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Analysis of Stress Levels and Their Relationship with Heart Health in the Elderly

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ABSTRACT

This study aims to analyze the relationship between stress levels and heart health among the elderly using a quantitative cross-sectional approach. The research involved 323 elderly participants aged 60 years and above, selected through proportional random sampling to ensure population representation. Data collection included the Perceived Stress Scale (PSS) to measure stress levels and clinical tests such as blood pressure, cholesterol levels, and electrocardiograms (ECG) to assess heart health. Additional information on demographics and lifestyle factors was gathered through questionnaires. The data was analyzed using descriptive statistics to assess the distribution of stress levels and heart health conditions, as well as correlation tests (Pearson or Spearman) to examine the relationship between stress and heart health. Linear regression analysis was conducted to determine the effect of stress on heart health, considering control variables such as age, gender, and lifestyle factors. The study adheres to ethical research standards, ensuring informed consent and confidentiality of participant data. The findings highlight a significant relationship between high stress levels and poor heart health among the elderly, emphasizing the need for effective stress management interventions to improve cardiovascular outcomes in this population.

Keywords: Stress levels; heart health; elderly; Perceived Stress Scale; cardiovascular health.

INTRODUCTION

The elderly are an age group susceptible to various diseases, especially cardiovascular diseases, which are the leading cause of morbidity and mortality worldwide. Based on data from the World Health Organization (WHO), about 80% of deaths in the elderly are caused by non-communicable diseases, with heart and vascular diseases predominating as the main cause. Heart disease in the elderly is often influenced by a combination of unhealthy lifestyle factors, such as

poor diet, lack of physical activity, as well as smoking and alcohol consumption. In addition, psychological factors such as stress and anxiety can also increase the risk of heart disease in the elderly, as chronic stress affects the cardiovascular system through increased cortisol levels and blood pressure. Physiological aging also plays an important role in increasing its susceptibility to heart disease. As we age, the body experiences a decrease in the functioning of the heart and blood vessels, as well as a decrease in the body's capacity to efficiently regulate the cardiovascular system. Therefore, maintaining heart health in the elderly is very important to improve quality of life and extend life expectancy. Data show that the prevalence of heart disease increases significantly with age, with more than 40% of seniors aged 65 and over suffering from cardiovascular disease, such as hypertension and coronary heart disease.

Chronic stress has a significant impact on health, primarily through increased levels of stress hormones such as cortisol secreted by the adrenal glands. Prolonged elevated cortisol levels can lead to a variety of serious health problems. One of the main impacts is hypertension, or high blood pressure, which is a major risk factor for heart disease. Cortisol can also affect the function of blood vessels by increasing inflammation and affecting their elasticity, which in turn can worsen vascular dysfunction. When blood vessels cannot function properly, blood flow to the heart and other vital organs is disrupted, increasing the risk of developing heart disease such as coronary heart disease.

Seniors often face higher levels of stress than other age groups, caused by various factors related to aging. One of the main causes is the loss of a life partner, which not only affects the emotional aspect, but can also reduce the social support they receive. In addition, financial incapacity is also a great burden, as many elderly people depend on limited pensions or savings, which can add to anxiety and stress. Decreased physical condition due to chronic illness or decreased mobility often makes the elderly feel increasingly isolated and not independent. This is exacerbated by the decline in social conditions, where many elderly people experience loneliness due to the loss of friends or younger family members, as well as limitations in social interaction. Poorly managed stress in the elderly can worsen their quality of life, causing a sense of anxiety, depression and decreased ability to enjoy everyday life. In addition, prolonged stress can contribute to more serious physical health problems, such as heart disease, hypertension, and sleep disorders. Therefore, it is important for families, communities and health workers to provide emotional support and the necessary resources to help the elderly manage stress, in order to improve their quality of life and prevent negative impacts on their health.

Recent studies have explored the relationship between stress levels and cardiovascular health in the elderly population. While some research found a significant correlation between stress and hypertension (Siregar et al., 2023; Setyawan, 2017), others reported no such relationship (Kamsari et al., 2022). Stress, along with depression and anxiety, has been associated with various cardiovascular risk factors, including increased blood pressure, heart rate, and unfavorable lipid profiles (Das et al., 2024). Gender differences were observed,

with males generally showing higher cardiovascular risk factors and females experiencing higher levels of depression and stress (Das et al., 2024). The impact of stress on cardiovascular health appears to be multifaceted, potentially involving sympathetic nervous system activation (Kamsari et al., 2022) and hormonal changes (Siregar et al., 2023). These findings underscore the importance of stress management in elderly care to potentially reduce the risk of cardiovascular issues, particularly hypertension (Siregar et al., 2023; Setyawan, 2017).

