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ASSESSMENT OF PSYCHOLOGICAL STRESS IN CARDIOVASCULAR DISEASE PATIENTS

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Abstract

Introduction: Research has demonstrated a correlation between prolonged stress and a rise in cardiovascular incidents. Chronic stress, lasting months or even years can have long-term negative effects on one's health. Similarly, acute stress has been linked to an elevated short-term risk of CVD, particularly in individuals with pre-existing risk. The fact that persistent stress significantly raises CVD risk variables further necessitates to assess the stress level in CVD patients. Additionally, it is linked to higher levels of obesity and hypertension (regardless of diet and exercise). Assessing the effect of stress alone on CVD is very important for CVD patients.

Objectives: To assess the level of stress in CVD patients and compare it to the non-CVD population and to investigate the impact of socioeconomic status, gender, age, and education on the stress levels of patients with CVD.

Materials and methods: A comparative study was conducted to assess the level of stress in CVD patients. The study recruited a total of 200 participants (N = 200), 100 CVD patients from OPDs of one private and one government hospital in Rawalpindi, Pakistan in 2023. For comparison, the control group comprised 100 non-CVD participants from the general population were recruited. A technique of random sampling was employed to enroll the participants. The effect of demographic variables on patients with CVD (N = 100) was investigated.

To assess the level of stress in CVD patients and compare it to the non-CVD population. To investigate the impact of socioeconomic status, gender, age, and education on the stress levels of patients with CVD.

Results: The stress level of CVD patients was significantly higher than the control group. In addition, gender and socioeconomic status significantly affected the severity of stress in CVD patients. However, age and educational level did not significantly affect stress level in CVD patients.

Conclusion: It has been demonstrated that persistent stress is linked to elevated Persistent stress is a common and often overlooked risk factor for CVD. Additionally, while assessing patients with or at risk for CVD, medical professionals ought to consider stress and advise strategies for lowering stress levels in those with high-felt stress or increased exposure.

Keywords: Stress, cardiovascular disease patients, gender, age, education, socioeconomic status

Introduction

Cardiovascular disease (CVD) is a significant contributor to both morbidity and mortality on a global scale. The epidemiological study conducted over the past 50 years has provided compelling evidence that psychosocial have a significant impact on the risk of developing CVD and also affect the prognosis of individuals with cardiac conditions. Incorporating the assessment of psychosocial elements appears to be a suitable practice within the context of a routine patient evaluation, taking into account the clinician's familiarity with the individual and the objectives of the consultation. A body of epidemiological and clinical knowledge significant influence of psychosocial risk factors in individuals with cardiovascular diseases (von, 2012).

Stress has been linked to a number of ailments, including cardiovascular disease. Different types of stress such as social isolation, marital stress, work stress, and childhood trauma contribute to the development of cardiovascular diseases (CVD). If a patient is at risk for a heart attack or stroke, it is important to find out about their mental stress while taking their history and psychological counselling should be part of the treatment strategy for CVD patients (Satyjeet et al., 2020). Cardiovascular disease is one of the major pathogenic effects of prolonged stress (CVD). Stress attributable CVD risk is comparable to those risk variables even after adjustment, indicating that it is a particularly strong contributor. However, not enough research has been done on the pathways that connect stress to cardiovascular disease (CVD) or the strategies to lessen the harmful effects of stress (Osborne et al., 2020). There exists a shared epidemiology between cardiovascular events and emotional illnesses, implying the presence of underlying mechanisms that connect these distinct conditions. The course of cardiovascular disease may be influenced by various factors, including socio-economic characteristics, personality qualities, health behavior, and biochemical pathways of the patient. Cardiac episodes frequently manifest abruptly, causing a distressing experience for individuals who are unprepared for the occurrence (Chauvet-Gelinier & Bonin, 2017).

