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Translation and Cross-Cultural Adaptation of the International Duke Activity Status Index in the Urdu Version

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DECLARATIONS

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ABSTRACT

Background: Cardiovascular diseases are a leading cause of morbidity worldwide, necessitating effective tools for functional capacity assessment. The Duke Activity Status Index is widely used for this purpose; its adaptation and validation for Urdu speakers ensures accessibility and accuracy in clinical evaluations for native patients. **Objective:** To translate, cross-culturally adapt, and determine the validity & reliability of the Duke Activity Status Index Questionnaire in the Urdu version through psychometric properties. **Methodology:** It was a descriptive cross-sectional study conducted within 6 months at Allama Iqbal Hospital, Sialkot. A sample of 18 participants older than 22 years, having diagnosed coronary artery disease, valvular heart disease, arrhythmia, and who were able to recite and comprehend both Urdu and English, were included in the study. Two independent translators, both of whom had command of both English and Urdu and who were native speakers, worked on the forward translation from English to Urdu and formulated. A thorough review was done by the expert panel, which consisted of 10 experts having more than 10 years of clinical experience in cardiopulmonary physical therapy. The final Urdu version was forwarded to two expert translators, who were both native English speakers, for backwards translation, while maintaining the blinding. A small pilot study was done on 10 cardiovascular disease patients. The translated version was again re-evaluated by the bilingual experts for any inconsistencies that might have existed. The final phase II focused on cross-cultural adaptation and the establishment of the reliability and validity of this version. The participants were requested to fill Urdu version, and the test was repeated after 20 hours. Intra-class correlation coefficient was applied to analyse test-retest reliability. **Results:** The Duke Activity Status Index had good face and content validity. The test-retest reliability showed a strong relationship between the two measures ($r=0.01$) and an excellent correlation (intra-class correlation=0.89). **Conclusion:** The Duke Activity Status Index-Urdu version showed a very good agreement of the translated Urdu version with the original English version. The psychometric properties of this version were good, with strong reliability and validity.

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INTRODUCTION

In 1989, MA Hlatky developed the Duke Activity Status Index (DASI) to predict the functional capacity in cardiovascular disease patients (CVD).¹ The DASI is a reliable instrument used to assess functional capacity, especially useful for evaluating preoperative risk in individuals with conditions such as pulmonary, cardiovascular diseases, heart failure, chronic kidney disease, and cancer.²⁻⁷ Moreover, the tool has proven to be a useful and valid tool for the calculation of the peak oxygen consumption (VO_2).^{3,8,9} The diagnosis of CAD has conventionally emphasised the existence of obstructive CAD. However, non-obstructive coronary arteries are regarded to be present in at least two out of every five angina patients who are referred for elective angiography; the incidence is even greater in females. Recently, the American Heart Association and the American College of Cardiology revised the CAD definition to include both obstructive and non-obstructive forms, recognising that ischemia can occur without the presence of blockages.

For patients with myocardial ischemia (MI) symptoms but no obstructive coronary arteries, these same guidelines included a diagnostic pathway for assessing chest pain.¹ Perioperative complications are more likely to occur in people with low functional capacity. The DASI can determine the highest level of physical activity that is possible. It's unclear, though, how well the DASI score detects high-risk individuals.² Recent evidence has suggested that there is a better correlation of functional capacity with VO_2 when clinicians assess the mentioned.² On the other hand, the DASI is a self-completed survey composed of 12 questions, each contributing differently to the overall score.^{3,13,14} Each question pertains to daily living activities and requires a simple 'yes' or 'no' response. This scale also provides estimations of peak VO_2 max and the metabolic equivalent (MET),^{1,15}

For an effective application, DASI has to be in the native language of the patients for better understanding.¹⁶⁻¹⁹ DASI has been translated into various languages such as Turkish, Hindi, Portuguese, Brazilian, Arabic and Thai.^{2,20-24} Currently, there has been no translation of the tool in any of the national languages of Pakistan. Thereby, this study aimed to translate and work on the cross-cultural adaptation of the questionnaire DASI in Urdu and establish the

reliability and validity of the translated version.