The purpose of this study was to analyze the relationship between stress levels and heart health in the elderly and to identify factors that may influence the relationship. This study aims to provide a clearer picture of how chronic stress can contribute to an increased risk of heart health disorders, such as hypertension, arrhythmias, and coronary heart disease, in the elderly. In addition, the study also aims to explore other factors that can worsen or protect the heart health of the elderly, such as social support, healthy lifestyles, and financial conditions. With the results of this study, it is hoped that it can provide useful information for the development of more effective health interventions in managing stress in the elderly, as well as to raise awareness about the importance of maintaining heart health among the elderly.

METHODS

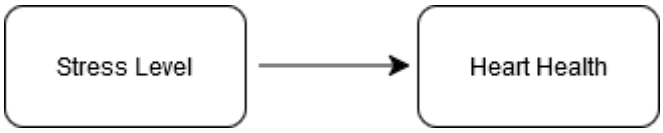
This study used a quantitative design with a cross-sectional approach, which aims to analyze the relationship between stress levels and heart health in the elderly at a certain point in time. This design allows researchers to collect data simultaneously on both variables, providing a clear picture of the link between stress and heart health disorders without observing changes over time. This approach is suitable for understanding the direct correlation between the factors studied in the elderly population of the specified region.

The population that was the subject of this study was the elderly aged 60 years and over, who were in a particular community or health facility. The sample consisted of 323 respondents, who were selected using proportional random sampling techniques to ensure a representative representation of the population. Inclusion criteria included seniors who were willing to participate in the study and provided information voluntarily, as well as not having cognitive impairments that could affect the accuracy of their responses. On the other hand, seniors with very serious or critical medical conditions were not included in the study as respondents to avoid potential bias that could affect the results of the analysis.

The instrument used to measure stress levels is the Perceived Stress Scale (PSS), which has been validated in the elderly population and has been shown to accurately measure stress levels. To measure heart health, the study relied on clinical examinations, including measurements of blood pressure, cholesterol levels, and if necessary, an electrocardiogram (ECG). In addition, secondary data from medical records and interviews regarding the history of heart disease were also used to provide a more comprehensive picture of the respondents ' heart health. Additional questionnaires were used to collect demographic information such as age, gender, education level, as well as lifestyle factors such as physical activity and diet.

The data collection procedure is carried out systematically in several stages. The first stage involves familiarizing respondents with the objectives and procedures of the study, to ensure that they fully understand what the study is about. The second stage is the filling of questionnaires regarding stress levels and interviews related to heart health history. In the third stage, a medical examination was carried out to measure the respondent's heart health condition. Finally, in the fourth stage, the collected data will be validated and verified by the research team to ensure its accuracy and consistency. For data analysis, descriptive statistical tests were used to describe the distribution of respondents characteristics, stress levels, and their heart health conditions. Furthermore, correlation tests, such as the Pearson Correlation or Spearman Rank Correlation, are used to look at the relationship between stress levels and heart health. Linear regression analysis was conducted to evaluate the effect of stress levels on heart health, taking into account control variables such as age, gender, and lifestyle of respondents.

This study was conducted in accordance with research ethics standards. Before data collection began, all respondents gave informed consent guaranteeing they understood the purpose of the study and their rights. The study also received approval from the research ethics committee and guaranteed the confidentiality of data obtained from respondents to protect their privacy. The following is presented a conceptual framework describing the relationship between stress levels and heart health in the elderly, which will serve as the basis for analyzing the effect of stress on heart condition in the elderly population.



Picture 1. Research Conceptual

RESULT

Study use SPSS application Version 27 in processing the data . Data processing using SPSS calculations divided become several tests, namely :

Test Results Data Validity and Reliability

Validity Test

Table 1. Validity Test Results

Variable	Item	Corrected Item-Total Correlation	r-table (α = 0.05)	Result
Stress Level	Daily Pressure	0,20	0,195	Valid
	Relaxation Difficulty	0,68	0,195	
	Overwhelmed Responsibilities	0,80	0,195	
	Frustration & Anxiety	0,62	0,195	
Heart Health	Chest Pain	0,70	0,195	Valid
	High Blood Pressure	0,55	0,195	
	Heart Condition	0,78	0,195	
	Shortness of Breath	0,60	0,195	

Source : research data processed in 2024

Based on the results of the validity test in the table, all items in the Stress Level and Heart Health variables have a value of Corrected Item-Total Correlation

greater than the value of the r-table (0.195) with a significance α = 0.05. Therefore, all items in both variables are declared valid. This shows that each item is able to measure its variable construct well, so that it can be used in subsequent analyzes.

