Reliability and Validity of PSS-10 among Warfarin Patients

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Author's contribution

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Original Research Article

ABSTRACT

Objective: The objective of the current study was to assess the reliability and validity of Perceived Stress Scale 10 (PSS-10) among warfarin patients.
Methodology: A cross-sectional study was performed among warfarin 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 female patients (n=238, 65.9%) than the male patients (n=123, 34.1%) in total of 361 studied patients. No major issues regarding internal consistency, factorial validity, convergent validity and floor and ceiling effect were observed.
Conclusion: The present study confirmed the reliability and validity of PSS-10 among warfarin patients.

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1. INTRODUCTION

These days, stress is part of everyone's life, and individuals experience a higher level of stress in their life, especially in acute and chronic diseases [1] Patients under stress usually develop psychiatric disorders and even sometimes psychological trauma and stress-related disorders (SRDs) [2,3] SRDs are a group of mental problems or diseases which are usually diagnosed or established after the presence of a preceding stressful event [4,5]. Depending on the type of a trigger, its sign and symptoms, and the total duration of an event, the SRDs are categorized as acute stress disorders and chronic stress disorders [2,3]. Over the past decade, it was reported that various risk factors regarding SRDs were directly or indirectly linked with warfarin therapy [4,5]. Several studies suggested that psychological traumas and SRDs usually aggravate potential risks of acquiring various chronic and life-threatening diseases like cardiovascular disorders with comorbidities, autoimmune diseases and even mortalities [2,3]. Furthermore, few studies had advocated the hypothetical relationship between warfarin therapy with psychological unrest and SRDs [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. The PSS-10 has extensively used in different countries among different populations. An adequate level of the factorial validity, convergent validity, internal consistency and floor and ceiling effect must be obtained before using the PSS 10 among patients. In the past, despite its extensive use, the PSS-10 psychometric characteristics had not been tested among warfarin patients. Therefore, this study aimed to evaluate the reliability and validity of the PSS-10 among warfarin patients.

2. MATERIALS AND METHODS

A cross-sectional study was conducted at an outpatient cardiovascular clinic in a hospital. Total of 361 patients on warfarin participated in the study. All of the study participants were adults (aged 18 years and above) and on warfarin. In this study, the convenience sampling technique was used to achieve the targeted sample.

The reliability and validity of the PSS-10 tool was performed because the PSS-10 was first time used among warfarin patients in current settings. The reliability (internal consistency) of the PSS-10 was also done using Cronbach 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 total items.

2.1 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.

3. RESULTS and DISCUSSION

Fig. 1. shows the demographic data of the study participants. There were 361 warfarin patients with fewer males than females (n=123, 34.1%, and n=238, 65.9% respectively). One hundred and seventy-eight (49.3 %) were < 65-years old whereas one hundred and eighty-three (50.7%) were equal or above 65-years of age. One hundred and fifty-eight (43.8%) were unmarried and two hundred and three (56.2%) were married. Two hundred and thirty-three (64.5%) were employed and one hundred and twenty-eight (35.5%) were unemployed. One hundred

and thirty-nine (38.5%) had their INR in range and two hundred and twenty-two (61.5%) had INR, not in range.

Table 1 shows Cronbach alpha value, which was obtained to ascertain the reliability of the PSS-10 among warfarin patients.

Table 1. Reliability (internal consistency) of the PSS-10

Item	Value
Cronbach alpha	0.88

Table 2 represents the factor structure of the PSS-10 among warfarin 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 0.870 was obtained. The null model ($\chi 2$) value reported was 1320.00, df = 45, while implied model ($\chi 2$) value was 97.365, df = 26. The fit indices namely, NFI = 0.93, TLI = 0.90, CFI =

0.94 and IFI = 0.94, i.e., ≥ 0.90 while RMSEA = 0.08, i.e., <0.10. All these values indicated a good factor structure which established the factorial validity of the PSS 10 among warfarin patients. The average factor loadings were 0.7, i.e., ≥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 ≥0.7 [10] and factorial validity was accepted when RMSEA was <0.1 [11] and TLI, CFI, NFI, IFI were >0.90 [12].

