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Combined profiles derived from cardiovascular risk factors, health-promoting lifestyle, and post-traumatic stress disorder symptoms

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ABSTRACT

Background: Obviously, determining and organizing patients' health profile is important after a cardiac event or procedure. Therefore, the present study was conducted with the aim of cluster analysis of the post-traumatic stress disorder (PTSD) symptoms, illness risk factors, and health-promoting lifestyle profile (HPLP) in patients with heart disease.

Methods: This cross-sectional study was conducted on 201 patients with established heart disease in a hospital in the west of Iran. The participants were randomly selected during January–May 2017. The self-report checklist for demographics and cardiovascular risk factors, the Health-Promoting Lifestyle Profile II (HPLP-II), and the NSESSS-PTSD were the measurement tools. The results were analyzed using two-stage cluster analysis (TSCA), one-way ANOVA, and Bonferroni post hoc test.

Results: The mean age of patients (50.2% female) was 53.4 ± 11.9 years old. TSCA provided the three clusters: (A) samples with poor lifestyle/high PTSD (36.3%); (B) samples with a relatively poor lifestyle/moderate PTSD (20.9%); and (C) samples with a relatively good lifestyle/mild PTSD (42.8%). In most variables, there is a significant difference between clusters A and C ($p < 0.05$).

Conclusions: The profiles of risk factors, lifestyle, and experienced PTSD symptoms are not the same for all patients with heart disease. So, specialists should focus on high-risk groups through the design and delivery of appropriate interventions and cardiac rehabilitation programs tailored to the unique Profiles.

1. Introduction

Cardiovascular diseases (CVDs) are among the most important causes of mortality around the world. In Iran, a large part of the general population is at risk of developing CVDs and its physical and psychological consequences.[1] Post-Traumatic Stress Disorder (PTSD) is one of the most important psychological consequences of CVDs.[2] PTSD is an anxiety disorder characterized by a non-adaptive sustained response to one or more highly stressful factors.[3,4] Patients with PTSD symptoms are often exposed to aggressive thoughts about a stressful event and try to avoid that event and its reminding triggers.[5] This disorder is common in both the general population as well as in the clinical population, particularly among patients with acute and chronic heart disease.[3,6,7] PTSD is not only one of the risk factors for developing CVDs, but it is also a harmful side effect of these diseases and their mortality.[3,5,8,9] The previous findings suggest that this disorder is associated with morbidity and even the severity of the severe stenosis of the vessels in coronary patients.[10] The death from PTSD in patients with heart disease is also an important point in these studies.[10,11]

Obviously, the occurrence and continuation of PTSD in a number of patients are unavoidable after a cardiac event or procedure.[5] However, the profiles of cardiovascular risk factors and lifestyle of all patients aren't the same.[12] The severity of this disorder, the other cardiovascular risk factors and the patient's lifestyle[3] are likely to play a decisive role in the future outcomes of the disease, including quality of sleep, suicidal thoughts, family relationships, occupational status, and social function.[7] Concerning the onset of CVDs, a study showed that after controlling all cardiovascular risk factors and lifestyle factors, the incidence rate of coronary heart disease in people with PTSD was twice more than in those without this disorder.[4] However, it seems that after the stabilization of heart disease, the risk factors and lifestyle profiles along with PTSD have an important role in patient's improvement.

Based on these considerations and the fact that PTSD and its outcomes incur high costs to society's health system,[7] it is important to

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structurally determine and distinguish the health profiles of patients with heart disease. Drawing up this profile, which includes the severity of PTSD, risk factors, and lifestyle of a patient can play an effective role in designing future interventions; thus, the present study was conducted with the aim of cluster analyzing the PTSD, risk factors, and HPLP in patients with heart disease.

