	0.978	0.989	0.001	0.06	0.34
Q5	0.991	0.988	0.994	0.001	0.04	0.26
Q6	0.984	0.977	0.988	0.001	0.06	0.35
Q7	0.72	0.597	0.804	0.001	0.22	1.47
Q8	0.992	0.988	0.994	0.001	0.04	0.25
Q9	0.992	0.988	0.994	0.001	0.04	0.25

ICC, Intraclass correlation coefficient value; CI, Confidence Interval; SEM, Standard error of measurement; MDC, Minimal detectable change; p value, Probability value.

Floor and ceiling effect

Less than < 11% respondents selecting "0" or "9" indicated that mSBST does not show significant "floor" or "ceiling" effects. Less than < 32% respondents selecting "0" or "5" indicated that psychosocial subscore does not show significant "floor" or "ceiling" effects. The response distributions for each item showed that all response categories had no significant floor or ceiling effects **(Table 5).**

Table 5. *Item response distribution:*

	Response category (%)									
	0	1	2	3	4	5	6	7	8	9
Total score	0.7	7.4	4.4	5.2	7.4	11.9	21.5	19.3	11.9	10.4
Psychosocial subscore	1.5	8.1	17	9.6	31.9	31.9				

DISCUSSION

The SBT-Neck is a model that aims to categorize patients for targeted treatment. The importance of the mSBST is highlighted in stratifying the patients into 3 subgroups according to the risk of poor prognosis and matching with targeted type of treatment. As if the patient has low risk to poor prognosis, only needs exercise advice and education about condition. While if the patient has a medium risk to poor prognosis, needs to have physical therapy sessions. But if the patient has high risk to poor prognosis, has to have psychological treatment besides the physical therapy sessions. The present study was designed to test the face validity, the content validity, the concurrent validity, the internal consistency reliability and the test-retest reliability of the Arabic-language version of mSBST that targets to stratify patients with non-specific neck pain into subgroups matching appropriate treatment plans. A number of 135 patients with nonspecific neck pain participated in this study, this study was conducted in several outpatient clinics.

For face validity, 10 experts participated in this study to investigate the validity of Arabic version of mSBST. There were 5 experts holding Ph.D. and 5 experts had master degree. Their mean ± SD experience years of the expert panel for face validity was 12.5 ± 4.02 years with minimum of 8 years and maximum of 20 years. The mean index of clarity of Arabic version of mSBST was 92.22% which is excellent. The index of clarity of Arabic version of mSBST ranged from 90% to 100%. The mean expert proportion of clearance was 97.78%, which is excellent. The expert proportion of clearance ranged from 88.89% to 100%.

For content validity, this study has good content validity As Less than < 11% respondents selecting "0" or "9" indicated that mSBST does not show significant "floor" or

"ceiling" effects. Less than < 32% respondents selecting "0" or "5" indicated that psychosocial subscore does not show significant "floor" or "ceiling" effects. The response distributions for each item showed that all response categories had no significant floor or ceiling effects. Also, the Dutch study analyzed the data of 100 patients concerning the SBT-Neck to determine floor and ceiling effects. One patient (1%) scored zero, and one patient (1%) scored nine points, implying no important floor and ceiling effects, and therefore, a good content validity. In addition, the Thai study found that 17 volunteers (6.5%) gave the lowest total mSBST-TH score (0 points) and 5 volunteers (1.9%) gave the highest total mSBST-TH score (9 points) so the Thai version also has good content validity. The Arabic version of mSBST demonstrated excellent content validity, as the scale CVI (S-CVI) was 1. The mean expert proportion of relevance was 100 % which is excellent.

For construct validity, the correlations between the total score of mSBST and NDI (r = 0.426), TSK (r = 0.427), PCS (r = 0.449), NPRS (r = 0.511) and GPES (r = 0.366) were moderate positive significant correlation (p < 0.001). Also, there was a significant correlation between psychosocial subscore and NDI (r = 0.395), TSK (r = 0.345), PCS (r = 0.465), NPRS (r = 0.450) and GPES (r = 0.325) were moderate positive significant correlation (p < 0.001). In line with the Thai version, the researchers found that the correlation between mSBST-TH and standard reference questionnaires, namely VAS-TH, NDI-TH, PCS-TH, FABQ-TH, EQ5D-5L-TH and EQ5D-5L-TH-VAS was a moderate correlation between mSBST-TH total score and all standard reference questionnaires, with a correlation value between 0.305 (FABQ-TH total score) and -0.554 (EQ5D-5L-TH-VAS), except for the correlation with FABQ-W (rs=0.271) (48) by statistical significance (p < 0.001). In addition, a moderate association was found between mSBST-TH psychosocial. The subscores and all standard reference questionnaires had correlations between 0.331 (PCS-TH magnification) and -0.524 (EQ5D-5L-TH-VAS), except for the correlation with

