

## **Psychometric properties of Cohen's Perceived Stress Scale - A study among atrial fibrillation patients**

**Running title:** Psychometric properties of PSS-10 among AF patients

### **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*

## **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.

## **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 Principle 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.

## RESULTS and DISCUSSION

Figure 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.

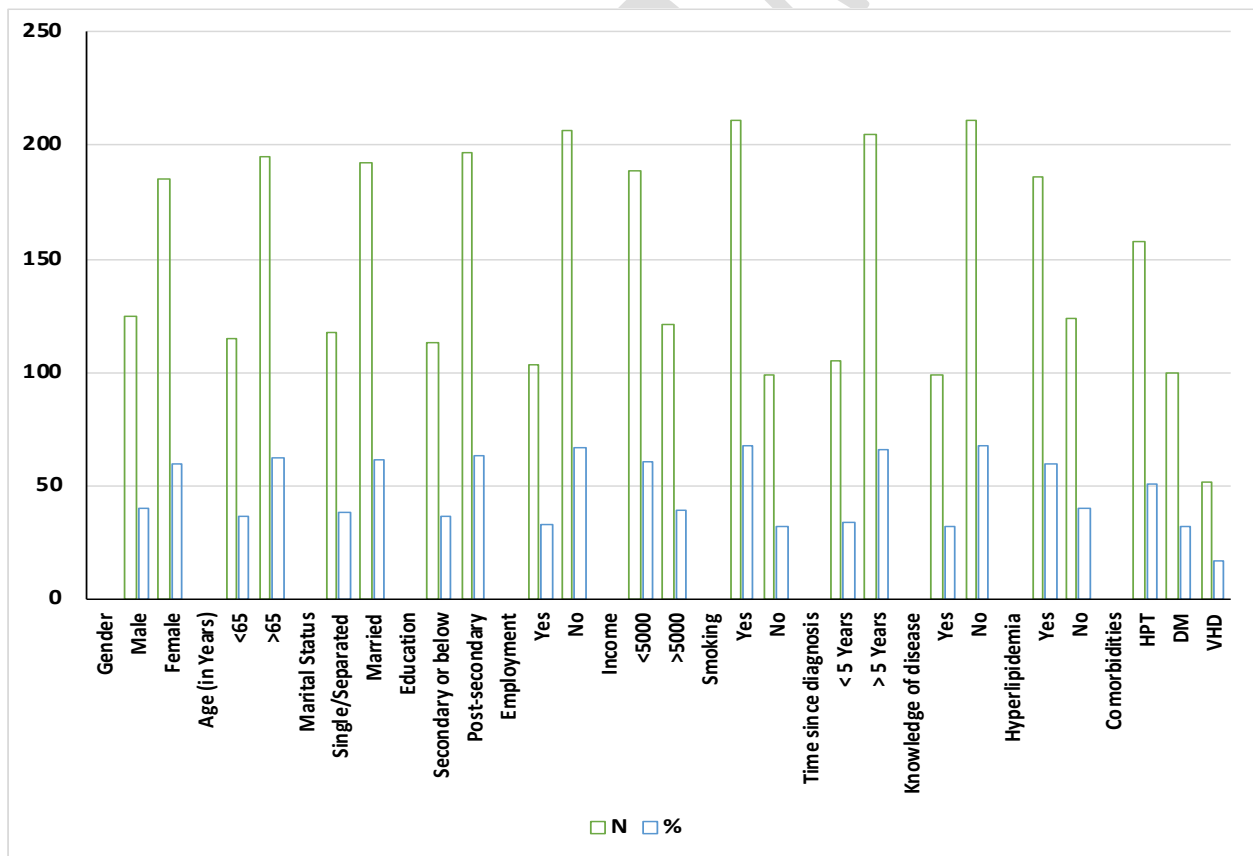


Figure 1: Demographic data of the AF patients

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.

**Table1: 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**  
**Components**

<b>Items</b>	<b>1</b>	<b>2</b>
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	

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.

## **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.

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