

Translation, cultural adaptation and validation of Copenhagen neck functional disability scale in Urdu language

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Author's Contribution

¹⁻³Conception and design, ¹ Collection and assembly of data, ²⁻⁴Analysis and interpretation of the data, Statistical expertise, ⁴⁻⁵Critical revision of the article for important intellectual content, Final approval and guarantor of the article.

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A B S T R A C T

Background: Literature reveals high prevalence of neck disability in Pakistani population, and limited translated tools are available in Urdu language. Therefore, due to unavailability of screening tools in national language of Pakistan people usually remain unaware regarding the significance of early screening regarding any disease.

Objective: To Translate and validate the Copenhagen neck functional disability scale in Urdu language.

Methodology: This cross sectional study was conducted at Physical Therapy Department of Haider Hospital in Multan. A total of 75 participants aged between 18 to 40 years of both gender with nonspecific neck pain for minimum 12 weeks were included. Initially, two independent professionals made two forward translation into Urdu language. Then, these translations were synthesized into single translation. The synthesized translated version was translated backward into English language. The expert reviewed the synthesized translated version and backward translated version and approved the translated final synthesized version. The psychometric properties test included internal consistency validity (Cronbach's alpha), test-retest reliability (ICC 2, 1), and concurrent validity (correlation with Numeric pain rating scale and Neck disability index).

Results: The mean The Cronbach's alpha for Copenhagen neck functional disability scale Urdu version (CNFDS-U) was 0.76 showing good internal consistency. The test-retest reliability determined with intraclass correlation coefficient ICC (2, 1) was 0.84 (95% CI; 0.74 to 0.90, $P < 0.001$). Test-retest mean scores correlation was $r = 0.86$ ($P < 0.001$). The Pearson's correlation coefficient between CNFDS-U and NDI was $r = 0.65$ ($P < 0.001$). The Pearson's correlation coefficient between CNFDS-U and NPRS was $r = 0.60$ ($P < 0.001$).

Conclusion: The Urdu translated version of Copenhagen neck functional disability scale showed high internal consistency, excellent test-retest reliability, and good concurrent validity.

Key words: Cervical pain, Disability, Pain, Screening, Translation

Introduction

Neck pain is among the common health related conditions affecting the two third of world population globally at some period in their life.¹ Mostly the acute onset of neck pain is manageable with or without treatment, however almost 50% of individuals will continue to experience a certain grade of pain. Chronic neck pain is labelled when the signs and symptoms

persists over 90 days and above.² The most prevalent neck pain description is described as 'postural or mechanical based neck pain, sometimes also called as cervical spondylosis'.³ However, the term cervical spondylosis is an umbrella terms that shades variety of features such as age or occupational related degenerative changes in anatomy of cervical spine including facet joints, vertebrae, intervertebral discs, and ligaments.⁴

There are various causes of neck pain that include; cervical spine intervertebral disc herniation, bulging, or protrusion, abnormal postures, sports activities, whiplash injuries, psychological disorders (anxiety, stress, depression) spinal stenosis, referred pain from acute coronary syndrome, tumors or cancers in cervical and head regions, retropharyngeal abscess, and formation of osteophytes.⁵

Clinical researches encourage monitoring and measuring the extent of functional disability which helps the early recognition of diseases severity, which further could improve the treatment regime and better outcomes.^{2,6} However, majority of population do not use screening tools and scales because of various reasons including unavailability of the literature in their mother or national language. Therefore, various tools and questionnaires are being translated for cultural adaptation.

Jordan et al (1998) developed a self-administered tool to measure the functional disabilities level in patients with cervical pain.⁷ The CNFDS was particularly invented to overcome the Neck Disability Index's lack of application to the general European populations. The CNFDS tool contains 15 items with the possible responses of 'yes', 'occasionally' or 'no'. For item no 1 till item no 5, a 'yes' specifies a good function. For item number 6 till item number 15, a 'no' indicates a good function. A good function obtains a score of 0, a poor function obtains a score of 2 and the response 'occasionally' always obtains a score of 1. The total score of CNFDS is directly proportional to the functional disability level, in which greater scores represent a higher disability.⁸

The CNFDS original version and other translated versions have shown good to excellent psychometric properties including validity and reliability.^{7,9,10} However, up to current literature searching no Urdu translated version is available of CNFDS. Therefore, the study aimed to translate CNFDS into CNFDS-U (Urdu version of CNFDS), and validate the CNFDS-U for cross-cultural adaptation.