The current study evaluated the reliability and validity of PSS-10 among warfarin patients. Stress during cardiac diseases can have long-term negative effects on the overall health of the patients. In the literature, several studies are evident that determined health related quality of life among warfarin and anticoagulant patients [13-16]. Few studies are also evident that measured stress using the PSS-10 tool but fewer are present that determined PSS-10 psychometric properties among cardiovascular patients especially on warfarin. 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 warfarin patients.

Table 2. Factor Analysis: Components and factor loadings

| No.	Perceived Stress Scale 10	Component 1	Component 2
1	In the last month, how often have you been upset because of something that happened unexpectedly?	0.678	
2	In the last month, how often have you felt that you were unable to control the important things in your life?	0.634	
3	In the last month, how often have you felt nervous and "stressed"?		0.684
4	In the last month, how often have you felt confident about your ability to handle your personal problems?		0.783
5	In the last month, how often have you felt that things were going your way?	0.681	
6	In the last month, how often have you found that you could not cope with all the things that you had to do?	0.687	
7	In the last month, how often have you been able to control irritations in your life?	0.543	
8	In the last month, how often have you felt that you were on top of things?	0.752	
9	In the last month, how often have you been angered because of things that were outside of your control?	0.708	
10	In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	0.701	
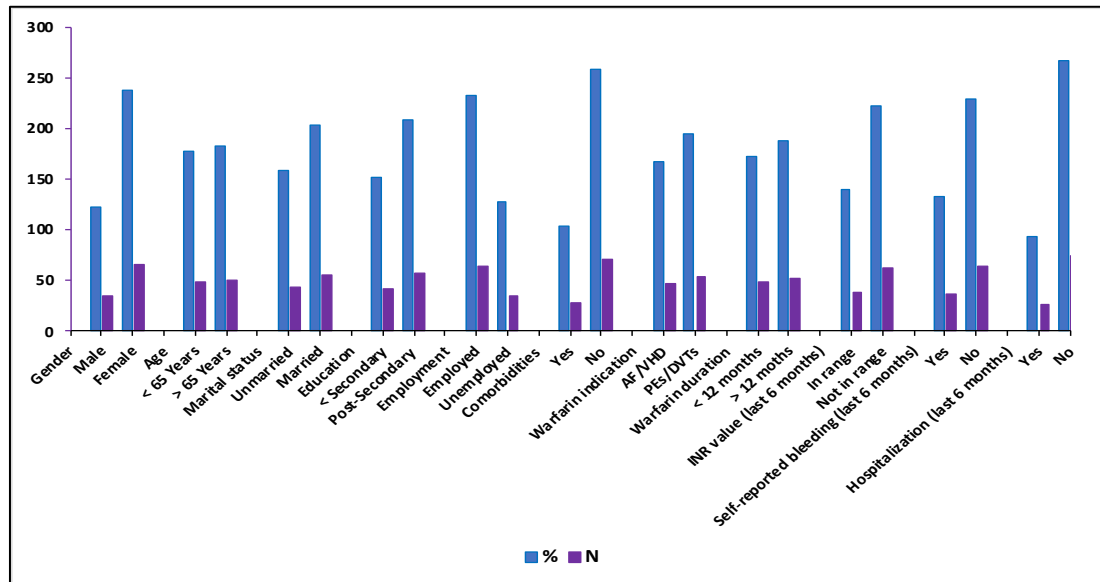
Fig. 1. Demographic data of the study participants

An adequate level of the factorial validity, convergent validity, internal consistency and floor and ceiling effect was observed among warfarin patients. Among warfarin 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 [17,18], a 1-Factor model [18,19] and bi-factor model [20-22] but none of them were performed among warfarin patients. Absence of the floor and ceiling effects further confirmed the psychometric validation of the PSS 10 among warfarin patients [22,23]. Time constrain and less sample size were the two main limitations of this study. Future studies can be performed on a larger scale to get an enhanced and broader psychometric characteristics analysis of each of the items of the PSS 10.

4. CONCLUSION

The current study has validated components (reliability and validity) of the PSS-10 among warfarin patients which was first time measured among the studied population. 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.

CONSENT

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

ETHICAL APPROVAL

It's not applicable.

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COMPETING INTERESTS

Author has declared that no competing interests exist.

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