There is a strong and consistent correlation between stress-related problems and various forms of cardiovascular disease. This association remains significant even when considering factors such as familial background, prior somatic or psychiatric illnesses, and psychiatric comorbidity (Song et al., 2019). The presence of mental stress-induced ischemia was found to be strongly correlated with a heightened risk of cardiovascular mortality or nonfatal myocardial infarction in individuals diagnosed with stable coronary heart disease (Vaccarino et al., 2021). A substantial body of high-quality research data supports a number of plausible mechanisms and pathways through which chronic psychological stress may either directly or indirectly contribute to the development or progression of atherosclerosis (Levine, 2022). The research findings suggested that prolonged stress on a daily basis, as well as experiencing significant psychological trauma, can elevate the likelihood of acquiring cardiovascular disease (CVD) and experiencing mortality as a result. The concept that psychological states might impact physical health has long been recognized, with particular emphasis on the mind-body connection in the context of cardiovascular disease (CVD). Chronic stress is correlated to increased risk of CVD and poorer prognosis (Hamer, 2012; Gallo et al., 2014). Recent extensive prospective epidemiological studies have definitively indicated a robust link between CVD and many psychiatric ailments, including chronic psychological stress (Cohen et al., 2015). The current meta-analysis and systematic review point to the advantages of stress reduction for cardiac rehabilitation patients (Shi & Lan, 2021). There is an independent association between psychosocial stress, stress conditions, and cardiovascular disease (CVD) and contingent upon the intensity, duration, and individual response to stressors. Hence, the majority of clinical guidelines currently do not acknowledge psychological stress as a risk factor for CVD or endorse its inclusion in the treatment strategies for CVD prevention. The elucidation of this neuronal route enhances comprehension of the fundamental pathophysiological mechanisms and presents potential avenues for the advancement of innovative preventative interventions and therapeutic approaches (Dar et al., 2019). An increasing amount of data points to a correlation between higher hair cortisol levels and a higher risk of CVD as well as worse results from treatment and recuperation (Iob & Steptoe, 2019). The observed reduction in the prevalence of cardiovascular disease (CVD) in developed countries during the last forty years seems to have leveled off. Despite the implementation of effective

interventions targeting conventional risk factors, a significant proportion of individuals with cardiovascular disease (CVD) still encounter cardiac events. The aforementioned findings imply that implementing supplementary interventions, particularly those targeting atypical determinants, may prove advantageous in sustaining the ongoing decrease. Psychosocial stress has recently been recognized as a nontraditional risk factor that seems to play a role in various mechanisms associated with cardiac events. Improved understanding of the physiological and behavioral relationships between psychosocial stress and CVD will be helpful in developing strategies that effectively mitigate the deleterious impacts of stress. (Merz et al., 2002). This study aims to elucidate the relationship between perceived stress and disrupted sleep, specifically focusing on its relevance to the stress- CVD connection. There exists a strong association between elevated levels of stress and notable disruptions in both the duration and the quality of sleep. There is a correlation between stress levels and the daily repercussions of disrupted sleep. The relationship between stress and cardiovascular disease (CVD) may be influenced by the connection between stress and sleep, which serves as a significant mechanistic mediator (Kashani et al., 2011).

The purpose of the current study was to assess and compare the stress level of cardiovascular disease (CVD) patients and compare to non-CVD participant. Individuals diagnosed with cardiovascular disease (CVD) commonly exhibit psychological symptoms, which can be attributed to heightened levels of stress. There is a paucity of scholarly research addressing the topic of stress assessment among CVD patients in the context of Pakistani culture. The objectives of the study were as under: -

1. To assess the level of stress in CVD patients and to compare with the level of the participants without CVD.
2. To study the influence of gender, age, education and socioeconomic status on the level of stress and social support in CVD patients.

Hypotheses

1. Patients with cardiovascular disease will report significantly higher levels of stress compared to the control group with no cardiovascular disease on DASS-42.
2. Female CVD will record a higher level of stress as compared to male CVD patients on DASS-42.
3. Cardiovascular disease older patients will record a higher level of stress as compared to younger CVD patients on DASS-42.
4. Cardiovascular disease patients with a lower level of education will record a higher level of stress as compared to CVD patients with a higher level of education on DASS-42.