Methodology

It was a cross sectional validation study conducted at Physical Therapy Department of Haider Hospital Multan. The sample size calculates for suggested total 75 participants. As per Kline 2011 criteria.²⁰ The study included the participants with age 18 to 40 years of both gender. The Participants has nonspecific neck pain for minimum 12 weeks taken by purposive sampling technique. Ethical Committee of University of Lahore approved the study (Ref no IRB-UOL-FAHS/891/2021).

Translation process consisted of total five steps; Step 1; Two instinctive Urdu-speaking translators (one physical therapist and one person with MA in English) who were also formally familiar with English translated the English CNFDS into Urdu. Both translation individuals were informed to target for conceptual rather than literal word to word translation. Step 2; Both translations were synthesized and consensus version was produced by formal discussion between the two independent translators and one of research author. Step 3; Next step was the backward translation of the synthesized translated version. Two professional translators accomplished the task of backward translation. These two translators were kept blinded regarding questionnaire development concepts. Step 4 Then an expert committee reviewed all these translations. The expert committee consisted of professional translators, clinical researchers, physical therapists, and a methodologist. After reviewing forward translation, synthesized translation and backward translation the committee finalized a pre-final version. Step 5 The pre-final version of CNFDS-U approved by the expert committee was tested on 20 individuals with cervical pain to examine face validity. When the 20 individuals filled the questionnaire, then all items of CNFDS-U were discussed one by one with all participants. The recommendation and suggestions from the 20 participants were recorded and reviewed by the expert committee. After minor changes on suggestions and recommendation, the final version of CNFDS-U was developed and then was recommended for formal study data collection.

Data Collection Tools: NDI (Neck Disability Index) Neck disability is driven from Oswestry Disability Index (ODI), consisted of total 10 items questions. Each question contains six possible answers with scoring from zero to five. Maximum score of NDI is 50 and minimum is 0. Greater the score represents greater disability. NDI is valid and reliable tool extensively examined for psychometric properties in neck pain population.^{11, 12} NPRS (Numeric Pain Rating Scale) NPRS is 10 cm vertical scale, which contains 0 to 10 marking and is extensively used to rate the pain intensity. The 0 represents no pain while 10 represents maximum excruciating pain experienced. Patient were asked to mark the level of your neck pain according to the number (greater the number greater the intensity of pain).¹² CNFDS-U Patient filled the final version of CNFDS-U on two events. Self-Structured Questionnaire

On day first patient demographics including age, gender, onset of neck pain, occupation, and address were obtained on self-structured questionnaire.

Data collection and data analysis procedure All patients signed written informed consent form and an approval

was sought from Ethics Committee of University of Lahore. All the patients completed the NDI, NPRS, and CNFDS-U questionnaires on day 1. Patients were asked to fill the CNFDS-U on 3rd day also. It was made sure that both readings of CNFDS-U were taken by same examiner, so that test-retest reliability could be measured. Analysis was carried out on SPSS version 23. Quantitative variables were presented with mean $\pm$ SD and qualitative variables were presented with frequency and percentage. Reliability was determined by test-retest reliability across repeated measures and internal consistency. Test-retest reliability was determined using an intra-class correlation coefficient (ICC2,1) and 95% confidence intervals (CIs). Internal consistency was determined with Cronbach's alpha. It was expected that Cronbach's alpha would be greater than 0.7 and intra-class correlation coefficient would be greater than 0.8.

Results

The study sample was consisted of total 75 individuals with mean $\pm$ SD age of 27.24 $\pm$ 9.73 years.

Among 75 subjects there were 34 (45%) males and 41 (55%) females. The mean score of CNFDS-U (Day 1) was 15.14 $\pm$ 5.64 and mean at 3rd day was 13.8 $\pm$ 4.96 ($P = 0.003$) (Table I). The Cronbach's alpha for CNFDS-U was 0.76. The test-retest reliability determined with ICC (2, 1) was 0.84 (95% CI; 0.74 to 0.90, $P < 0.001$). (Table II) Test-retest mean scores correlation was $r = 0.86$ ($P < 0.001$). (Table III)