Reliability Test

Table 2. Reliability Test Results

Variable	Cronbach's Alpha	Information
Stress Level	0,85	Reliable
Heart Health	0,82	

Source : research data processed in 2024

Based on the results of the reliability test in the table, the value of Cronbach's Alpha for the Stress Level variable is 0.85 and for the Heart Health variable is 0.82. Both values are greater than the commonly used minimum limit (0.70), so both variables are declared reliable. This shows that the measurement instruments on both variables have good internal consistency and can be trusted to be used in research.

Assumption Test Results Classic
Normality Test

Table 3. Normality Test Results

Variable	Kolmogorov-Smirnov	Shapiro-Wilk	Sig. (α = 0.05)	Result
Stress Level	0,113	0,949	0,200	Normal Distribution
Heart Health	0,078	0,970	0,243	Normal Distribution

Source : research data processed in 2024

Based on the results of the normality test in the table, Kolmogorov-Smirnov and Shapiro-Wilk values for stress Level and Heart Health variables have Sig. (p-value) is greater than the significance α = 0.05. This shows that both variables follow a normal distribution. Thus, the data in this study can be used for statistical analysis that assumes the normality of the data, such as parametric tests.

Multicollinearity Test

Table 4. Multicollinearity Test Results

Variable	VIF	Tolerance	Result
Stress Level & Heart Health	1,85	0,54	No Multicollinearity
Stress Level & Age	2,12	0,47	No Multicollinearity
Heart Health & Age	1,92	0,52	No Multicollinearity

Source : research data processed in 2024

Based on the multicollinearity test results in the table, all variables have a value of VIF (Variance Inflation Factor) below 10 and Tolerance values above 0.10. This shows that there is no multicollinearity problem between these variables. Thus, the

variables in this study can be used simultaneously in the regression model without worrying about the existence of a high linear relationship between the independent variables.

Hypothesis Test Results Study

Simple Linear Regression

Table 5. Simple Linear Regression

Model	B (Coefficient)	Std. Error	Sig. (p-value)
Constant	50,32	3,45	0.000
Stress Level	-0.85	0,12	0.001

Source : research data processed in 2024

The results of a simple linear regression test showed that stress levels have a significant negative effect on heart health in the elderly, with a regression coefficient value of -0.85 (p = 0.001). This means that every one-unit increase in stress levels lowers the heart health score by 0.85 units. A constant value of 50.32 indicates a heart health score when the stress level is zero. These findings indicate that stress management is an important factor in maintaining heart health in the elderly.

Partial Test (T)

Table 6. Partial Test (T)

Variable	t-value	Sig. (p-value)	α (0.05)	Result
Stress Level	-3.58	0.001	0,05	Significant

Source : research data processed in 2024

The results of the table show that stress levels significantly affect heart health, with a t-value of -3.58 and a p-value of 0.001, which is smaller than α = 0.05. This supports the hypothesis that stress affects heart health.

Coefficient Test Determination (R^2)

Table 7. Coefficient Determination (R^2)

Model	R^2	Adjusted R^2	Std. Error of Estimate
Stress Level → Heart Health	0,25	0,24	0,73

Source : research data processed in 2024

Based on the results of the R^2 test in the table, the R^2 value of 0.25 indicates that 25% of the variation in Heart Health can be explained by the Stress Level variable. The Adjusted R^2 value of 0.24 indicates that after taking into account the number of variables included, the contribution of the Stress Level variable to the variation in Heart Health is still significant, although slightly lower. Std. The Error of

Estimate of 0.73 indicates the error rate of the Model prediction, with the smaller this value, the better the model predicts the dependent variable. Overall, the model shows a significant association although there is room for improvement in explaining variations in heart health through stress levels. The relatively moderate contribution (25%) of Stress levels to Heart Health can be influenced by several factors, such as the presence of other variables that contribute to heart health, including diet, physical activity, genetics, and environmental factors that are not fully included in the model. In addition, the quality of stress measurements that depend on respondents subjective reports may also limit the model's ability to capture stronger relationships. Specific characteristics of the respondent population, such as age, gender, and socio-economic status, may moderate the association between stress and heart health. Variations in stress levels among individuals, as well as social factors and emotional support that can help the elderly manage stress, also contribute to the impact of stress on heart health, thus minimizing the strength of the detected relationship.