METHODOLOGY

It was a descriptive cross-sectional study design conducted within 6 months, after approval from the Research Ethical Committee (REC), Riphah International University, with Ref # Riphah/RCRS/REC/00783. The study was conducted at Allama Iqbal Hospital, Sialkot. A sample size of 18 was calculated. Non-probability convenience sampling was used to recruit the sample of 18. Participants older than 22 years who had a diagnosis of CVD, such as CAD, valvular heart disease, or irregular heart rhythm with at least one symptom, such as pain in the chest, palpitations, fatigue, or shortness of breath, had physician referrals to exercise testing and were able to recite and comprehend both Urdu and English were included in the study. The participants who had cognitive dysfunctions screened by the mini-mental state examination or were hospitalised two months before the study was conducted due to any acute illness, fever, or any severe physical limitation that could prevent them from doing the exercise test were excluded from the study.

According to WHO guidelines, the first phase focused on the translation of the tool under study. Two native speakers fluent in both English and Urdu independently translated the DASI into Urdu, producing two initial versions: DASI (T1) and DASI (T2). A thorough review was done by the expert panel, which consisted of 10 experts who had more than 10 years of clinical experience in cardiopulmonary physical therapy and rehabilitation from the Hospitals of Sialkot, Lahore, and Islamabad. To ensure accuracy, the finalised Urdu version of DASI was sent for back-translation to two expert translators who were native English speakers, keeping the process blinded. Informed consent was taken from all participants.

A small pilot study was done on 10 cardiovascular disease patients. Bilingual experts reassessed the translated version to identify and correct any inconsistencies. For any inconsistencies that might have existed. The summary of Phase I is shown in Figure 1. The final Phase II focused on cross-cultural adaptation and the establishment of reliability and validity of the DASI-Urdu version. Demographic data was obtained, including the weight and height of the participants as well.

Participants were asked to complete the DASI-Urdu version, and the same test was administered again after a 20-hour interval. The data was then

analysed using SPSS-21 software. Face and content validity were established. ICC was applied to analyse retest reliability. The summary of Phase

Figure 1: Translation of Duke Activity Status Index (Phase I)



Cross-cultural adaptation, reliability, and validity of DASI (Phase-II)

