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Original Research Article

EFFECT OF STRESS MANAGEMENT ON LEVEL OF DEPRESSION, ANXIETY AND STRESS IN CARDIOVASCULAR DISEASE PATIENTS

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Abstract: *Cardiovascular disease (CVD) remains a leading cause of morbidity and mortality worldwide, making holistic health management essential for patients. Psychological well-being, particularly stress, depression, and anxiety management, is critical for effective CVD rehabilitation. Interventions focused on stress management hold promise for reducing these negative psychological impacts, thereby enhancing patient health and recovery.* ***Objective:*** *This study aimed to evaluate the effect of a structured stress management intervention on reducing stress, depression, and anxiety levels in patients with cardiovascular disease.* ***Methods:*** *A pretest-posttest design with a control group was employed to assess the impact of stress management on mental health outcomes in CVD patients. Sixty patients with CVD were recruited from a private and a government hospital in Rawalpindi, Pakistan, in 2023. Patients were randomly assigned to either a control group (n=30) or an intervention group (n=30). The intervention group participated in eight weekly 90-minute sessions focused on stress, thought-feeling connections, relaxation techniques, cognitive distortion detection, management of anxiety and depression, social relations enhancement, and effective coping strategies. Data were collected at baseline (pretest), 1.5 months, and 3 months post-intervention using validated scales to measure anxiety, stress, and depression levels. The control group received standard care without any psychological intervention. Statistical analysis was performed using SPSS version 25, and repeated measures ANOVA was applied to evaluate changes in stress, depression, and anxiety levels over time.* ***Results:*** *The results revealed a significant reduction in stress, depression, and anxiety levels in the intervention group compared to the control group ($p<0.05$). Participants who underwent the stress management intervention showed substantial improvement in psychological well-being at both the 1.5-month and 3-month follow-ups.* ***Conclusion:*** *The stress management intervention demonstrated a significant positive impact on reducing anxiety, stress, and depression in CVD patients. These findings highlight the value of incorporating structured psychological support as a part of comprehensive care for cardiovascular patients, providing essential guidance for healthcare practitioners to enhance patient outcomes through holistic care.*

Keywords: Cardiovascular Disease, Stress Management, Anxiety, Depression, Psychological Intervention, Holistic Care, Patient Outcomes

Introduction

Cardiovascular disease (CVD) encompasses a range of conditions affecting the heart and arteries. This group comprises coronary heart disease, cerebrovascular disease, and rheumatic heart disease. Among the 17 million premature mortality occurring in 2019, where individuals passed away before reaching the age of 70 years, 38% was attributed to cardiovascular disease (1). Although there have been advancements in the accessibility of efficient prevention methods on a global scale, cardiovascular disease continues to be the primary cause of both mortality and premature death worldwide. Asia experiences the highest mortality rate from CVD. The primary modifiable CVD risk factors prevalent in Asian countries with limited treatment capabilities include smoking, an unhealthy diet, hypertension, dyslipidemia, obesity and diabetes. Additionally, increasing aging of the population in many Asian countries contributes to the escalating risk of CVD (2). The multiple ramifications of CVD necessitate a global effort to find effective preventive and management strategies to alleviate the physical, emotional, and economic burdens imposed on CVD patients and society throughout the world.

The medical community has made significant progress in understanding and treating CVD, but it is becoming increasingly clear that the impact of these illnesses goes beyond their physiological consequences (3). The relationship between mental illness and an increased risk of cardiovascular disease is complex and variable (4). Stress is an omnipresent aspect of human life. Chronic stress, despite being commonly disregarded, has significant clinical implications, such as CVD. Stress additionally intensifies the occurrence and intensity of many CVD risk factors, such as high blood pressure, diabetes mellitus, and obesity. The risk of stress in relation to CVD is comparable to that of other traditional risk factors, indicating that stress is a highly influential contributor. However, there has been a lack of thorough investigation into the processes that connect stress to CVD (5). Anxiety is a common psychological condition that can heighten the probability of developing cardiovascular disease. Continual stress and worry can result in unhealthy lifestyle, such as unhealthy food habits, a sedentary lifestyle, and smoking. As a result, these habits can potentially lead to the development of CVD. Higher prevalence rates of anxiety was observed in people with cardiovascular disease. These conditions are linked to

