Psychometric validation of of Cohen's Perceived Stress Scale among warfarin patients – Application by a cross-sectional study

Running title: Psychometrics of PSS-10 among warfarin patients

Abstract

Objective: This study aimed to perform the psychometric validation of Perceived Stress Scale 10 among warfarin patients.

Methodology: A cross-sectional study was performed among warfarin 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 409 study participants, there were more male patients (n=280, 68.5%) than the female patients (n=129, 31.5%). 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 Perceived Stress Scale 10 among thr studied cohort of the warfarin patients.

KEYWORDS: *Stress, warfarin, psychometric, validation, perceived stress scale 10*

INTRODUCTION

Patients under stress usually develop psychiatric disorders and even sometimes psychological trauma and stress-related disorders (SRDs).[1, 2] 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] 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.[3] 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.[1, 2]

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 has extensively used in different countries among different populations. In the past, despite its extensive use, the Perceived Stress Scale 10 psychometric characteristics had not been tested among warfarin patients. Psychometric validation of the Perceived Stress Scale 10 tool was crucial need of time before its usage among warfarin patients. Therefore, this study was designed to determine the psychometric properties of the Perceived Stress Scale 10 among warfarin patients.

MATERIALS AND METHODS

A cross-sectional study was conducted among warfarin patients at an outpatient cardiovascular clinic. 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 Perceived Stress Scale 10 tool was performed because the Perceived Stress Scale 10 was first time used among warfarin patients in current seetings. The reliability (internal consistency) of the Perceived Stress Scale 10 was also done using Chronbach alpha. The validity of the Perceived Stress Scale 10 was done by factorial and convergent validities. Factorial validation was done by measuring the factor structure of the Perceived Stress Scale 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 Perceived Stress Scale 10. The average factor loadings were calculated by adding all individual factor loadings and dividing the total by total 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 Statistical Package for Social Sciences (SPSS) version 24.0.

RESULTS and DISCUSSION

Figure 1 shows the demographic data of the study participants. Total of 409 patients on warfarin participated in the study. Out of 409 warfarin patients, fewer females than males (n=129, 31.5% and n=280, 68.5% respectively) participated in the study. Among 409 participants, 200 warfarin patients were below 65 years of age (48.9%) and 209 participants were

more than 65 years age group (51.1%). A total of 59.7% of the participants had lower than secondary level education, and 66.5% of them were unemployed. Figure 1 describes the detailed demographic parameters used in this study.
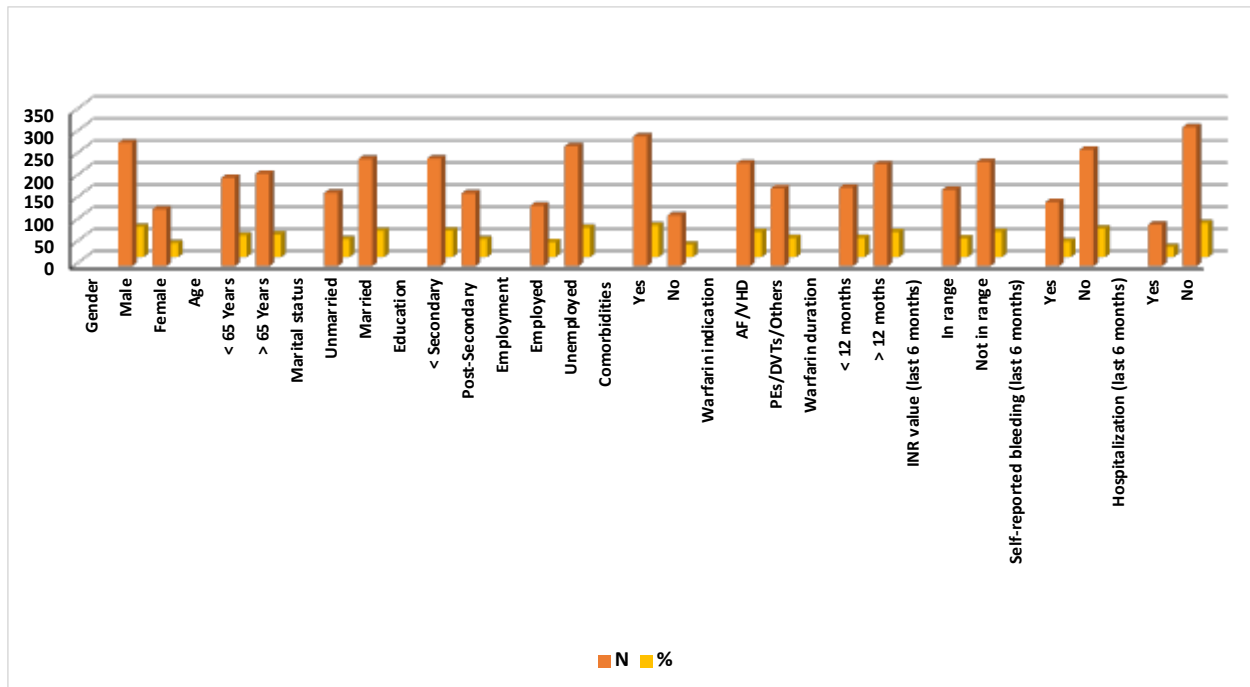