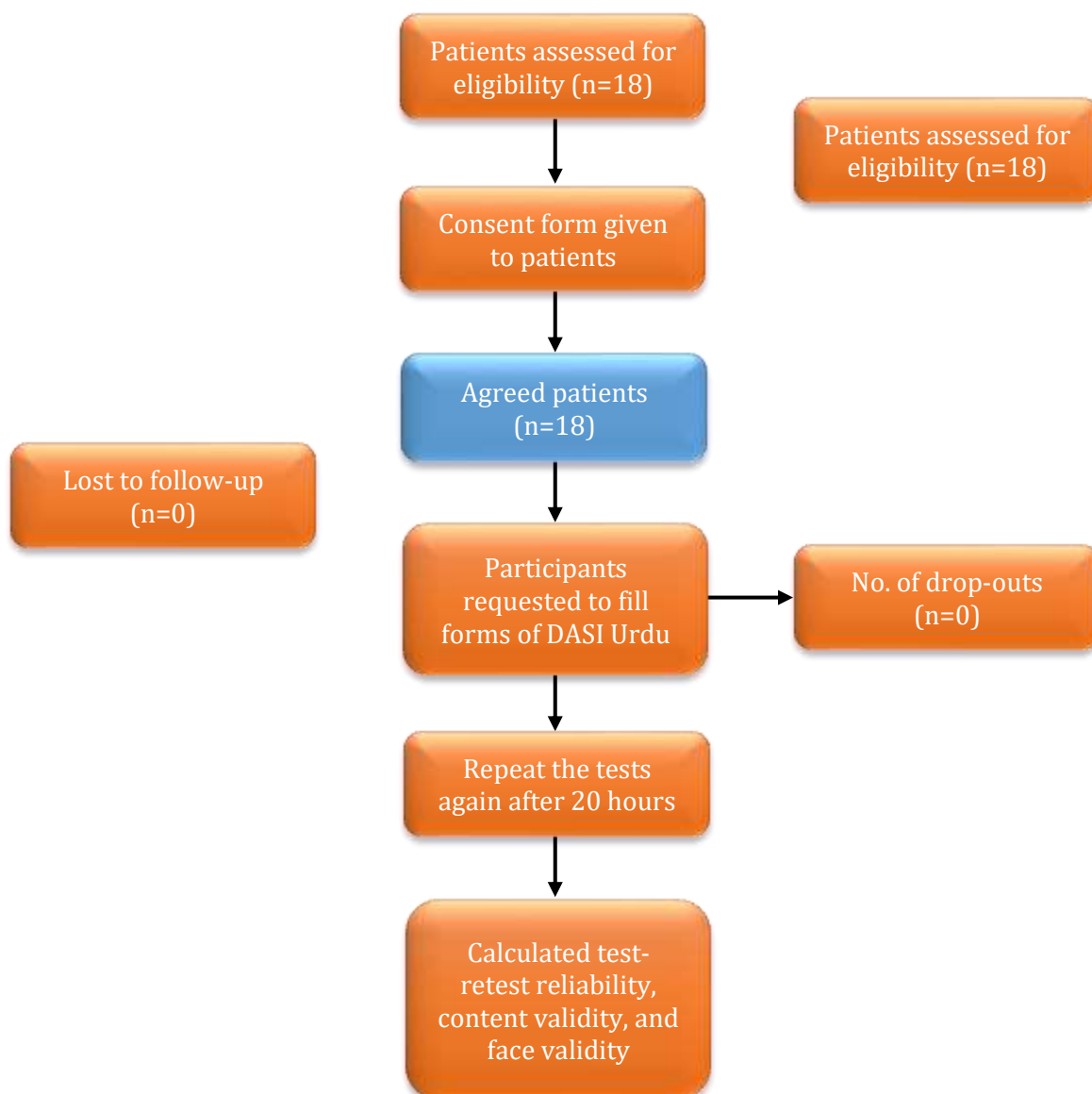


Table 1: Demographics of DASI Urdu in pilot testing and disease population

Variables	Pilot testing Mean±SD (n=10)	Disease population Mean±SD (n=18)
Age	53.833±14.84	54.30 ±14.90
DASI score 1	22.55 ±15.01	24.21±17.68
DASI score 2	22.55 ±15.01	24.21±17.68

Table 2: Test-retest reliability and construct validity for Urdu and English versions of DASI

Cronbach's alpha	0.94
Intraclass correlation coefficient	0.89
Pearson correlation	1.0
p-value	0.00

It is shown in Figure 1.

RESULTS

In this study, 10 cardiovascular disease patients, 6 females and 4 males, with a mean age of 54.30±14.90 years, were recruited in the pilot study.¹⁸ 18 cardiovascular disease patients, 7 females, and 11 males, with a mean age of 53.83±14.84 years, were recruited in the study as shown in Table 1. A panel of experts evaluated both the forward and backwards translations to determine face and content validity. Face validity was assessed using a binary scale with 'YES' or 'NO' responses. Participants unanimously agreed that the items in the questionnaire were easy to understand, clearly worded, and relevant to the study's objectives.

Content validity was evaluated using both a symbol plate and a Likert scale. Each item showed an item-level content validity index (I-CVI) above 0.80, and the overall scale-level content validity index (S-CVI) reached 1.00, reflecting outstanding content validity. As presented in Table 2, analysis of test-retest reliability indicated a strong association between the two administrations of DASI ($r=0.01$) and showed excellent consistency, with an ICC of 0.89. Furthermore, A Cronbach's alpha value of 0.94 was obtained for test-retest reliability, confirming strong internal consistency.

For construct validity, the DASI-Urdu was compared to the results of DASI-English, and Pearson's correlation was recorded at 0.01 with a p-value less than 0.05, confirming the construct validity of the tool, which is detailed in Table 2.

DISCUSSION

This study was conducted to translate and analyse the psychometric properties of the Urdu version of DASI. A panel of experts confirmed the face validity by evaluating each item on a 'yes' or 'no' scale, concluding that the translated version was straightforward, easy to understand, and clear. The validity and reliability of the Duke-Urdu questionnaire were established. The Duke-Urdu version showed strong validity, as indicated by a Pearson correlation of 0.01 with a p-value less than 0.05, along with high reliability demonstrated by an ICC of 0.89. Consistent were the results of DASI-Hindi, which was found to be a reliable tool (internal consistency of 0.78, test-retest reliability of 0.65, $p<0.05$) for the Indian cardiovascular disease individuals.²

In the Turkish population, the DASI version exhibited excellent internal consistency, with a Cronbach's alpha of 0.99 and an ICC of 0.98, reflecting high reliability. Similarly, other translated adaptations of the DASI also exhibited high reliability, with a Cronbach's alpha of 0.90 among cardiovascular disease patients diagnosed with either ischemic or idiopathic dilated cardiomyopathy. Additionally, when tested among cardiovascular patients, the Portuguese version of DASI showed strong reliability, including a test-retest ICC of 0.87, an inter-rater ICC of 0.84, and a Cronbach's alpha of 0.93.

