



## **Psychometric Properties of Cohen's Perceived Stress Scale - A Study among Atrial Fibrillation Patients**

**Bushra Jabeen<sup>1</sup>, Amra Salahuddin<sup>2</sup>, Yaman W. Kassab<sup>3</sup>, Krupavaram Bethala<sup>4</sup>,  
Ahmed Abdelrahman Gadelseed Salih<sup>5</sup>, Ganesh Sritheran Paneerselvam<sup>6</sup>,  
Winsthon Carpo Matias<sup>5</sup> and Muhammad Shahid Iqbal<sup>7\*</sup>**

<sup>1</sup>Department of Health Sciences, Faculty of Natural, Health, Humanities and Social Sciences, Khwaja Fareed University of Engineering & Information Technology, Rahim Yar Khan, Pakistan.

<sup>2</sup>Jinnah Sindh Medical University, Karachi, Pakistan.

<sup>3</sup>Department of Pharmacy Practice, College of Pharmacy, National University of Science and Technology, Muscat, Oman.

<sup>4</sup>School of Pharmacy, KPJ Healthcare University College, 71800 Nilai, Negeri Sembilan, Malaysia.

<sup>5</sup>Inpatient Pharmacy, Pharmacy Department, Mediclinic Airport Road Hospital, Abu Dhabi, UAE.

<sup>6</sup>School of Pharmacy, Taylor's University, 47500, Subang Jaya, Malaysia.

<sup>7</sup>Department of Clinical Pharmacy, College of Pharmacy, Prince Sattam bin Abdulaziz University, Al-kharj, 11942, Saudi Arabia.

### **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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### **ABSTRACT**

**Objective:** This study aimed to perform the psychometric properties of Perceived Stress Scale 10 among AF patients.

**Methodology:** A study was performed among AF patients using the Perceived Stress Scale 10. Sociodemographic and patients reported clinical data were collected. Descriptive and inferential statistics were applied using the Statistical Package for Social Sciences (SPSS) version 24.0. A p-value < 0.05 was considered statistically significant.

**Results:** Out of total 310 study participants, there were more female patients 185 (59.7%) than the male patients 125 (40.3%). No major issues regarding internal consistency, factorial validity, and convergent validity were observed.

**Conclusion:** The present study confirmed the reliability and validity of Perceived Stress Scale 10 among the studied cohort of the AF patients.

*Keywords: Stress; AF; psychometric; characteristics; perceived stress scale 10.*

## 1. INTRODUCTION

Arterial Fibrillation (AF) is characterized by the dyssynchronous contraction and excitation of the atrium and irregular ventricular excitation. AF is even reported in patients with unknown structural and electrophysiological abnormalities [1,2]. In literature, stress is the reaction when individuals perceive a divergence in their resources and abilities to respond to a stressor, usually a stimulus or an event [3,4].

Stress was shown to be associated with several cardiovascular outcomes. In women belonging to lower occupational status were shown to be associated with the increased risk of hypertension [5]. The response to a stressor is not an intuitive process that directly relates to the stressors or triggers, but stress usually occurs in a transactional way between the triggers and the subject [6]. The perceived stress is the subjective estimation of triggers or stressors, in a non-linear manner from the trigger to the stress response, mainly depend on various factors like gender, age, marital status, education, and experience [3-7].

The Perceived Stress Scale 10 was developed by Cohen, Kamarck, and Mermelstein in 1983. It is a self-reported tool and amongst the most frequently used instruments for measuring perceived stress. Till today it is frequently used to measure perceived stress among different target populations, i.e. patients and the general public [8,9]. The Perceived Stress Scale 10 comprised of 10 items which are used to measure "the degree to which situations in an individual's life is appraised as stressful" [10]. All 10 items of the Perceived Stress Scale 10 were designed to measure unpredictability, uncontrollability, and burdens among the individuals regarding their routine activities mainly in the last month. All of the Perceived Stress Scale 10 items are easy to grasp, and the responses received against them are simple to interpret, which makes the Perceived Stress Scale 10 to be used in any target population [8-10]. In the past, despite its extensive use, the Perceived Stress Scale 10 psychometric properties had not been tested

among AF patients. Therefore, this study aimed to evaluate psychometric properties of the Perceived Stress Scale 10 among AF patients.