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adverse cardiovascular outcomes, such as the occurrence and advancement of coronary artery disease and heart failure (HF). The connections between anxiety disorders and cardiac outcomes are most likely influenced by both behavioral and physiological factors, such as autonomic dysfunction, inflammation, and platelet aggregation. The identification and treatment of anxiety disorders are crucial due to their association with unfavorable outcomes (Celano et al., 2016). Although psychological factors are distinct risk factors for coronary heart disease (CHD); however, the diagnostic and therapeutic approaches for this condition have been relatively successful. Prevention is better than treatment; thus, in light of the rise in coronary heart disease (CHD) risk factors observed in recent years, greater emphasis must be placed on preventive measures and psychological factors. Undoubtedly, implementing psychological and pedagogical interventions within the community, as well as raising public awareness regarding the psychological determinants of coronary heart disease can significantly contribute to the long-term improvement of public health (6).

Psychosocial interventions incorporating stress management techniques effectively alleviated stress and anxiety levels in patients. Counselling, mindfulness-based intervention (MBI), and stress management programs effectively alleviated symptoms of depression and anxiety (7). Depression and anxiety disorders are prevalent and enduring in individuals with cardiovascular disease, and they are linked to unfavorable functional and cardiac outcomes. Therefore, it is crucial to make a prompt and precise clinical diagnosis by employing the DSM-5 criteria. There are medications that are both safe and effective for managing these illnesses in individuals with cardiac disease. The treatment may enhance psychiatric well-being, quality of life, and better outcomes 8). The major objective of the study was to evaluate the impact of stress management on depression, anxiety, and stress in CVD patients. Cardiovascular diseases is a serious worldwide health problem, and patients' psychological well-being is critical. Furthermore, it is important to examine the outcome of stress management strategies in reducing psychological risk factors like stress, anxiety and depression in CVD patients. By addressing this issue, the study aims to provide insights that can impact healthcare practices and improve the prognosis of CVD patients.Cardiovascular disease continues to be the primary cause of disease burden worldwide, highlighting the ongoing necessity to discover new supplementary prevention strategies. There has been significant advancement in the study of stress as a potential risk and predictive factor for CVD. Childhood exposure to severe stressors can have detrimental effects on health and elevate the likelihood of developing several chronic illnesses in adulthood. Adulthood stress has a significant role in triggering disease in individuals who already have a high amount of atherosclerotic plaque. Several clinical guidelines currently recognize stress as a specific focus for prevention for those who have a high overall risk of cardiovascular disease or who already have cardiovascular disease. Nevertheless, there are a limited number of scalable therapies that are grounded in empirical research (9).

