Original Research Article

Psychometric characteristics of Perceived Stress Scale – 10 (PSS-10) in cardiovascular patients

Running Head: Psychometrics of PSS-10 in cardiovascular patients

Abstract

Objective: The objective of the current study was to assess the psychometric characteristics of Perceived Stress Scale 10 (PSS-10) in cardiovascular patients.

Methodology: A cross-sectional study was performed in cardiovascular patients using the PSS-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: There were more male patients (n=212) than the female patients (n=150) in total of 362 studied patients. No major problems regarding internal consistency, factorial validity, convergent validity and floor and ceiling effect were observed.

Conclusion: The present study confirmed the psychometric characteristics of PSS-10 in cardiovascular patients.

KEYWORDS: *Stress, cardiovascular, reliability, validity, characteristics, PSS-10*

INTRODUCTION

Cardiovascular diseases usually caused due to electrophysiological or structural abnormalities that produce abnormal functioning of the impulses in the heart. Cardiovascular diseases usually are stroke, hypertension, heart failure, valvular heart disease, systemic embolism, ischemic heart disease, depression, stress and many more [1]. Stress is when humans perceive a divergence in their resources and their ability to respond to a stressor, usually called stress-trigger [2]. Stress is conceptualized into three different perspectives, i.e. biological stress, psychological stress, and environmental stress [3]. 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 [4]. 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 [4-6].

The Perceived Stress Scale-10 (PSS-10), a self-reported tool, is amongst the most frequently used instruments for measuring perceived stress. The PSS-10 was developed by Cohen, Kamarck, and Mermelstein in 1983. Till today it is frequently used to measure perceived stress among different target populations, i.e. patients and the general public [7,8]. The PSS-10 comprised of 10 items which are used to measure "the degree to which situations in an individual's life is appraised as stressful" [9]. All ten items of the PSS-10 were designed to measure unpredictability, uncontrollability, and burdens among the individuals regarding their routine activities mainly in the last month. All of the items are easy to grasp, and the responses received against them are simple to interpret, which makes the PSS-10 to be used in any target population [7,9]. The PSS-10 has well established psychometric properties and has been widely

used in several cultures and countries among different groups and sub-groups of various populaces [8]. In the past, despite its extensive use, the PSS-10 psychometric characteristics had not been tested among cardiovascular patients. Therefore, this study aimed to evaluate psychometric characteristics of the PSS-10 among cardiovascular patients.

MATERIALS AND METHODS

A cross-sectional study was conducted at an outpatient clinic among cardiovascular patients. Total of 362 patients participated in the study. All of the study participants were adults (aged 18 years and above) and had cardiovascular diseases. In this study, the convenience sampling technique was used to achieve the targeted sample.

The psychometric characteristics of the PSS-10 tool was performed because the PSS-10 was first time used among cardiovascular patients in current seetings. The reliability (internal consistency) of the PSS-10 was also done using Chronbach alpha. The validity of the PSS-10 was done by factorial and convergent validities. Factorial validation was done by measuring the factor structure of the PSS 10 through the Principle Component Analysis (PCA) by Exploratory Factor Analysis (EFA) method with Promax Rotation. Subsequently, it was reconfirmed with the same rotation using Partial Confirmatory Factor Analysis (PCFA) though Maximum Likelihood Analysis (MLA) method. The fit indices were also measured 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) to further ascertain the validity of the PSS-10. The average factor loadings were calculated by adding all individual factor loadings and ’dividing the total by the total number of items

Statistical Analyses

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 SPSS version 24.0.

RESULTS AND DISCUSSION

Figure 1 shows the demographic data of the study participants. There were 362 cardiovascular patients with more males than females (n=212, and n=150 respectively). One hundred and seventeen < 65-years old whereas two hundred and fourty-five were equal or above than 65-years of age. Ninety-eight were single or separated and two hundred and sixty-four were married. Eighty-nine were smokers and one hundred and ninety-sixty had cardiovascular diseases from more than five years.