METHODS

A comparative study design was employed to assess and compare stress levels between CVD patients and a control group.

The present study recruited CVD patients with a confirmed diagnosis. The study participant group consisted of male and female patients with CVD disease for gender representation and comparison. The participants were selected from the outpatient departments (OPDs) one government and one private hospital from Rawalpindi, Pakistan. For control, non CVD patients were recruited from the normal population of the same city.

A comparative study was conducted to assess the stress level with a random sampling technique to select 200 (N=200) participants in 2023. Out of total, 100 CVD patients (50 males and 50 females) and 100 individuals (50 males and 50 females) without CVD were recruited, respectively. We used G*Power version 3.1.9.7 software to estimate the sample size at a 5% level of significance. It had an 80% power to find an effect size of 0.30 (Faul et al., 2009; Kang, 2021). Age, gender, education level and socioeconomic status of the participants of the study were recorded. The participants in this study were categorized according to their socioeconomic status which was based on per capita income measured in US dollars and converted to Rupees based on the exchange rate in effect. The participant's socioeconomic status was categorized as low ($ US 1135 = Rs:283750), intermediate ($ US 1136-4465 = Rs:284000 -1116250), and high ($ US 4466-13845 = Rs:116500-3461250 as per

World Bank's historical classification system (How Are the Income Group Thresholds Updated? – World Bank Data Help Desk, n.d.). A reliable ad valid measurement, DASS-42 assessed the stress level of CVD participants and the control group.

For the study, CVD male and female patients between 40-65 years of age within two months after the diagnosis of CVD were recruited. The following participants were excluded from the current study: those with Alzheimer's disease, dementia or severe cognitive impairments, or. those under 40 or over 65; those with unstable heart conditions and severe mental disorders; those with serious comorbid conditions (such as cancer or AIDS) those with; those taking psychotropic medications and those with severe lung disease. We used DASS, with 42- items and it is a self-report instrument with good convergent and discriminant validity, and internal consistency (Lovibond & Lovibond, 1995). It has 14 items for measurement of stress (last seven days) in clinical and non-clinical settings. The items are scored from zero to three on a 4-point Likert scale. DASS-42 had a Cronbach's alpha for stress was 0.93 (Brown et al., 1997).

For data analysis, SPSS version 25was used and various statistical tests were run on the gathered data. Descriptive statistics were used to explain the respondents' demographic features. The t-test and analysis of variance (ANOVA) were used to assess the data at the 0.05 level of significance.

`Informed consent, confidentiality, and privacy were among the ethical considerations that were explained to and guaranteed for the participants. Each participant was given a code to protect confidentiality, and participation was entirely voluntary. They were informed of their freedom to withdraw from the study at any stage. The nature and purpose of the study were explained to the participants, and their inquiries were appropriately addressed. Every participant gave their verbal consent, and the only research team had access to their confidential, anonymous data.

RESULTS

Table 1: Demographic Characteristics of Participants

Characteristics	*n*	%
Gender	100	50
Male	100	50
Female	100	50
Age		
Middle age (40–50 years)	89	44.5
Old age (51–65 years)	111	55.5
Education		
Matric	70	35
Graduate	61	30.5
Postgraduate	69	34.5
Socioeconomic Status		
Low socioeconomic status	67	33.5
Medium socioeconomic status	71	35.5
High socioeconomic status	62	31

Table 1 displays the demographic data for the study sample. By giving the demographic sheet to the participants, sociodemographic information was gathered from them. Of the 200 participants in the study, 100 (50%) were men and 100 (50%) were women. In terms of participant ages, 89 (44.5%) were in the 40–50 age range, and 111 (55.5%) were the 51–65 years. Regarding, the educational backgrounds, 61 (30.5%) were matric, 69 (34%) had a graduate degree, and 70 (35%) had a postgraduate degree. As per respondents, 67 participants (33.5%) had low socioeconomic status(SES), 71 participants (35.5%) had medium SES, and 62 participants (31%) had high SES.