The impact of long-term stress and other stressors (such as physical, chemical, and psychological) on the occurrence of cardiovascular disease (CVD) and the initiation of sudden cardiac events have been well studied (10). While it is widely acknowledged that psychological stress can result in negative cardiovascular outcomes, the underlying mechanisms are not well comprehended. Recent findings from studies conducted on both humans and animal models have shown the significant importance of endothelial dysfunction in the development of cardiovascular illnesses caused by stress. Varying types and intensities of stress stimulate distinct parts of the neurological and humoral systems. The individual's personal traits and dispositions also impact the physiological reactions to stress (11). The relationship between major depressive disorder and coronary heart disease (CHD) is intricate and influenced by multiple factors. Major Depression is a prevalent and alterable risk factor for coronary heart disease. Further research efforts are necessary to have a deeper knowledge of the pathophysiological mechanisms that underlie Major depressive disorder (MDD) and coronary heart disease (CHD). This will help us develop more effective treatments. Efforts should be made to reduce the obstacles to detecting and treating major depressive disorder in individuals with coronary heart disease (Dhar & Barton, 2016). In the Western world, cardiovascular diseases, anxiety, and depression are prevalent clinical conditions that frequently coexist. In light of the evidence pertaining to a common pathophysiology, chronic systemic inflammation may serve as a mediator. The correlation between C-reactive protein (CRP) levels and depressive symptoms provided further support for the notion that inflammation plays a role in the pathophysiology of depression (12). Anxiety disorders are linked to an increased susceptibility to various cardiovascular events, such as stroke, coronary heart disease, heart failure, and cardiovascular mortality. The causality of these connections remains uncertain (13). Anxiety in cardiovascular patients is an important and growing area of study in healthcare. Anxiety is a distinct risk factor for CVD and should not be seen as synonymous with depression, even though they often occur together. Therefore, it is necessary to update international guidelines for the prevention of CVD in accordance with this (14). Cardiac rehabilitation (CR), when combined with stress management training (SMT), resulted in notable decrease in stress and more substantial improvements in health outcomes compared to conventional cardiac rehabilitation. The results imply that combining SMT with comprehensive CR may offer additional advantages and therefore, it is recommended to include SMT as a regular part of CR (15). The correlation between panic disorder and CVD has been thoroughly examined since the 1990s, although a definitive causative theory has not been firmly proven. Possible mediating variables include mental stress and cardiac perfusion abnormalities (16). Depression frequently occurs in individuals with cardiovascular disease (CVD), and it is associated with adverse health consequences. This may be attributed to their noncompliance with their prescription drugs (Goldstein et al., 2017). The empirical data establishes a correlation between depression and CVD. The significance of CVD prevention and therapy in averting depression and other mental diseases requires a comprehensive approach to healthcare that integrates mental health and cardiovascular treatment (17).

The diagnosis and treatment process for cardiovascular disease (CVD) frequently presents significant uncertainty and require major lifestyle changes. This difficult path might cause severe anxiety (18). A lifetime depressive episode and current depressive symptoms were both significantly associated with an increased risk of CVD morbidity. In order to potentially enhance the prognosis of CVD, screening and treatment for depression should be implemented for patients with CVD. Clinical outcomes might be enhanced through the integration of mental health treatment and improved training (19). Evaluating and controlling mental stress in those who have already been diagnosed with CVD or are at a significant risk of developing it, is now suggested according to guidelines. It is important to prioritize the development of therapy options that directly address mental stress (20). The positive psychological characteristics of well-being, such as good emotions, optimism, and life satisfaction, are now recognized as having a preventive effect on CVD and lifespan. An expanding body of literature has established a connection between positive well-being and improved cardiovascular health. This connection has been observed in healthy populations, where there is a lower occurrence of CVD, as well as in individuals with pre-existing CVD (21). The interaction among psychological stress and physiological response highlights the need to address mental health in the setting of CVD. Stress is a multifaceted and subjective construct. The significance of acute and chronic stress as risk factors for CVD is greatly underestimated in clinical practice. Consequently, there is a paucity of recommended coping methods that might effectively lower the burden of stress-related disorders. There is no universal method for handling stress, and any solutions used should consider individual characteristics and personal experiences (22). Psychosocial stress is associated with CVD, which is influenced by the intensity and length of the stress experienced, as well as how an individual responds to the stressor. Furthermore, stress is frequently complicated by unfavorable health practices. The majority of clinical guidelines currently do not acknowledge psychological stress as an independent risk factor for CVD or recommend its treatment for prevention of CVD. This indicates potential for the development of innovative preventive methods and therapeutics (23).Objective

The objective of the study was to evaluate the impact of stress management on the levels of stress anxiety and depression in CVD patients.

Methodology

The current study used a pretest-posttest design with a control group to evaluate the impact of stress management on anxiety, depression and stress in CVD patients.