2. Materials and methods

2.1. Design and procedure

The statistical population of this cross-sectional study included all patients with heart disease admitted to the men and women wards of Imam Ali Hospital, Kermanshah (west of Iran) during January–May 2017. All of these patients were hospitalized for having a cardiac event, such as heart attack or invasive interventions such as CABG and valve surgery. Using a simple random sampling, 201 patients met the inclusion criteria to the study. The inclusion criteria were an age of 18–85 years, the existence of reading and writing literacy and the ability to understand the questions, having at least one risk factor of CVDs for entering the cluster analysis, and the voluntary participation in the study along with the written consent. Refusing to continue cooperation and incomplete responses to the questionnaires were exclusion criteria. In data collection, one of the members of the research team attended the hospital every day and after giving the necessary explanations provided the patients with the sheets. After confirming the informed consent form to participate in the study, the patients completed the papers. The tools used to measure the variables under study included: the demographics and risk factors self-report checklist,[13] health-promoting lifestyle profile II (HPLP-II),[14–16] and PTSD questionnaire for DSM5.[17] It should be noted that the demographic features and the cardiovascular risk factors self-report checklist were compared to the information contained in patient records filed by the cardiologist. If there was an inconsistency between this data, it was directly discussed with the patient's cardiologist to assure the accuracy of the data.

2.2. Research tools

2.2.1. The checklist for demographic features and cardiovascular risk factors

This self-report checklist includes information on gender, age, marriage status, education level, occupational status, cardiovascular risk factors such as smoking, high blood pressure, diabetes, and hyperlipidemia, and eventually a family history of cardiovascular disease and heart attack.[13]

2.2.2. Health-promoting lifestyle profile II (HPLP-II)

The initial form of the 52-items questionnaire was developed by Walker et al., in 1987.[14] The tool has 6 subscales: Health responsibility (items 3-9-15-21-27-33-39-45-51); physical activity (4-10-16-22-28-34-40-46); nutrition (2-8-14-20-26-32-38-44-50); spiritual growth (6-12-18-24-30-36-42-48-52); interpersonal relations (1-7-13-19-25-31-37-43-49); and stress management (5-11-17-23-29-35-41-47). The scoring of each of the questions is based on the Likert scale (never = 1, sometimes = 2, often = 3, always = 4). The higher the overall score in this questionnaire reflects the appropriateness of a health-promoting lifestyle. Walker et al., have reported Cronbach's alpha of the total scale as 0.922 and the alpha of subscales between 0.702 and 0.904.[14] The Persian version of this questionnaire has also good reliability and validity.[15,16]

2.2.3. National stressful events survey PTSD short scale (NSESSS)

This 9-item scale based on DSM5 has been designed to assess the severity of post-traumatic stress disorder (PTSD) in adults over 18 years old. Each item is scored on the basis of the Likert scale, from not at all (=1) to severely (=4). The range of scores is between zero and 36, and the higher score indicates a more severe disorder. The reliability and validity of this tool have been verified by LeBeau et al., in 2014.[17]

2.3. Statistical analysis

A two-stage cluster analysis (TSCA) method was used to analyze the data. The reason for using this method is the presence of continuous and discontinuous variables and their simultaneous entry in the cluster analysis model. After the formation of three clusters proposed by the model, a one-way analysis of variance (ANOVA) was run to compare the continuous variables between clusters. However, a chi-square test was used to compare the clusters in discontinuous variables. Finally, Bonferroni's post hoc test was used to compare the mean scores in each cluster with other clusters. All the analyses were performed using SPSS v.20 and the significance level of 0.05 was considered for verifying the difference between the clusters.

3. Results

The mean age of patients was 53.4 ± 11.9 years old. Using a TSCA, 201 patients (50.2% were female) were classified into three clusters. The results of the analysis showed that the model had a moderate clustering quality, and the solution has been almost good in clustering the cases. TSCA provided the three clusters: (A) samples with poor lifestyle/high PTSD (36.3%); (B) samples with a relatively poor lifestyle/moderate PTSD (20.9%); and (C) samples with a relatively good lifestyle/mild PTSD (42.8%). The proportion of the biggest cluster to the smallest was 2.05. Table 1 shows the results of the comparison of the variables under investigation in three clusters.