The reliability results of DASI-Urdu have been in line with the previous evidence and have proven to be a reliable tool for patients with cardiovascular diseases. Our findings revealed an ICC of 0.89, a p-value below 0.05, and $r = 0.01$, confirming that the tool is both reliable and valid for assessing Urdu-speaking patients with heart failure. Adding further, DASI-Arabic showed ICC=0.78–0.88, indicating highly reliable for use in the Arabic language.²⁴ However, the generalizability of this study was somewhat restricted due to limitations imposed by the COVID-19 pandemic. Future researchers are encouraged to conduct comparison studies with a larger sample size and include other diseased groups.

CONCLUSION

In summary, the Urdu translation of the Duke Activity Status Index (DASI) showed high test-retest reliability in individuals with cardiovascular conditions and achieved solid face and content validity. Concurrent validity was found to be nearly optimal, with average strength movements showing consistent reliability across repeated measures. The availability of this culturally and linguistically adapted tool enables healthcare professionals in Pakistan to efficiently gather patient data, minimising the need for extensive explanations, as respondents can more easily comprehend the items in their native language. Thus, the Urdu DASI can be considered a reliable and valid instrument for use in clinical and research settings within the local population.

DECLARATIONS

Consent to participate: Written consent had been obtained from patients. All methods were performed following the relevant guidelines and regulations.

Availability of data and materials: Data will be available on request. The corresponding author will submit all dataset files.

Competing interests: None

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REFERENCES

1. Members WC, Gulati M, Levy PD, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. 2021; 78(22): e187-e285.
2. Silvapulle E, Darvall J, De Silva AJJoCA. Association between the Duke Activity Status Index and complications after noncardiac surgery: A systematic review. *Journal of Clinical Anaesthesia* 2025; 103: 111808.
3. Hlatky MA, Boineau RE, Higginbotham MB, Lee KL, Mark DB, Califf RM, et al. A brief self-administered questionnaire to determine functional capacity (the Duke Activity Status Index). *The American Journal of Cardiology*. 1989;64(10):651-4.
4. Govil N, Parag K, Kumar B, Khandelwal H, Dua R, Sivaji P. Translation, Cultural Adaptation, and Validation of the Duke Activity Status Index in

the Hindi Language. *Annals of Cardiac Anaesthesia*. 2020;23(3):315-20.

5. Wijeyesundera DN, Pearse RM, Shulman MA, Abbott TE, Torres E, Ambosta A, et al. Assessment of functional capacity before major non-cardiac surgery: an international, prospective cohort study. *The Lancet*. 2018;391(10140):2631-40.
6. Grodin JL, Hammadah M, Fan Y, Hazen SL, Tang WHW. Prognostic value of estimating functional capacity with the use of the Duke Activity Status Index in stable patients with chronic heart failure. *Journal of Cardiac Failure*. 2015 Jan;21(1):44-50.
7. Carter R, Holiday DB, Grothues C, Nwasuruba C, Stocks J, Tiep B. Criterion validity of the Duke Activity Status Index for assessing functional capacity in patients with chronic obstructive pulmonary disease. *Journal of Cardiopulmonary Rehabilitation and Prevention*. 2002 Aug;22(4):298-308.
8. Ravani P, Kilb B, Bedi H, Groeneveld S, Yilmaz S, Mustata S, et al. The Duke Activity Status Index in patients with chronic kidney disease: a reliability study. *Clinical Journal of the American Society of Nephrology*. 2012 Apr;7(4):573-80.
9. Li MH-G, Bolshinsky V, Ismail H, Ho K-M, Heriot A, Riedel B. Comparison of Duke Activity Status Index with cardiopulmonary exercise testing in cancer patients. *Journal of Anesthesia*. 2018 Aug;32(4):576-84.
10. Senthong V, Wu Y, Hazen SL, Tang WW. Predicting long-term prognosis in stable peripheral artery disease with baseline functional capacity estimated by the Duke Activity Status Index. *American Heart Journal*. 2017;184:17-25.
11. Shulman M, Cuthbertson B, Wijeyesundera D, Pearse R, Thompson B, Torres E, et al. Using the 6-minute walk test to predict disability-free survival after major surgery. *British Journal of Anaesthesia*. 2019;122(1):111-9.
12. Stokes JW, Wanderer JP, McEvoy MD. Significant discrepancies exist between clinician assessment and patient self-assessment of functional capacity by validated scoring tools during preoperative evaluation. *Perioperative Medicine*. 2016;5(1):1-8.
13. Elias KM. Understanding Enhanced Recovery After Surgery Guidelines: An Introductory Approach. *Journal of Laparoendoscopic & Advanced Surgical Techniques*. 2017 Sep;27(9):871-5.
14. Ajitsaria P, Eissa SZ, Kerridge RK. Risk Assessment. *Curr Anesthesiol Rep*. 2018 Mar 1;8(1):1-8.
15. Fernandes-Andrade AA, Britto RR, Soares