The study sample comprised (N= 60) participants diagnosed with CVD by the cardiologist. Patients with cardiovascular disease participated in the study. This study's respondents were recruited from the OPD of one private and one government hospital in Rawalpindi during 2023 by a random sampling technique. The inclusion criteria were male and female patients with CVD who were getting care at the outpatient department (OPD) and had been diagnosed during the preceding two months. The age range for eligible participants was from 40 to 65 years. The individuals under the age of 40 or over the age of 65, those with severe mental disorders, with unstable heart conditions, those on psychotropic medications, with significant lung disease, with comorbid serious illnesses such as cancer or AIDS, and those suffering from dementia, Alzheimer's disease, or severe cognitive impairments were excluded from the study. These criteria were developed to guarantee that the study focused on a certain demographic and that the participant group remained homogeneous.

The depression, anxiety and stress scale (DASS-42) is a 42-items self-report instrument and has three sub-scales with a good convergent and discriminant validity, and internal consistency (Lovibond & Lovibond, 1995). Each subscale has 14-items that measure anxiety, depression and stress (last seven days) in clinical and non-clinical settings. The items are scored from zero to three on a 4-point Likert scale. The instrument (DASS-42) had a Cronbach's alpha of 0.93, 0.96 and 0.89, for stress, depression, and anxiety, respectively (Brown et al., 1997).

The stress management intervention comprised of eight weekly sessions lasting 90 minutes each, provided free of charge to the CVD patients. The sessions were conducted in a group setting. The sessions centered on introducing stress, elucidating the connection between thoughts and emotions, providing relaxation techniques, identifying cognitive distortions, mitigating anxiety and depression, enhancing social interactions, and fostering social support. Additionally, the sessions emphasized developing effective coping strategies for managing stress. Following each session, a concise overview of the sessions was furnished to the participants. The control group was not subjected to any intervention (Orth-Gomér et al., 2009; Ghazavi t al., 2016). Permission from the hospital authorities was obtained to collect the data of CVD patients and administer stress management intervention. The verbal consent from each participant was obtained. The psychological approach of managing stress, a sample of sixty CVD patients (N = 60) was randomly selected, with half of the participants (n = 30) randomly assigned to the stress management intervention group and half (n = 30) randomly assigned to the control group. Pre-intervention data were collected by DASS-42 before administering psychological interventions to the experimental group. Psychological intervention was delivered within one week of pretest assessment. Post-intervention data was recorded at 1.5 and three months following the intervention.

Results

This 1 table provides an overview of the demographic characteristics of the study participants. The majority of participants were male (61.7%) and within the "Old Age" group (51–65 years) at 70%. Most had completed matric-level education (63.3%), and a significant portion belonged to the low socioeconomic status category (65%).

Mauchly's Test of Sphericity results show sphericity assumptions were nearly met for depression, anxiety, and stress, indicated by approximate significance values above the standard threshold of 0.05. Greenhouse-Geisser and Huynh-Feldt corrections are provided for each measure,

supporting the reliability of repeated-measures analysis. (Table 2)

This table 3 summarizes the descriptive statistics for depression, anxiety, and stress levels at three time points (pretest, posttest 1, and posttest 2) for both intervention and control groups. The intervention group showed significant reductions across all subscales over time, with depression scores dropping from 20.50 to 9.23, anxiety from 14.37 to 7.80, and stress from 19.63 to 13.23. In comparison, the control group showed more moderate reductions, indicating the effectiveness of the intervention.

Table 4 depicted significant differences between the pretest, posttest1 and posttest 2 results for all three subscales (depression, anxiety, and stress). The partial eta squared indicated a large effect size.

The depression subscale, indicated differences in scores between the pretest, posttest-1, and posttest, F (2, 197) = 189.00, $p < 0.01$. The effect size was large ($\eta 2 = 0.77$). Similarly, the anxiety subscale also revealed significant differences among the pretest, posttest-1 and posttest-2 scores, F (2, 197) = 132.733, $p < 0.01$, $\eta 2 = 0.70$.The stress subscale also exhibited significant differences between the pretest, posttest-1and posttest-2, indicated by F (2, 197) = 129.639, $p < 0.01$, and a substantial effect size of partial $\eta 2 = 0.69$. (Table 5)

Adjustment for multiple comparisons: Bonferroni The mean difference is significant at the .05 level the results of table 5 showed significant post differences in pretest, pretest1 and pretest 2 depression, anxiety and stress scores across.