Table I: Descriptive data of the study tools.			
Variables	Day 1 (Mean $\pm$ SD)	Day 3 (Mean $\pm$ SD)	P value
CNFDS-U	15.14 $\pm$ 5.64	13.8 $\pm$ 4.96	0.003**
NDI	20.06 $\pm$ 10.88	14.98 $\pm$ 9.55	0.000**
NPRS	5.61 $\pm$ 1.99	4.57 $\pm$ 1.2	0.000**

The Pearson's correlation coefficient between CNFDS-U and NDI was $r = 0.65$ ($P < 0.001$). The Pearson's

Table II: Test-retest Reliability			
	Intra Class Correlation	95% Confidence Interval	P value
Test-retest	0.84	0.75 to 0.90	<0.001

Table III: Correlation of CNFDS-U.		
Variables	Pearson's R	P value
CNFDS-U day 1 and day 3	0.86	<0.001
CNFDS-U and NDI	0.65	<0.001
CNFDS-U and NPRS	0.60	<0.001

correlation coefficient between CNFDS-U and NPRS was $r = 0.60$ ($P < 0.001$). Factor analysis was performed for structural validity and exploratory factor analysis discovered five factors explained as 5 components' values were greater than 1. The

scree plot (Figure 1) also specified a clear uni-dimensional flow for the CNFDS-U.

Reliability Statistics		
Table IV: Cronbach's Alpha		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No of Items
0.755	0.753	15

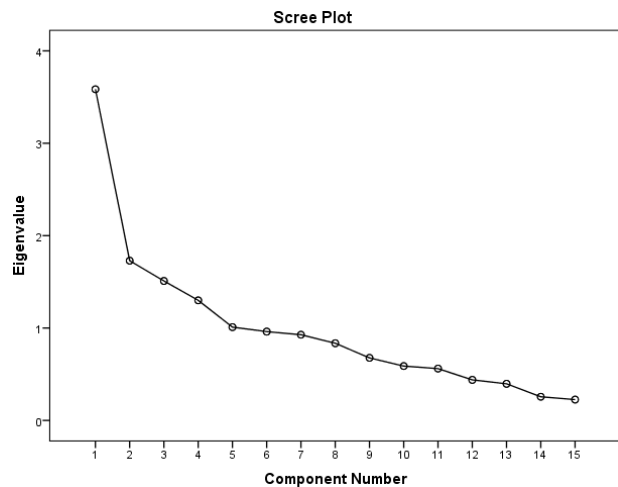


Figure 1. Scree Plot of components.

Discussion

To our up to dated literature searching the study is pioneer that has translated the Copenhagen Neck Functional Disability Scale in Urdu language for the first time and evaluated the validity, reliability, and cultural adaptation related to Pakistani population. In our study, mean score for CNFDS-U was 15.14 $\pm$ 5.64 that shows significant disability in Pakistani population with neck pain. While mean score of neck disability index also showed mild cervical functional disability in the Pakistan population (5.61 $\pm$ 1.99).

Regarding the psychometric properties first of all the internal consistency of the CNFDS-U was measured through Cronbach's alpha was good (Cronbach's alpha = 0.76). While previously a study conducted by Ahmed Mohammed et al (2018) also found the good to excellent internal consistency (Cronbach's alpha = 0.86) for the Arabic version of CFNDS.¹³ The Italian version translated and validated by Domenico Angilecchia et al (2018) also had good to excellent internal consistency (Cronbach's alpha = 0.84).¹⁴ Cao et al (2021) found internal consistency of Chinese version of CNFDS as good to excellent; Cronbach's alpha = 0.83.⁹ The Persian version of CFNDS was published by Ghasemi et al (2019) and the internal consistency was also found to be good to excellent (Cronbach's alpha = 0.91).¹⁵ Overall, the findings of our study related to internal consistency validity were similar to previous linguistic translated version of CNFDS.