FABQ-TH total score (rs=0.270), FABQ-TH physical activity (rs=0.276), FABQ-W (rs=0.241), PCS-TH total score (rs=0.270) and PCS-TH rumination (rs=0.273) by statistical significance (p < 0.001).While the Dutch version found a low correlation between activity-question 3 and the NDI scores (r = .13); a moderate correlation between activity-question 4 and the NDI, kinesiophobia-question 5 and the TSK, and catastrophising-questions 6 and 7 and the PCS; and a high correlation between SBT-question 1 and the single-item question (r = .55), and bothersome-question 9 and the NPRS (r = .50) (table 3). All correlations were a priori, as expected, regarding the direction of the correlation and the magnitude, with the exception of activity-question 3. The researchers concluded that the construct validity is sufficient.

For internal consistency of mSBST questionnaire, Unfortunately, the internal consistency of the mSBST for individuals with NP has been investigated in only one study (the Thai study) [12]. However, the finding in this study was similar to the mSBST Thai version. The Cronbach's alpha coefficient of the mSBST-AR for each of its items ranged from 0.650 to 0.770, and the difference values between each item ≤ 0.1 represented that all items are relevant while the Cronbach's alpha coefficient of the mSBST-TH for each of its items ranged from 0.680 to 0.740, and the difference values between each item ≤ 0.1 represented that all items are relevant. The Cronbach's alpha coefficient of the mSBST-AR for the total score was 0.724 while The Cronbach's alpha coefficient of the mSBST-TH for the total score was 0.73, both demonstrating acceptable internal consistency and representing the consistent concept of the mSBST in both versions. While unfortunately, the Dutch study [11] of the mSBST for individuals with NP was not assessed the Cronbach's alpha coefficient for item by item.

For test-retest reliability of mSBST questionnaire, The ICC of the mSBST-AR for total score and psychosocial subscore were 0.989 and 0.974, respectively, indicating excellent and acceptable test-retest reliability while The ICC of the mSBST-TH for total

score and psychosocial subscore were 0.81 and 0.70, respectively, indicating good and acceptable test-retest reliability. This study results of the test-retest reliability and also the results from the Thai study couldn`t be compared with the previous study of the mSBST (Dutch study) for individuals with Non-specific neck Pain due to the differences in statistical analysis (quadratic-weighted kappa and specific agreement used) as the Dutch study [11] found that the quadratic kappa of .58 for the SBT-Neck indicated a moderate reproducibility. Distribution is skewed due to the large proportion of patients at "low risk" and the absence of a stable "high-risk" group. For the "low-risk" group, the researchers found a specific agreement of 90.9% and a 66.7% agreement for the "medium-risk" group. The researchers were unable to calculate the specific agreement for the "high-risk" group as there were no patients in this 'reproducibility sample'. The overall agreement indicated excellent reproducibility for the "low-risk" group and fair reproducibility for the "medium-risk" group.

CONCLUSION
The results of this study presented that the mSBST-AR has acceptable excellent face validity, excellent content validity, good construct validity, excellent internal consistency and excellent test-retest reliability and appropriate for use in Arabic-speaking patients with non-specific neck pain in Egypt. Thus, the mSBST-AR can be used in both research and clinical settings to classify Arabic individuals with non-specific neck pain in Egypt into subgroups: low, moderate, and high risk for chronicity.

RECOMMENDATIONS
Future studies are needed to confirm the validation of the mSBST in other Arabic countries and cultures. Also, future studies are needed to test the predictive validity of the mSBST-AR