Figure 1: Demographic data of the study participants

Table 1 shows Cronbach alpha value, which was obtained to ascertain the reliability of the Perceived Stress Scale 10 among the studied warfarin patients.

Item	Value
Cronbach alpha	0.784

Table1: Validation (reliability) of the Perceived Stress Scale 10

Table 2 describes the factor analysis of the questionnaire and its component analysis. The KMO and Bartlett's test value was 0.932. The 2-factor solution was later confirmed using PCFA

using MLA with the same rotation. The null model ($\chi 2$) values and implied model ($\chi 2$) values were also determined with df = 25. The fit indices like NFI = 0.953, TLI = 0.934, CFI = 0.953 and IFI = 0.948, i.e., >0.90 while RMSEA = 0.79, i.e., <0.08. All these values indicated an appropriate factor structure and established the factorial validity of the Perceived Stress Scale 10 among warfarin patients. Convergent validity was also established as the average factor loadings were 0.72, i.e., ≥0.7 [7,8]. And factorial validity was accepted when RMSEA was <0.1 [9] and TLI, CFI, NFI, IFI were >0.90.[10]

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?	0.666	
2	In the last month, how often have you felt that you were unable to control the important things in your life?	0.867	
3	In the last month, how often have you felt nervous and "stressed"?		0.687
4	In the last month, how often have you felt confident about your ability to handle your personal problems?		0.778
5	In the last month, how often have you felt that things were going your way?	0.578	
6	In the last month, how often have you found that you could not cope with all the things that you had to do?	0.658	
7	In the last month, how often have you been able to control irritations in your life?	0.504	
8	In the last month, how often have you felt that you were on top of things?	0.631	
9	In the last month, how often have you been angered because of things that were outside of your control?	0.702	
10	In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	0.660	

Though in literature several studies are evident that determined health related quality of life among warfarin and anticoagulant patients but nothing is reported regarding Perceived Stress Scale 10 psychometric validation among warfarin patients.[11-14] Few studies are also evident that

measured stress using the Perceived Stress Scale 10 tool but fewer are present that detrmined Perceived Stress Scale 10 psychometric properties among cardiovascular patients especially on warfarin. The current study evaluated the reliability and validity of Perceived Stress Scale 10 among warfarin patients. Indeed, stress during cardiac diseases can have long-term negative effects on the overall health of the patients.[15, 16] 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 Perceived Stress Scale 10 among te studied cohort of the warfarin patients.