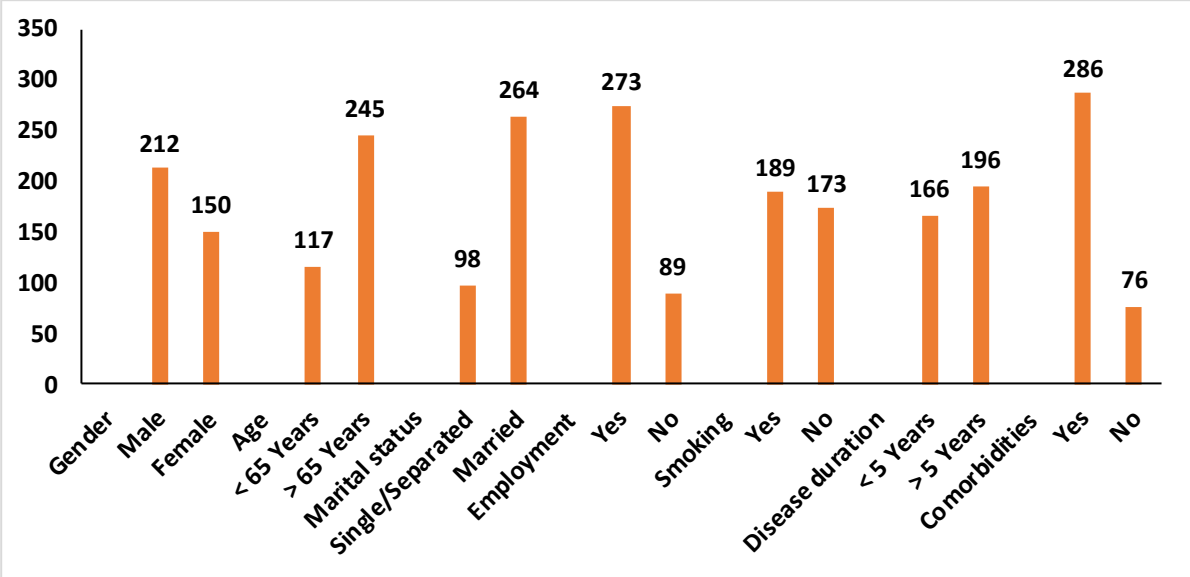

Figure 1: Demographic data of the study participants

Table 1 shows Chronbach alpha value, which was obtained to ascertain the reliability of the PSS-10 among cardiovascular patients. The internal consistency of the PSS 10 was measured by Cronbach's alpha and the value was 0.920.

Table1: Reliability (internal consistency) of the PSS-10

Item	Value
Chronbach alpha	0.920

Table 2 represents the factor structure of the PSS-10 among cardiovascular patients. Complete validation of the psychometric properties of the PSS-10 was done. The EFA 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 2-factor solution was later confirmed using PCFA by MLA with the same rotation. Kaiser-Meyer-Olkin measure of sampling adequacy was tested and a value of 0.893 was obtained. The null model ($\chi 2$) value reported was 1403.00, df = 42, while implied model ($\chi 2$) value was 98.456, df = 26. The fit indices namely, NFI = 0.97, TLI = 0.94, CFI = 0.98 and IFI = 0.96, i.e., $\geq$0.90 while RMSEA = 0.084, i.e., <0.10. All these values indicated a good factor structure which established the factorial validity of the PSS-10 among cardiovascular patients. The average factor loadings were 0.7, i.e., $\geq$0.7 and hence, the convergent validity of the PSS-10 was also established. Convergent validity was accepted when the factor loadings (average) on the scale were $\geq$0.7 [4,5] and factorial validity was accepted when RMSEA was <0.1 [6] and TLI, CFI, NFI, IFI were >0.90 [7].

Table 2: Factor structure of PSS-10

Items	Factors	
	1	**2**
PSS-1	0.763	
PSS-2	0.698	
PSS-3		0.798
PSS-4		0.755
PSS-5	0.786	
PSS-6	0.729	
PSS-7	0.697	
PSS-8	0.799	
PSS-9	0.843	
PSS-10	0.772	

The current study evaluated the psychometric characteristics of PSS-10 among cardiovascular patients. Stress during cardiac diseases can have long-term negative effects on the overall health of the patients [8-10]. In the literature, several studies are evident that determined health related quality of life among cardiovascular and anticoagulant patients [10-13]. Few studies are also evident that measured stress using the PSS-10 tool but fewer are present that detrmined PSS-10 psychometric properties among cardiovascular patients. Hence by considering the need of the time, this study was planned and performed. Furthermore, this was the first study to determine reliability and validity of PSS-10 among cardiovascular patients.

An adequate level of the factorial validity, convergent validity, internal consistency and floor and ceiling effect was observed among cardiovascular patients. Among cardiovascular patients, EFA favored the 2-factor model for the PSS 10 validation. In literature, mixed findings are evident regarding CFA of the PSS 10 whereby some of the studies showed the 2-factor model [14,15], a 1-Factor model [15,16] and bi-factor model [17-19] but none of them were performed among cardiovascular patients. Absence of the floor and ceiling effects further confirmed the psychometric validation of the PSS-10 among cardiovascular patients [19,20]. During the determination of the reliability and validity of the PSS-10 no major issues regarding factorial validity, convergent validity, internal consistency and floor and ceiling effect were observed.

CONCLUSION

The current study confirmed the psychometric characteristics of the PSS-10 among cardiovascular patients which was first time measured among the studied population.

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