REFERENCES
1. Hoy D, Brooks P, Blyth F, Buchbinder R. The epidemiology of low back pain. Best practice & research Clinical rheumatology. 2010 Dec 1;24(6):769-81.
2. Safiri S, Kolahi AA, Hoy D, Buchbinder R, Mansournia MA, Bettampadi D, Ashrafi-Asgarabad A, Almasi-Hashiani A, Smith E, Sepidarkish M, Cross M. Global, regional, and national burden of neck pain in the general population, 1990-2017: systematic analysis of the Global Burden of Disease Study 2017. bmj. 2020 Mar 26;368.
3. Vos T, Flaxman AD, Naghavi M, Lozano R, Michaud C, Ezzati M, Shibuya K, Salomon JA, Abdalla S, Aboyans V, Abraham J. Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. The lancet. 2012 Dec 15;380(9859):2163-96.
4. Meisha DE, Alsharqawi NS, Samarah AA, Al-Ghamdi MY. Prevalence of work-related musculoskeletal disorders and ergonomic practice among dentists in Jeddah, Saudi Arabia. Clinical, cosmetic and investigational dentistry. 2019 Jul 5:171-9.
5. Haldeman S, Carroll L, Cassidy JD. Findings from the bone and joint decade 2000 to 2010 task force on neck pain and its associated disorders. Journal of occupational and environmental medicine. 2010 Apr 1;52(4):424-7.
6. Jun JJ, Steinmetz NA, Siegle JH, Denman DJ, Bauza M, Barbarits B, Lee AK, Anastassiou CA, Andrei A, Aydın Ç, Barbic M. Fully integrated silicon probes for high-density recording of neural activity. Nature. 2017 Nov 9;551(7679):232-6.
7. Kim R, Wiest C, Clark K, Cook C, Horn M. Identifying risk factors for first-episode neck pain: A systematic review. Musculoskeletal Science and Practice. 2018 Feb 1;33:77-83.
8. Fejer R, Kyvik KO, Hartvigsen J. The prevalence of neck pain in the world population: a systematic critical review of the literature. European spine journal. 2006 Jun;15:834-48.

9. Spitzer WO. Scientific monograph of the Quebec Task Force on whiplash-associated disorders. Spine. 1995;20:1-73.

10. Hill JC, Dunn KM, Lewis M, Mullis R, Main CJ, Foster NE, Hay EM. A primary care back pain screening tool: identifying patient subgroups for initial treatment. Arthritis Care & Research: Official Journal of the American College of Rheumatology. 2008 May 15;59(5):632-41.

11. Bier JD, Ostelo RW, Koes BW, Verhagen AP. Validity and reproducibility of the modified STarT Back Tool (Dutch version) for patients with neck pain in primary care. Musculoskeletal Science and Practice. 2017 Oct 1;31:22-9.

12. Phungwattanakul N, Boonyapo U, Wiangkham T. Reliability of the Thai version of the modified STarT Back Screening Tool in individuals with neck pain. Chulalongkorn Medical Journal. 2022;66(4):391-6.

13. Elsabbagh L, Al-Atwi T, Aldossary D, Alshami AM, Hill JC, Abu-Ras W, Huijer HA, Brooks D. Cross-cultural adaptation and validation of the STarT Back Tool for Arabic speaking adults with low back pain in Saudi Arabia. Journal of Orthopaedic Science. 2019 Mar 1;24(2):200-6.

14. Wheeler AH, Goolkasian P, Baird AC, Darden BV. Development of the Neck Pain and Disability Scale: item analysis, face, and criterion-related validity. Spine. 1999 Jul 1;24(13):1290.

15. Vernon H, Mior S. The Neck Disability Index: a study of reliability and validity. Journal of manipulative and physiological therapeutics. 1991 Sep 1;14(7):409-15.

16. Alghadir AH, Anwer S, Iqbal ZA. The psychometric properties of an Arabic numeric pain rating scale for measuring osteoarthritis knee pain. Disability and rehabilitation. 2016 Nov 19;38(24):2392-7.

17. Shaheen AA, Omar MT, Vernon H. Cross-cultural adaptation, reliability, and validity of the Arabic version of neck disability index in patients with neck pain. Spine. 2013 May 1;38(10):E609-15.

18. Juweid M, Farah K, Hawamdeh Z, Alqudah A, Nowlin L, Vlaeyen J, Trost Z. Fear of movement/[re] injury among arabic low back pain patients: establishing the validity of the Tampa Scale of kinesiophobia–Arabic version. Myopain. 2015 Oct 2;23(3-4):134-42.

19. Terkawi AS, Sullivan M, Abolkhair A, Al-Zahrani T, Terkawi RS, Alasfar EM, Khait SS, Elkabbani A, Kabbani N, Altirkawi KA, Tsang S. Development and validation of Arabic version of the pain catastrophizing scale. Saudi journal of anaesthesia. 2017 May 1;11(Suppl 1):S63-70.

20. Al Shabasy S, Abbassi M, Finch A, Roudijk B, Baines D, Farid S. The EQ-5D-5L valuation study in Egypt. Pharmacoeconomics. 2022 Apr;40(4):433-47.