DCM, Velloso M, Pereira DAG. Evaluation of the Glittre-ADL test as an instrument for classifying functional capacity of individuals with cardiovascular diseases. *Brazilian Journal of Physical Therapy*. 2017 Sep 1;21(5):321–8.

16. KIM J, PARK E, AN M. The Cognitive Impact of Chronic Diseases on Functional Capacity in Community-Dwelling Adults. *Journal of Nursing Research*. 2019 Feb;27(1):1–8.

17. Wijesundera DN, Beattie WS, Hillis GS, Abbott TE, Shulman MA, Ackland GL, et al. Integration of the Duke Activity Status Index into preoperative risk evaluation: a multicentre prospective cohort study. *British Journal of Anaesthesia*. 2020;124(3):261–70.

18. Kiptoo-Tarus P. The psychology of mother language: Diversity or adversity; towards peace building and cohesion among ethnic communities in Kenya. *Hybrid Journal of Psychology* 2021 Apr 13;2(1). Available from:

<https://royalliteglobal.com/psychology/article/view/587>

19. Moradi T, Sidorchuk A, Hallqvist J. Translation of questionnaire increases the response rate in immigrants: Filling the language gap or feeling of inclusion? *Scandinavian Journal of Public Health*. 2010 Dec 1;38(8):889–92.

20. Johnson CM, Rostila M, Svensson AC, Engström K. The role of social capital in explaining mental health inequalities between immigrants and Swedish-born: a population-based cross-sectional study. *BMC Public Health*. 2017 Jan 25;17(1):117.

21. Svensson AC, Fredlund P, Laflamme L, Hallqvist J, Alfredsson L, Ekbom A, et al. Cohort Profile: The Stockholm Public Health Cohort. *International Journal of Epidemiology*. 2013 Oct;42(5):1263–72.

22. Mustafaoglu R, Demir R, Aslan GK, Sinan UY, Zeren M, Yildiz A, et al. Translation, cross-cultural adaptation, reliability, and validity of the Turkish version of the Duke Activity Status Index in patients with pulmonary hypertension. *Pulmonology*. 2021;S2531-0437.

23. Coutinho-Myrrha MA, Dias RC, Fernandes AA, Araújo CG, Hlatky MA, Pereira DG, et al. Duke Activity Status Index for cardiovascular diseases: validation of the Portuguese translation. *Arquivos Brasileiros de Cardiologia*. 2014;102:383–90.

24. Vibulchai N, Thanasilp S, Preechawong S, Broome ME. Validation of the Thai version of the Duke Activity Status Index in patients with a previous myocardial infarction. *Asian Biomedicine*. 2014;8(5):623–9.

25. Neves LMT, Alberto KN, Arenas FP, Arena

R, Cipriano Junior G. Translation and cross-cultural adaptation of the Duke Activity Status Index to Brazilian Portuguese. *Fisioterapia em Movimento*. 2013;26(3):631–8.

26. AlAmmari M, Sultana K, Al Harbi SN, Marenga AS, AlTuraiki A, Althemery AU, et al. Validation and psychometric properties of the Arabic version of the Duke Anticoagulation Satisfaction Scale (DASS). *Frontiers in Pharmacology*. 2020;11:1999.

27. Parissis JT, Nikolaou M, Birmpa D, Farmakis D, Paraskevaides I, Bistola V, et al. Clinical and Prognostic Value of Duke's Activity Status Index Along With Plasma B-Type Natriuretic Peptide Levels in Chronic Heart Failure Secondary to Ischemic or Idiopathic Dilated Cardiomyopathy. *The American Journal of Cardiology*. 2009 Jan 1;103(1):73–5.

28. Mustafaoglu R, Demir R, Aslan GK, Sinan UY, Zeren M, Kucukoglu MS. Does Duke Activity Status Index help predicting functional exercise capacity and long-term prognosis in patients with pulmonary hypertension? *Respiratory Medicine*. 2021;181:106375.