The results of the above table show that there is a significant difference between the clusters in terms of these variables: gender, cigarette smoking, hyperlipidemia, hypertension, diabetes, and history of MI ($p < 0.0005$). In all components except for cigarette smoking, cluster A has a higher frequency. Also, as seen, the mean of cluster A in some components of HPLP-II including physical activity ($p = 0.010$), spiritual growth ($p < 0.0005$), and stress management ($p < 0.0005$) are significantly lower than other clusters. Finally, the results show that the mean PTSD score in cluster A is significantly higher than other clusters ($p < 0.0005$).

The results of multiple comparisons of mean variables in the proposed clusters are shown in Fig. 1. The results of Post hoc test of Bonferroni show that the scores of cluster A in physical activity ($p = 0.016$), spiritual growth ($p < 0.0005$), and stress management ($p < 0.0005$) are significantly lower than cluster C. Also, the scores of cluster A in PTSD is significantly higher than cluster C ($p < 0.0005$). In other variables, there is no significant difference between the clusters.

4. Discussion

The present study was conducted with the aim of cluster analysis of the PTSD, illness risk factors, and HPLP in patients with heart disease. The cluster analysis was employed as a useful technique for simplifying the data set into data groups based on their relationships.[18] In the cluster analysis, the subjects with the greatest similarity are put in the same cluster, and each cluster has the most different from the other clusters.[18,19]

Based on the results, three clusters were proposed: cluster A with a high prevalence of risk factors, poor HPLP, and high PTSD; cluster B with a low prevalence of risk factors, and moderate HPLP and PTSD; and cluster C with a moderate prevalence of risk factors, good HPLP, and low PTSD. These results are consistent with the findings of previous studies regarding the contributing role of lifestyle components such as physical activity and psychological factors in clustering and membership of patients with heart disease[20] and other populations.[21–23]

The results of this study showed that there is a significant difference between the clusters in terms of cardiovascular risk factors and the

Table 1
The comparison of risk factors, lifestyle components, and PTSD in the suggestive clusters.

Variable	Cluster A (n = 73; 36.3%)	Cluster B (n = 42; 20.9%)	Cluster C (n = 86; 42.8%)	p-value
	samples with poor lifestyle/high PTSD	samples with a relatively poor lifestyle/moderate PTSD	samples with a relatively good lifestyle/mild PTSD	
Sex, female (%)	58 (79.4)	42 (100)	1 (1.2)	0.0005
Smoking (%)	4 (5.5)	1 (2.4)	34 (39.5)	0.0005
HLP (%)	42 (57.5)	2 (4.8)	9 (10.5)	0.0005
HTN (%)	64 (87.7)	0 (0.0)	15 (17.4)	0.0005
DM (%)	31 (42.5)	8 (19.0)	12 (13.9)	0.0005
Family history (%)	41 (56.2)	19 (45.2)	36 (41.9)	0.288
MI history (%)	30 (41.1)	0 (0.0)	24 (27.9)	0.0005
HPLP-II				
Health responsibility	20.74 ± 5.09	20.59 ± 4.94	20.69 ± 4.97	0.989
Physical activity	12.23 ± 3.93	12.36 ± 2.94	12.98 ± 3.85	0.010
Nutrition	23.29 ± 3.66	22.38 ± 3.15	23.88 ± 3.40	0.070
Spiritual growth	23.85 ± 4.00	25.12 ± 3.60	26.52 ± 3.33	0.0005
Interpersonal relations	25.68 ± 4.49	26.64 ± 3.91	26.68 ± 5.04	0.349
Stress management	15.49 ± 2.89	16.64 ± 2.78	17.74 ± 3.78	0.0005
PTSD	20.48 ± 6.79	18.19 ± 4.98	16.41 ± 5.93	0.0005

Abbreviations: HLP= Hyperlipidemia; HTN= Hypertension; DM = Diabetes mellitus; MI = Myocardial infarction; HPLP-II= Health-promoting lifestyle profile-II; PTSD= Posttraumatic stress disorder.
ANOVA used for the continuous variables; Chi-square used for the categorical variables.

prevalence of these factors in members of cluster A is more than the other clusters. The prevalence of risk factors for the disease probably results from adopting an unhealthy lifestyle.[24,25] According to this, the present results show that members of cluster A compared to cluster C have a more adverse condition in half of the components of HPLP (physical activity, spiritual growth, and stress management). These factors can also play a role in experiencing the symptoms of PTSD in general.[20,26]

Regarding the risk factors of CVDs, the results of a previous review confirm the relationship between the frequency and type of risk factors for CVDs, including socio-demographic features of age and gender, history of MI, chest pain, high blood pressure, and psychiatric conditions with experienced PTSD symptoms.[26] The presence of highly risk factors and disability in stress management as one of the components of HPLP can be associated with the increasing experience of PTSD symptoms.[27,28] Therefore, the cluster analysis has properly identified and suggested this cluster from the other clusters; and the patients in this cluster need urgent intervention and special training.