## 2. MATERIALS AND METHODS

A study was conducted among AF patients. A total of 276 patients participated in the study. All of the study participants were adults (aged 18 years and above) and had AF. In this study, the convenience sampling technique was used to achieve the targeted sample.

As the Perceived Stress Scale 10 was first time used among AF patients so the psychometric properties validation of the Perceived Stress Scale 10 tool was also performed by determining its factorial and convergent validities. Factorial validation was done by measuring factor structure through Principal Component Analysis (PCA) by Exploratory Factor Analysis (EFA) with Varimax Rotation. Later on, it was reconfirmed with the same rotation using Partial Confirmatory Factor Analysis (PCFA) through Maximum Likelihood Analysis (MLA). Various fit indices were also determined to further ascertain the validity of the Perceived Stress Scale 10 like Root Mean Square Error of Approximation (RMSEA), Tucker Lewis Index (TLI), Comparative Fit Index (CFI), Normed Fit Index (NFI) and Incremental Fit Index (IFI). Convergent validity was accepted when the factor loadings (average) on the scale were  $\geq 0.7$  [11] and factorial validity was accepted when RMSEA was  $\leq 0.08$  and TLI, CFI, NFI, IFI were  $> 0.90$  [12].

Means and standard deviations were calculated for continuous variables, whereas the categorical variables were presented as frequencies and percentages. Data were coded and analyzed using the Statistical Package for Social Sciences (SPSS) version 24.0.

## 3. RESULTS AND DISCUSSION

Fig. 1 shows the demographic data of the study participants. A total of 195 (62.9%) of the patients were above 65 years of age whereas

115 (37.1%) were below 65 years of age. The marital status of the participants showed that 192 (61.9%) were married and 118 (38.1%) were either single or separated.

Table 1 shows Cronbach alpha value, which was obtained to ascertain the reliability of the Perceived Stress Scale 10 among AF patients. The internal consistency of the Perceived Stress Scale 10 was measured by Cronbach's alpha and the value was 0.778.

**Table 1. Internal consistency of the Perceived Stress Scale 10**

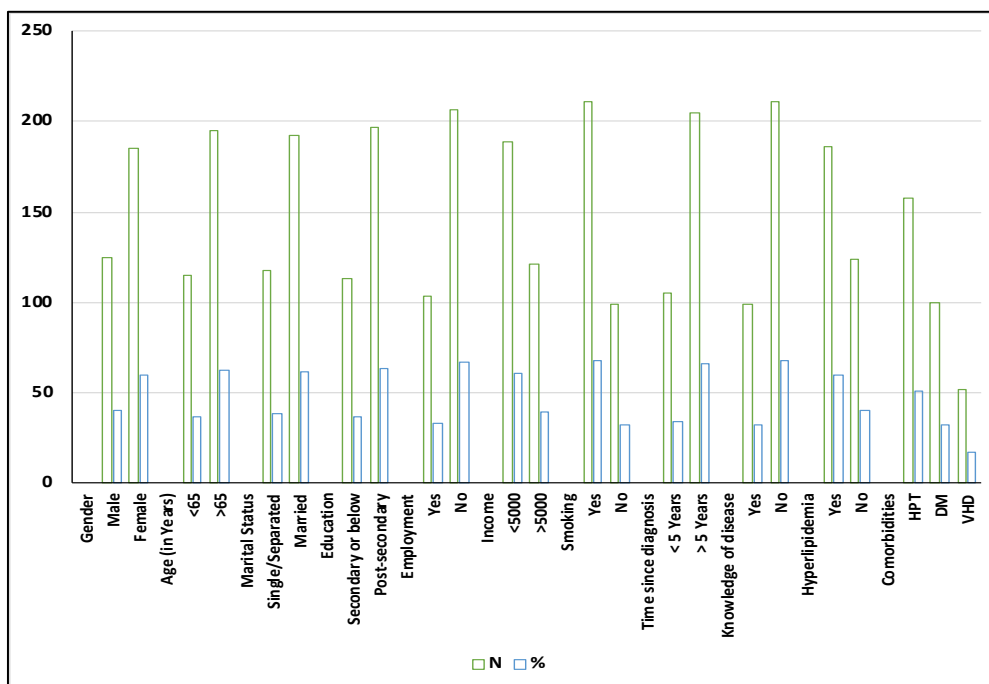
Item	Value
Cronbach alpha	0.778

Table 2 represents the factor structure of the Perceived Stress Scale 10 among AF patients. The Perceived Stress Scale 10 was first time used to measure stress level among AF patients in current study settings. Complete validation of the psychometric properties of the Perceived Stress Scale 10 was conducted. EFA was conducted using PCA with Varimax Rotation that highlighted a 2-factor solution based on eigenvalues >1.0. Non-salient factor loadings <0.3 and salient factor loadings >0.3 were recognized as a single factor solution. The KMO and Bartlett's test value was 0.923. The 2-factor solution was later confirmed using PCFA using