In the study, next psychometric element considered was test-retest reliability measured with Intra Class Correlation Coefficient (ICC2, 1). Our study found excellent test-retest reliability for CNFDS- U (ICC = 0.84, $P < 0.001$). The original version of CNFDS has demonstrated excellent test-retest reliability (ICC = 0.99)⁷, while previous translated version of CNFDS into different languages also shown good to excellent reliability. Same results were reported by Domenico Angilecchia et.al (2018) regarding the test-retest reliability of Italian version of CNFDS (ICC = 0.99, (0.996 to 0.998 95% CI)).¹⁴ Similar excellent test-retest reliability (ICC = 0.93, $P < 0.05$) was found for the Chinese version of CNFDS, translated and validated by Cao et al (2021).¹⁶ Relatively the Persian version of CNFDS showed more close values for ICC to our findings which were ICC = 0.85, concluded by Ghasemi et al (2019).¹⁵ Likewise, the Turkish version of CNFDS, translated by Yapali et al (2012) found good to excellent test-retest reliability (0.85 (95% CI = 0.68 to 0.94)).¹⁷ The discussion regarding the reliability of CNFDS-U with previous translated version demonstrates that just like previous studies, the CNFDS-U has proven excellent test-retest reliability.

Previous literature has determined the concurrent validity in aspect of psychometric properties of CNFDS original and translated versions. In our study, the concurrent validity was determined by estimating the strength and direction of correlation with previous validated tools being used for neck pain and disability including NDI and NPRS.

In our study statistical significant moderate strength correlation was found for both NDI ($r = 0.65$, $P < 0.001$), and NPRS ($r = 0.6$, $P < 0.001$). Previously both the NDI and NPRS has shown excellent validity and reliability for measuring neck disability and neck pain respectively.^{18, 19} The original version of CNFDS has demonstrated strong significant positive correlation with pains scales including NPRS ($r = 0.83$, $p < 0.05$), Global Assessment Scale ($r = 0.89$, $P < 0.05$).⁷ Likewise, for the Italian version of CNFDS the Pearson correlation coefficient showed good to excellent concurrent validity ($r = 0.85$ with NDI, $r = 0.71$ with NBQ, $r = 0.57$ with VAS).¹⁴ The Chinese version of CNFDS has also shown good to excellent correlation with NDI ($r = 0.65$, $P < 0.01$), VAS ($r = 0.59$, $P < 0.01$), and as well as for parameters of SF-36 it ranges from 0.47 to 0.6 ($P < 0.05$).¹⁶ Similarly, Ghasemi et al (2019) found good to excellent correlation for Persian version of CNFDS with NDI and VAS ($P < 0.05$).¹⁵

While French version of CNFDS has shown moderate to strong correlation with SF-36 domains; 0.46 for CDNFS and SF36 physical ($P < 0.001$), 0.44 for CDNFS and SF36 mental ($P < 0.001$), 0.46 for CDNFS and perceived health change

($P < 0.001$), 0.43 for CDNFS and physical function ($P < 0.001$), 0.49 for CDNFS and limitations in physical functions ($P < 0.001$), 0.42 for CDNFS and SF36 bodily pain ($P < 0.001$), 0.4 for CDNFS and general health status ($P < 0.001$). French version of CNFDS also demonstrated moderate correlation with VAS (Spearman's $\rho = 0.45$, $P < 0.05$).¹⁰ Similar findings were reported for Turkish version published by Yapali et al (2012), strong correlation was found between CNFDS Turkish version and NDI 0.79 ($P < 0.001$), and between CNFDS and VAS 0.73 ($P < 0.001$).

Discussing the findings of our study regarding concurrent and construct validity estimated with correlation of CNFDS-U with previously validated tools has proven good to excellent concurrent validity. However, the tools considered in previous studies for determining concurrent validity may vary from study to study.

Conclusion

The study findings on the psychometric properties and discussion of study findings with previous literature has clearly shown that just like previous translated versions the Urdu translated version of CNFDS has high internal consistency, excellent test-retest reliability, and good concurrent validity. Furthermore, the CNFDS-U and NDI scores demonstrates significant mild to moderate neck functional disability in Pakistani population.

Recommendation and Limitations: Pakistani population has significant incidence of cervical functional disability, therefore, prevention and educational programs must be initiated. Further tools regarding musculoskeletal screening should be translated in Urdu language to counter language barrier. Further researches with larger sample size should be conducted to further evaluate the global burden of disease regarding cervical dysfunctions. The study lacks in the factorial analysis of CNFDS-U. The study sample was less when compared to previous studies on translated versions of CNFDS. The study was only single centered study.