The strength of the current study is the simultaneous partitioning of patients based on demographic factors, lifestyle, and PTSD. Although, similar to other studies in the field of medicine and behavioral sciences, the current study also faced a number of limitations. In current study, only self-reporting tools were used. Probably, using structured interviews can provide more accurate information. Since PTSD is also related to other life-threatening traumas, screening of other traumas experienced by each patient is helpful. Finally, it is recommended that future studies select larger samples to be able to improve the model.

5. Conclusion

The patients fall into three separate homogeneous categories according to cardiovascular risk factors, HPLP, and severity of PTSD. In other words, the profiles of risk factors, lifestyle, and experienced PTSD symptoms are not the same for all patients with heart disease. So, specialists should focus on high-risk groups through the design and delivery of appropriate interventions and cardiac rehabilitation programs tailored to the unique Profiles.

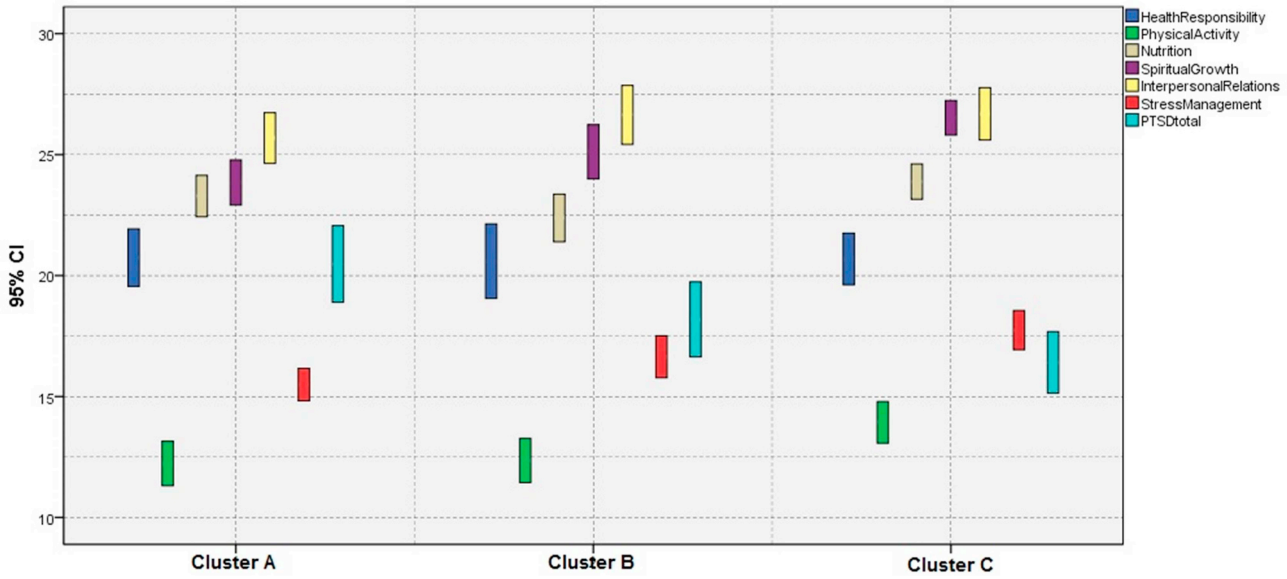

Fig.1. Comparison of variables among the derived clusters.

Conflicts of interest

None of the authors have conflicts of interest to report.

Contribution details

All authors participated in the design of the study and drafted the manuscript and read and approved the final manuscript.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.cegh.2019.04.006.

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