An adequate level of the factorial validity, convergent validity, internal consistency and floor and ceiling effect was observed among warfarin patients. Among the studied warfarin patients, EFA favored the 2-factor model for the Perceived Stress Scale 10 validation. In literature, mixed findings are evident regarding CFA of the Perceived Stress Scale 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 Perceived Stress Scale 10 among warfarin patients.[22, 23] During the determination of the reliability and validity of the Perceived Stress Scale 10 no major issues regarding factorial validity, convergent validity, internal consistency and floor and ceiling effect were observed.

CONCLUSION

The current study reported the psychometric validation of various components of the Perceived Stress Scale 10 among warfarin patients which was first time measured among the studied population.

REFERENCES

1. Chaddha A, Robinson EA, Kline-Rogers E, Alexandris-Souphis T, Rubenfire M. Mental Health and Cardiovascular Disease. Am J Med 2016;129:1145-1148.

2. Chauvet-Gelinier JC, Bonin B. Stress, anxiety and depression in heart disease patients: A major challenge for cardiac rehabilitation. Ann Phys Rehabil Med 2017;60:6-12.

3. Darling CA, McWey LM, Howard SN, Olmstead SB. College student stress: the influence of interpersonal relationships on sense of coherence. Stress & health 2007;23:215-229.

4. Seligman F, Nemeroff CB. The interface of depression and cardiovascular disease: therapeutic implications. Ann N Y Acad Sci 2015;1345:25-35.

5. Manzar MD, Salahuddin M, Peter S, et al. Psychometric properties of the perceived stress scale in Ethiopian university students. BMC Public Health 2019;19:41.

6. Severino P, Mariani MV, Maraone A, Ceccacci A, Tarsitani L, Maestrini V et al. Triggers for atrial fibrillation: the role of anxiety. Cardiol Res Pract 2019;1208505.

7. Iqbal MS. Effect of warfarin therapy adherence on health-related quality of life among patients on warfarin: A cross-sectional study. Lat Am J Pharm 2020;39:1549-1558.

8. 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.

9. Chen F, Curran PJ, Bollen KA, Kirby J, Paxton P. An empirical evaluation of the use of fixed cutoff points in RMSEA test statistic in structural equation models. Sociol Methods Res 2008;36:462-494.

10. Shadfar S, Iraj M. Application of Structural Equation Modeling (SEM) in restructuring state intervention strategies toward paddy production development. Int J Acad 2013;3:576-618.

11. Iqbal MS, Kassab YW, Al-Saikhan FI, Almalki ZS, Haseeb A, Iqbal MZ, Ali M. Assessing quality of life using WHOQOL-BREF: A cross-sectional insight among patients on warfarin in Malaysia. Saudi Pharm J 2020.

12. Al-Saikhan FI. Genetic risk assessment towards warfarin application: Saudi Arabia study with a potential to predict and prevent side effects. Saudi J Biol Sci 2020;27:456-459.

13. Iqbal MS, Muthanna FMS, Kassab YW, Hassali MA, Al-Saikhan FI, et al. Determinants of health-related quality of life among warfarin patients in Pakistan. PLOS ONE 2020;15: e0234734.

14. Iqbal MS, Kassab YW, Al-Saikhan FI, Khan AH, Haseeb A, Hassali MA, Iqbal MZ. Role of warfarin therapy knowledge in health-related quality of life among warfarin patients. Lat Am J Pharm 2020;39:1300-1308.

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. Barbosa-Leiker C, Kostick M, Lei M, et al. Measurement invariance of the perceived stress scale and latent mean differences across gender and time. Stress Health 2013;29:253-260.

18. Reis RS, Hino AA, Añez CR. Perceived Stress Scale: Reliability and validity study in Brazil. J Health Psychol 2010;15:107-114.

19. 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.

20. Perera MJ, Brintz CE, Birnbaum-Weitzman O, 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.

21. Wu SM, Amtmann D. Psychometric evaluation of the Perceived Stress Scale in multiple sclerosis. ISRN Rehab 2013;2013:608356.

22. 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.

23. 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.