MLA with the same rotation. The null model ( $\chi^2$ ) value reported was 1766.122,  $df = 45$ , while implied model ( $\chi^2$ ) value was 71.778,  $df = 26$ . The fit indices, NFI = 0.93, NNFI = 0.95, CFI = 0.95, IFI = 0.96 i.e.,  $\geq 0.90$  and RMSEA = 0.07 i.e.,  $\leq 0.08$  were observed. All these values indicated an appropriate factor structure [13]. This established the factorial validity of the Perceived Stress Scale 10 among AF patients. Convergent validity was also established as the average factor loadings were calculated by adding all individual factor loadings and dividing the total by 10. The average factor loadings were 0.7, i.e.,  $\geq 0.7$  and hence, the convergent validity of the Perceived Stress Scale 10 was also established [14].

**Table 2. Factor structure of Perceived Stress Scale 10**

Items	Components	
	1	2
PSS1	0.75	
PSS2	0.63	
PSS3		0.81
PSS4		0.74
PSS5	0.68	
PSS6	0.75	
PSS7	0.58	
PSS8	0.69	
PSS9	0.69	
PSS10	0.71	



**Fig. 1. Demographic data of the AF patients**

The current study assessed the psychometric properties of Perceived Stress Scale 10 among AF patients. Stress especially physiological stress during chronic diseases especially heart diseases can have long-term effects on the overall health of the patients [15,16]. This was the first study to assess psychometric properties among AF patients in the studied population. A study done by Westcott *et al.* (2018) reported that several stress triggers like negative emotions are directly linked to the development and progression of AF while positive feelings and reframe from the stressors are considered as protective from AF [17].

The psychometric properties validation of the Perceived Stress Scale 10 was done to ascertain its validity and reliability among AF patients. This psychometric investigation found an adequate level of the internal consistency, factorial validity, convergent validity and floor and ceiling effect of the Perceived Stress Scale 10 among AF patients. PCFA evaluated the 2-factor model for the Perceived Stress Scale 10 among AF patients. The majority of the earlier studies showed the 2-factor model [18,19], some of them represented a 1-Factor model [19,20] and few presented with bi-factor model [21-23] but they were all in a different population than AF patients. In literature, the internal consistency of the Perceived Stress Scale 10 by the Cronbach alpha and McDonald's Omega values were adequately acceptable values of 0.70 and we obtained Cronbach alpha of 0.923. Floor and ceiling effects absence further entails the psychometric characteristics of the Perceived Stress Scale 10 among AF patients and endorsed that the variance of the measurement is not unaccounted [24]. It is observed that the Perceived Stress Scale 10 psychometric properties were quite adequate among the study population and had no major issues of the internal consistency, factorial validity, and convergent validity among AF patients.

#### 4. CONCLUSION

The current study confirmed the psychometric properties validation of the Perceived Stress Scale 10 among AF patients which was first time measured among the studied population.

#### CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

#### ETHICAL APPROVAL

It is not applicable.

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#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