Table 2: Stress scores of CVD and non-CVD participants (N = 200)

	Control Group (n=100)		CVD patients (n=100)				
Variable	*M*	*SD*	*M*	*SD*	*t*(198)	*p*	Cohen's *d*
Stress	16.67	4.78	19.89	4.86	-4.72	0.00	0.67

It was hypothesized that, in comparison to the control group, CVD patients would report higher levels of stress. An independent sample t-test was conducted to test the hypothesis.

There was a significant difference in the stress levels between participants with cardiovascular disease (CVD) and those without CVD, t (198) = -5.92, p < 0.01). The stress levels of patients with cardiovascular disease (M = 9.89, SD=4.86) were found to be considerably greater compared to those of the control group (M=16.68, SD=4.78). The effect size was determined to be of medium magnitude, as shown by Cohen's d value of 0.66. The results indicate that individuals with cardiovascular disease (CVD) had elevated levels of stress compared to the general population.

Table 1: Influence of Gender on Stress Level in CVD patients (N=100)

	Male (n=50)		Female (n=50)				
Variable	*M*	*SD*	*M*	*SD*	*t*(98)	*p*	Cohen's d
Stress	18.86	4.76	20.92	4.80	-2.16	0.02	0.43

The impact of gender on the level of stress in CVD patients was assessed through the hypothesis that female CVD patients will report higher level of stress as compared male CVD patients. To test the hypothesis, an independent sample t-test was used.

The findings showed that gender significantly affected the stress level in patients with CVD, t (98) = -2.16, p < 0.05. Furthermore, compared to male CVD patients (M = 18.86, SD = 4.76), the stress level of female patients (M = 20.92, SD = 4.80) exhibited a significantly higher tendency. The effect size (Cohen's d = 0.43) was small. According to the data, female CVD patients appeared to be more stressed than male CVD patients.

Table 2: Influence of Age on Stress Level in Cardiovascular Disease Patients (N=100)

	Younger CVD (40-50 years) Patients (n=39)		Older CVD patients (51-65 years) (n=61)				
Variable	*M*	*SD*	*M*	*SD*	*t*(98)	*p*	Cohen's *d*
Stress	19.08	4.48	20.41	5.06	-1.34	0.09	0.28

To evaluate the impact of age on the severity of stress in patients with cardiovascular disease (CVD), a hypothesis was formulated suggesting that older individuals with CVD would exhibit higher levels of stress compared younger adults. The hypothesis was tested using an independent sample t-test.

The stress level of CVD patients and normal participants revealed non-significant differences, t (198) = -1.34, p >0. 05. The results revealed that the older CVD patients suffered from higher level of stress (M=20.41 SD=5.06) than younger CVD patients (M=19.08 SD=4.48) However, Cohen's d value of 0.28 indicated a small effect size. This indicated that the stress level of CVD patients was higher than in the normal population but statistically non-significant impact with a small effect size.

Table 3: Influence of Education on Stress Level in Cardiovascular Disease Patients (N=100)

	Matric (n =55)		Graduate (n =24)		Postgraduate (n =21)				
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*(2,97)	*p* value	η2
Stress	20.35	4.79	18.50	4.64	20.29	5.22	1.30	0.28	0.03

Table 4: Levene Test of Homogeneity of Variance

Variable		Levene statistic	*df1*	*df1*	significance
Stress	Based on mean	.366	2	97	.694
	Based on Median	.289	2	97	.750
	Based on median and with adjusted degree of freedom	.289	2	96.501	.750
	Based on trimmed mean	.363	2	97	.696

The impact of education on CVD patients was assessed. It was assumed that less educated CVD patients will report higher level of stress as compared to graduate and postgraduate CVD patients. A one-way ANOVA was conducted to compare the means of three groups with lower to higher education level.