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References

1. Bier JD, Scholten-Peeters WG, Staal JB, Pool J, van Tulder MW, Beekman E, et al. Clinical practice guideline for physical therapy assessment and treatment in patients with nonspecific neck pain. *Physical therapy*. 2018;98(3):162-71.
2. 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;33:77-83.
3. Ha SY, Sung YH. A temporary forward head posture decreases function of cervical proprioception. *Journal of exercise rehabilitation*. 2020;16(2):168.
 4. Mujawar JC, Sagar JH. Prevalence of Upper Cross Syndrome in Laundry Workers. *Indian J. Occup. Environ. Med*. 2019 Jan-Apr;23(1):54-6.
 5. Osborn W, Jull G. Patients with non-specific neck disorders commonly report upper limb disability. *Manual Therapy*. 2013 2013/12/01;18(6):492-7.
 6. Kim YJ, Park JY, Choi KY, Moon BJ, Lee JK. Case reports about an overlooked cause of neck pain: calcific tendinitis of the longus colli. *Medicine*. 2017;96(46).
 7. Jordan A, Manniche C, Mosdal C, Hindsberger C. The Copenhagen Neck Functional Disability Scale: a study of reliability and validity. *J Manipulative Physiol Ther*. 1998;21(8):520-7.
 8. Angilecchia D, Mezzetti M, Chiarotto A, Daugenti A, Giovannico G, Bonetti F. Development, validity and reliability of the Italian version of the Copenhagen neck functional disability scale. *BMC Musculoskeletal Disorders*. 2018 2018/11/23;19(1):409.
 9. Cao S, Zhou C, Wang Q, Hu F, Zhang L, Ding Y, et al. Cross-cultural Adaptation and Validation of the Simplified Chinese Version of the Copenhagen Neck Function Disability Scale. *Spine*. 2021;46(15):1048-53.
 10. Forestier R, Françon A, Arroman FS, Bertolino C. French version of the Copenhagen neck functional disability scale. *Joint Bone Spine*. 2007 2007/03/01;74(2):155-9.
 11. Kim E-K, Kim JS. Correlation between rounded shoulder posture, neck disability indices, and degree of forward head posture. *Journal of physical therapy science*. 2016;28(10):2929-32.
 12. Firdous S, Mehta Z, Fernandez C, Behm B, Davis M. A comparison of Numeric Pain Rating Scale (NPRS) and the Visual Analog Scale (VAS) in patients with chronic cancer-associated pain. *American Society of Clinical Oncology*; 2017.
 13. Elbeltagy AM, El Sayed WH, Allah SSR. Validity and Reliability of the Arabic Version of the Copenhagen Neck Functional Disability Scale in Neck Pain Patients. *Asian spine journal*. 2018;12(5):817.
 14. Angilecchia D, Mezzetti M, Chiarotto A, Daugenti A, Giovannico G, Bonetti F. Development, validity and reliability of the Italian version of the Copenhagen neck functional disability scale. *BMC Musculoskeletal Disorders*. 2018;19(1):1-9.
 15. Ghasemi F, Yoosefinejad AK, Pirouzi S, Ghaem H. Evaluating the cross-cultural adaptation, reliability, and validity of the Persian versions of the copenhagen neck function disability scale and neck bournemouth questionnaire. *Spine*. 2019;44(2):E126-E32.
 16. Kirkwood RN, Batista NCL, Marques LBF, de Melo Ocarino J, Neves LLA, de Souza Moreira B. Cross-cultural adaptation and reliability of the functional gait assessment in older Brazilian adults. *Braz. J. Phys Ther*. 2021;25(1):78-85.
 17. Yapali G, Günel MK, Karahan S. The Cross-Cultural Adaptation, Reliability, and Validity of the Copenhagen Neck Functional Disability Scale in Patients With Chronic Neck Pain: Turkish Version Study. *Spine*. 2012;37(11):E678-E82.
 18. Swanenburg J, Humphreys K, Langenfeld A, Brunner F, Wirth B. Validity and reliability of a German version of the Neck Disability Index (NDI-G). *Manual Therapy*. 2014;19(1):52-8.
 19. Young IA, Dunning J, Butts R, Mourad F, Cleland JA. Reliability, construct validity, and responsiveness of the neck disability index and numeric pain rating scale in patients with mechanical neck pain without upper extremity symptoms. *Physiother Theory Pract*. 2019;35(12):1328-35.
 20. Kyriazos TA. Applied psychometrics: sample size and sample power considerations in factor analysis (EFA, CFA) and SEM in general. *Psychology*. 2018;9(08):2207.2

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