Table 1 Demographic Characteristics of Participants

Characteristics	n	%
Gender		
Male	37	61.7
Female	23	38.3
Age		
Middle Age (40-50 years)	18	30
Old Age (51-65 years)	42	70
Education		
Matric	38	63.3
Graduate	12	20
Postgraduate	10	16.7
Socioeconomic Status		
Low socioeconomic status	39	65
Medium socioeconomic status	16	26.7
High socioeconomic status	5	8.3

Table 2 Mauchly's Test of Sphericity for Stress Management on Depression, Anxiety and Stress in Cardiovascular Disease Patients

Within Subject Effect	Macuchly's W	Approx. Chi-Square	df	Sig.	Greenhouse Geisser	Epsilon Huynh-Feldt	Lower-boune
Depression	.927	4.303	2	.116	.932	.979	.500
Anxiety	.909	5.411	2	.067	.917	.962	.909
Stress	.904	5.768	2	.056	.912	.957	.500

Table 3 Descriptive Statistics

		Pretest		Posttest 1		Posttest 2		
Subscale	Group	*M*	*SD*	*M*	*SD*	*M*	*SD*	N
Depression	Intervention	20.50	3.03	15.60	2.94	9.23	3.16	30
	Control	17.30	4.24	16.20	4.40	13.07	4.72	30
Anxiety	Intervention	14.37	3.15	10.20	2.70	7.80	2.36	30
	Control	16.17	3.73	14.33	3.51	11.03	2.93	30
Stress	Intervention	19.63	3.03	15.33	2.66	13.23	2.98	30
	Control	21.60	3.93	19.60	3.46	15.83	2.91	30

Table 4 Results of repeated measures ANOVA

Subscale		*Type III Sum of square*	*df*	*Mean Square*	*F*	*p*	Partial η2
Depression	Sphericity Assumed	1832.50	2	916.25	189.00	0.00	0.77
	Greenhouse-Geisser effects	1832.50	1.86	982.87	189.00	0.00	0.77
	Hyphen-Feldt	1832.50	1.96	936.31	189.00	0.00	0.77

	Low-bound	1832.50	1.00	1832.50	189.00	0.00	0.77
Anxiety	Sphericity Assumed	1026.90	2	513.450	132.73	0.00	0.70
	Greenhouse-Geisser effects	1026.90	1.83	559.953	132.73	0.00	0.70
	Hyphen-Feldt	1026.90	1.92	533.877	132.73	0.00	0.70
	Low-bound	1026.90	1.00	1026.900	132.73	0.00	0.70
Stress	Sphericity Assumed	1110.68	2	555.34	129.64	0.00	0.69
	Greenhouse-Geisser effects	1110.68	1.82	608.79	129.64	0.00	0.69
	Hyphen-Feldt	1110.68	1.91	580.59	129.64	0.00	0.69
	Low-bound	1110.678	1.00	1110.68	129.64	0.00	0.69

Table 5. Post hoc Comparison

Dependent Variable	**(I) Factor 1**	**(J)Factor 1**	**Mean Difference (I-J)**	**Standard Error**	**Sig.**	**95% Confidence Interval**	
						Lower Bound	Upper Bound
Depression	Pretest	Posttest 1	3.000*	.355	0.00	2.13	3.87
		Posttest 2	7.750*	.448	0.00	6.65	8.86
	Posttest 1	Posttest 2	4.750*	.398	0.00	3.77	5.73
Anxiety	Pretest	Posttest 1	3.067*	.372	0.00	2.15	3.98
		Posttest 2	5.917*	.407	0.00	4.91	6.92
	Posttest 1	Posttest 2	2.850*	.302	0.00	2.11	3.60
Stress	Pretest	Posttest 1	3.150*	.367	0.00	2.25	4.05
		Posttest 2	6.050*	.425	0.00	5.00	7.10
	Posttest 1	Posttest 2	2.900*	.330	0.00	2.09	3.71