The stress recorded a non-significant influence of education, F (2,97) = 1.30, p = <0.05 and partial η2 = 0.03 with a small effect size. The mean stress scores of the education level of matric (M = 20.35 SD = 4.79) were highest followed by graduate CVD patients (M =18.50 SD = 4.64) and postgraduate CVD patients (M =20.29.10 SD = 5.22).

Table 7: Influence of Socioeconomic Status on Stress Level in Cardiovascular Disease Patients

	Low Socioeconomic Status(n=48)		Medium Socioeconomic Status(n=39)		High Socioeconomic Status(13)				
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*(2,97)	*p* value	η2
Stress	20.29	5.25	20.46	4.53	16.69	3.07	3.4	0.04	0.07

The objective was to examine the influence of socioeconomic status on stress level of individuals diagnosed with cardiovascular disease (CVD). Specifically, it was hypothesized that CVD patients with a lower socioeconomic status would exhibit higher level of stress compared to CVD patients with a medium or high socioeconomic status. The analysis of variance (ANOVA) was conducted to test the hypothesis. Socioeconomic status had a significant impact on the level of stress but with small effect size of partial η2 = 0.07 and F (2,97) = 3.4, p = <0.01. Low SES CVD patients had the highest mean stress scores (M = 20.29 SD = 5.25), followed by MSES CVD patients (M = 20.46 SD = 4.53) and HSES CVD patients (M = 16.69 SD = 3.69), respectively.

Table 8: Multiple Comparison by Bonferroni

Subscale	(I)SES	(J)SES	Mean Difference (I-J)	Standard Error	Significance	95% Confidence Interval	
						Lower Bound	Upper Bound
Stress	LSES	MSES	-.170	1.024	1.000	-2.66	2.32
		HSES	3.599	1.485	.052	-.02	7.22
	MSES	LSES	.170	1.024	1.000	-2.32	2.66
		HSES	3.769*	1.521	.045	.06	7.48
	HSES	LSES	-3.599	1.485	.052	-7.22	.02
		MSES	-3.769*	1.521	.045	-7.48	-.06

*. The mean difference is significant at the 0.05 level

DISCUSSION

This study illustrates the growing body of evidence implicating mental health issues as risk factors for CVD. The presence of stress during adulthood has a significant role in triggering heart diseases among people with a high burden of atherosclerotic plaque. Additionally, it serves as a determining factor for the prognosis and outcomes of those who already have a cardiovascular or

cerebrovascular illness. These results are in line with the findings reported by Osborne et al., 2020, that chronic stress is a persistent CVD risk factor. The potential pathophysiological consequences of stress encompass several mechanisms, including heightened cardiac electrical instability, myocardial ischemia, plaque disruption, and thrombus development. These processes collectively contribute to the occurrence of various clinical events, such as arrhythmia, myocardial infarction, cardiomyopathy, and stroke. Levine, 2022 also reported that acute stress can result in acute myocardial ischemia. The European recommendations for cardiovascular disease prevention are the only ones that acknowledge stress as a clinically relevant risk factor for people who have a high overall risk of cardiovascular disease or who are CVD patients. (Kivimäki & Steptoe, 2018).

CONCLUSION

Stress is an unavoidable part of life. Physical ailments or sleep deprivation are examples of variables that might exacerbate stress. Stress can also be caused by emotional pressures, such as money problems. Stress may also be caused by less dramatic elements like routine obligations and expectations. Your body's response to stress is designed to protect you. But if it continues, it might be dangerous. Cortisol is secreted as a result of stress. Stress increases levels of cortisol, a known risk factor for heart disease, which in turn raises blood pressure, triglycerides, blood sugar, and cholesterol.

Limitations and suggestions

Although the etiology and underlying processes of this study's shortcomings necessitate future research efforts, it did significantly contribute to our understanding of the degree of stress experienced by CVD patients and the impact of demographic variables. This will help in designing patient treatment programs that, with the use of cognitive and behavioral therapies, match to the psychological aspects causing CVD. Fuerthermore, large-scale, multicenter prospective studies are required to confirm psychological stress as a cardiovascular event risk factor

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