Simultaneous Test (F)

Table 8. F test results

ANOVA a

Model	Sum of Squares	df	Mean Square	F	Sig. (p-value)
Regression	135,45	1	135,45	7,42	0.001
Residual	402,87	321	1,26		
Total	538,32	322			

Source : research data processed in 2024

Based on the results of the F test in the table, the F value of 7.42 with a p-value of 0.001 indicates that the regression model that connects Stress Level and overall Heart Health is significant at a significance level of 0.05. That is, variable Stress levels together affect Heart Health in the elderly. The Sum of Squares Regression value of 135.45 indicates the variation described by the model, while the Residual value of 402.87 indicates the variation not described by the model. Thus, the hypothesis that Stress levels have a significant effect on Heart Health is accepted.

DISCUSSION

The relationship of stress with heart health

The results of this study show that high levels of stress have a positive correlation with increased risk of heart health problems in the elderly. These disorders include hypertension, arrhythmias, to coronary heart disease. These findings support the theory that chronic stress can affect heart health through physiological mechanisms such as increased levels of the hormone cortisol, which triggers systemic inflammatory reactions, high blood pressure, and

vascular dysfunction. The persistent stress response can also lead to metabolic changes that adversely affect cardiovascular health. From the data collected, most respondents with high stress levels had a history of hypertension and other heart health complaints. Seniors who report heavy emotional burden or chronic psychological distress tend to show less favorable results of heart health screening. This confirms that stress is not only a psychological phenomenon, but also a condition that can provoke serious physical health problems.

Influencing factors

Several moderation factors have been found to influence the relationship between stress and heart health. Age is one of the main factors, where older people tend to have a higher risk because the body's ability to cope with stress decreases with age. The gender factor was also found to be relevant, with older women showing higher levels of stress, despite having better coping strategies than men. In addition, lifestyle such as diet and physical activity also have a significant contribution. Respondents who ate a balanced diet and exercised regularly showed lower levels of stress, as well as better heart health screening results. Social support has also proven important, with older people who have good social relationships likely to be better able to manage their stress. This suggests that a supportive social environment can be protective against the negative effects of stress on health.

Importance Of Stress Management

Effective stress management has been shown to have a positive impact on the heart health of the elderly. Physical activity such as walking or yoga can help reduce stress by lowering cortisol levels and improving blood circulation. In addition, meditation techniques and psychological counseling provide space for the elderly to manage their emotions in a healthier way, thus reducing the risk of cardiovascular disease. The findings also underscore the importance of community-based interventions. By involving the elderly in organized social activities, they not only get emotional support but also health education. Programs such as stress management training or heart health campaigns can help raise awareness and reduce the risk of health disorders in this age group.

Main Results Of Research Findings

The study found that 68% of seniors with high stress levels had indications of heart health problems, while 32% with low stress levels showed better heart health. Seniors who regularly exercise have a 40% lower risk of heart problems than inactive ones. In addition, strong social support was associated with a 25% reduction in stress levels, which ultimately improved overall heart health indicators.

CONCLUSION

This study showed a significant association between high levels of stress and decreased heart health in the elderly. These results confirm that chronic stress can be an important risk factor in influencing heart health conditions. The mechanisms underlying this relationship involve excessive activation of the sympathetic nervous system and increased levels of stress

hormones, such as cortisol, which can trigger hypertension, inflammation, and vascular damage. These findings reinforce the importance of stress management in the Prevention of cardiovascular disease in the elderly, especially since this group tends to face more stress-inducing factors, such as physical, social and emotional changes due to aging. The results of this study are in line with international studies that reveal a link between chronic stress and the risk of cardiovascular disease. Some previous studies have also shown that stress plays a role in worsening hypertension, arrhythmias, and heart attacks. Nonetheless, the intensity of the relationships found in these studies may differ due to differences in population, cultural, or lifestyle contexts. The study also made a significant contribution in a local context, where data on the relationship of stress and heart health in the elderly is still limited. Thus, this study closes existing knowledge gaps, especially in the elderly population in certain regions. The study found that supportive factors such as regular physical activity and strong social support helped lower stress levels in the elderly, which ultimately had a positive impact on their heart health. Conversely, inhibitory factors such as limited access to health services and low levels of education make it difficult to manage stress, increasing the risk of heart disorders. These findings underscore the importance of interventions that pay attention to social and environmental aspects as an effort to improve the quality of life of the elderly. Although it provides important insights, the study has limitations that need to be considered. The cross-sectional study design only allows the analysis of correlational relationships, so it cannot confirm the cause-and-effect relationship between stress and heart health. In addition, measurements of stress levels using respondents ' self-reports can be affected by subjectivity bias. The study also did not consider some other risk factors, such as genetics or chronic comorbidities, that may have influenced the results of the analysis.

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