Discussion

The current study's findings highlight the significance of stress management intervention in reducing depression, anxiety and stress in CVD patients. Acute and chronic stress have been related to an increased risk of cardiovascular events (24). Stress causes the production of stress hormones such as cortisol and adrenaline, which can lead to elevated blood pressure, inflammation, and endothelial dysfunction, all of which are risk factors for CVD The research has clearly demonstrated that stress management in CVD patients have a significant influence on their level of anxiety, depression, and stress. The pretest, posttest 1, and posttest 2 results indicated that the participants in the intervention group had a substantial decrease in depression, anxiety, and stress. It is worth noting that while the control group had some reduction, the intervention group experienced a significantly more pronounced decrease, indicating the remarkable efficacy of the stress management intervention. Furthermore, post hoc comparisons demonstrated significant differences in pretest, posttest 1, and posttest 2 scores of each subscale (depression, anxiety, and stress) for the intervention and control group. These findings support the stress management intervention's effectiveness in lowering depression, anxiety, and stress in individuals with CVD. These findings support that CVD patients can pursue stress management that may reduce their level of depression, anxiety, and stress. The substantial differences and large effect sizes indicated significant impact of stress management in CVD patients. As described above, numerous studies have established a connection between depression, anxiety and elevated CVD risk. However, further work is needed to address several important knowledge gaps and translate evidence into improved outcomes for CVD patients (25). The impact of stress management interventions on cardiovascular patients is a multifaceted process that has significant implications for anxiety, stress and depression in CVD patients. The finding demonstrates that stress management intervention have been shown to be effective to reduce the psychological burden (26). Health professionals assist patients in coping with the mental problems and lifestyle adjustments to reduce the risks associated with CVD. Furthermore, these interventions can contribute to better mental health in cardiovascular patients (27).

The research had a relatively small sample of 60 CVD patients, 30 in the intervention group and 30 in the control group. Small sample sizes may restrict the findings' generalizability to a larger group of CVD patients. Furthermore, the intervention consisted of eight weekly sessions over a very short period of 3 months. The influence of stress management may continue to improve psychological impacts in CVD patients beyond the three-month time frame of the intervention. An extended length of follow-up might offer further insight into the long-term impacts (28). The outcomes of the research may not be applicable to all CVD patients because participation was confined to individuals from specific hospitals the individuals' features may differ from those found in various healthcare settings or areas.

The study can help healthcare providers to manage stress, depression and anxiety in CVD patients. To assist in enhancing the psychological well-being of CVD patients, healthcare practitioners may consider including stress management programs in their treatment plans. Furthermore, stress management therapies may be helpful

not just for CVD patients but also for people at risk of acquiring cardiovascular disease (29). Healthcare practitioners might consider applying such treatments as part of CVD prevention efforts in high-risk groups.

Conclusion

To conclude, the outcomes of this study shed light on the critical role that stress management intervention may play in addressing and decreasing anxiety, stress and depression. The outcomes of the research clearly support the hypothesis that stress management interventions have a significant influence on decreasing level of anxiety, stress, and depression.

Declarations

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.
Ethics approval and consent to participate
Approved by the department concerned. (IRBEC-022/23)
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Conflict of interest

The authors declared absence of conflict of interest.

Author Contribution

***MUHAMMAD ARIF KHAN (Ph.D. Scholar*)**
Coordination of collaborative efforts.
Study Design, Review of Literature.
RUQAIA GUL (Ph.D. Research Supervisor)
Conception of Study, Development of Research Methodology Design, Study Design, Review of manuscript, final approval of manuscript.
Conception of Study, Final approval of manuscript.
ERUM IRSHAD (Professor & Chairperson)
Manuscript revisions, critical input.
Coordination of collaborative efforts.
Data acquisition, analysis.
Manuscript drafting.

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