#### REFERENCES

1. Ball J, Carrington MJ, McMurray JJ, Stewart S. Atrial fibrillation: profile and burden of an evolving epidemic in the 21st century. *Int J Cardiol.* 2013;167:1807-1824.
2. Zoni-Berisso M, Lercari F, Carazza T, Domenicucci S. Epidemiology of atrial fibrillation: European perspective. *Clin. Epidemiol.* 2014;6:213-220.
3. Manzar MD, Salahuddin M, Peter S, Alghadir A, Anwer S, Bahammam AS, et al. Psychometric properties of the perceived stress scale in Ethiopian university students. *BMC Public Health.* 2019;19:41.
4. Lee EH. Review of the psychometric evidence of the Perceived Stress Scale. *Asian Nurs Res.* 2012;6:121-127.
5. Djoussé L, Levy D, Benjamin EJ, Blease SJ, Russ A, Larson MG, et al. Long-term alcohol consumption and the risk of atrial fibrillation in the Framingham study. *Am J Cardiol.* 2004;93:710-713.
6. Bin Salih S, Showlag M, Al-Qahtani M, Taha A, Yousuf M, Abdullah M. Clinical characteristics of patients with atrial fibrillation at a tertiary care hospital in the central region of Saudi Arabia. *J Family Community Med.* 2011;18:80-84.
7. Lee EH. Review of the psychometric evidence of the perceived stress scale. *Asian Nurs Res.* 2012;6:121-127.
8. Folkman S. Gellman MD, Turner JR. *Stress: Appraisal and coping.* Encyclopedia of behavioral medicine New York, NY: Springer New York. 2013;1913-1915.
9. Maroufizadeh S, Zareiyan A, Sigari N. Reliability and validity of Persian version of

- perceived stress scale (PSS-10) in adults with asthma. *Arch Iran Med.* 2014;17:361-365.
10. Cohen BE, Edmondson D, Kronish IM. State of the art review: Depression, stress, anxiety, and cardiovascular disease. *Am. J. Hypertens.* 2015;28:1295-1302.
  11. Bollen KA, Long JS. Tests for Structural Equation Models: Introduction. 1992;21:123-131.
  12. Shima R, Farizah H, Majid HA. The 11-item medication adherence reasons scale: Reliability and factorial validity among patients with hypertension in Malaysian primary healthcare settings. *Singapore Med J.* 2015;56:460-467.
  13. Thrall G, Lip GY, Carroll D, Lane D. Depression, anxiety, and quality of life in patients with atrial fibrillation. *Chest.* 2007;132:1259-1264.
  14. Foundation KK. Determining poverty line and sufficiency line. Available: <https://kkf.org.sa/media/qfahczvz/1-determining-poverty-line-and-sufficiency-line-2017.pdf> Accessed 13 Nov 2021
  15. Dimsdale JE. Psychological stress and cardiovascular disease. *J Am Coll Cardiol.* 2008;51:1237-1246.
  16. Malik AO, Peri-Okonny P, Gosch K, Thomas M, Mena C, Hiatt WR, et al. Association of perceived stress levels with long-term mortality in patients with peripheral artery disease. *JAMA Netw Open.* 2020;3:e208741-e208741.
  17. Westcott SK, Beach LY, Matsushita F, Albert CM, Chatterjee N, Wong J, et al. Relationship between psychosocial stressors and atrial fibrillation in women >45 years of age. *Am J Cardiol.* 2018;122:1684-1687.
  18. Barbosa-Leiker C, Kostick M, Lei M, McPherson S, Roper V, Hoekstra T, et al. Measurement invariance of the perceived stress scale and latent mean differences across gender and time. *Stress Health.* 2013;29:253-260.
  19. Reis RS, Hino AA, Añez CR. Perceived stress scale: Reliability and validity study in Brazil. *J Health Psychol.* 2010;15:107-114.
  20. Roberti JW, Harrington LN, Storch EA. Further psychometric support for the 10-item version of the Perceived Stress Scale. *J. Coll. Couns.* 2006;9:135-147.
  21. Perera MJ, Brintz CE, Birnbaum-Weitzman O, Penedo FJ, Gallo LC, Gonzalez P, et al. Factor structure of the Perceived Stress Scale-10 (PSS) across English and Spanish language responders in the HCHS/SOL Sociocultural Ancillary Study. *Psychol. Assess.* 2017;29:320-328.
  22. Wu SM, Amtmann D. Psychometric evaluation of the perceived stress scale in multiple sclerosis. *ISRN Rehab.* 2013;2013:608356.
  23. Jovanovic VD, Gavrilov-Jerkovj VJP. More than a (negative) feeling: Validity of the perceived stress scale in serbian clinical and non-clinical samples. *Psihologija.* 2015;48:5-18.
  24. Lim CR, Harris K, Dawson J, Beard DJ, Fitzpatrick R, Price AJ. Floor and ceiling effects in the OHS: An analysis of the NHS PROMs data set. *BMJ Open.* 2015;5:e007765.

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