UKRIDA HOSPITAL WORKERS STRESS PROFILE USE PERCEIVED STRESS SCALE AND HEART RATE VARIABILITY METHODS

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ABSTRACT

Background Stress is a condition of unbalance the physical and mental states, unable to respond to stimulus situations, and the end cause stress responses. Stress is one of the fourth ranked diseases in the world that experience stress. The symptoms of stress are palpitations, headaches, high blood pressure, disturbed digestion, shortness of breath, and difficulty sleeping. The measuring of stress using the perceived stress scale questionnaire in which the questionnaire has ten questions and the results obtained can determine the level of stress. If stimulation from internal or external stress occurs, will affect the nervous system, a heart rate variability tool used to measure the level of stress.

Objective The aims of this study are to determine the relationship between stress and heart rate variability, and stress levels based on gender and age.

Methods The conducted study was with quantitative analysis methods using cross-sectional design on 262 data.

Results Based on the results of this study, the majority were aged less than thirty-five years and there were more women than men. In addition, the results of the chi-square test showed no significant relationship between stress and heart rate variability because the results of significancy was 0.432.

Conclusions Measurement of stress on UKRIDA Hospital workers has not shown a significant relationship between the stress questionnaire and heart rate variability. However, there was a tendency for the worker to experience stress accompanied with an increase of the sympathetic nervous system measured by the Heart Rate Variability methods.

Keywords: Heart Rate Variability, Perceived Stress Scale, Stress

INTRODUCTION

Health is a state in which the mental, physical, and social conditions are in good condition; these three conditions influence each other or are inseparable. The definition of health according to the World Health Organization (WHO) in 1948 was "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity." Mental health is a state where there is well-being in the individual and the individual can manage stress well. A state of stress is a reaction of the body that is out of control in a situation and can cause changes in managing emotions, behaviour, and the body. Medical, psychological, and social problems can emerge if a high degree of stress occurs, and there are possibilities of harming someone. When someone is under modest stress, they normally endeavour to address the situation. Individual internal and external factors, such as the environment, can induce stress. Stress can cause a decrease in work, disturbed mental health such as depression, and cardiovascular disease, and it can also cause high blood pressure. The experience of stress occurs to anyone, and age limits less.¹,²
The prevalence of stress events is quite high; more than 350 million people in the world experience stress, and it is the fourth-ranked disease in the world, according to the WHO. The stress prevalence study conducted by the Health and Safety Executive in the UK involved 487,000 productive UK residents from 2013–2014. The number of stress events was greater in women (54.62%) than in men (45.38%). The World Health Organization states that around 450 million people in the world experience stress. In Indonesia, around 10% of the total population experiences stress. According to the Research and Development Agency (2013) listed in the results of the 2013 Basic Health Research, around 1.33 million residents of DKI Jakarta experience stress. This figure reaches 14% of the total population, with acute stress levels reaching 1-3% and severe stress reaching 7-10%.

The researcher intends to conduct research on stress monitoring measurement for Krida Wacana Christian University Hospital Workers (UKRIDA Hospital) with the Perceived Stress Scale Method. This research is important for workers, knowing that the activities carried out by workers daily are quite dense, so it should be done. This study is to determine the mental health of workers.

METHODS

The analytic study with a cross-sectional design, the independent variable is the stress score measured by the Stress Scale, and the dependent variable is heart rate variability observed and measured at the same time to determine profile stress in workers at RS-FKIK UKRIDA with the Perceived Stress Scale Method. The PSS has three versions, including the original 14-item scale developed by Cohen et al. (1983) and shorter versions with ten items and four items. The research used the ten-item PSS to measure the stress scale on the workers of the Faculty of Medicine and Health Sciences Hospital, Krida Wacana Christian University, conducted in June 2022. This research has passed the Ethical Review No. SLKE: 1259/SLKE-IM/UKKW/FKIK/KE/IV/2022. Each UKRIDA Hospital worker subject had taken the Perceived Stress Scale test. Besides that, an HRV examination is conducted, which takes 10–15 minutes with the HRV Stress Analyzer type SA3000P. From the HRV Stress Analyzer examination, SDNN (Standard Deviation Normal to Normal) and RMSSD (Root Mean Square of Successful Different) values are obtained. Univariate and bivariate data analysis with Chi-Square using SPSS 2.0.

RESULTS:

Data Characteristics

Based on research data entitled "Stress Monitoring Measurement for Workers at UKRIDA Hospital with a Study of the Heart Rate Variability and Perceived Stress Scale Methods" for workers working at UKRIDA Hospital located on Jl. North Arjuna, Kb. Jeruk, West Jakarta City. The research was conducted in June 2022, which is one of the studies from the MCU. A total of 251 research subjects met the inclusion and exclusion criteria, to obtain a relationship between stress and heart rate variability at UKRIDA Hospital.

Stress Levels Based on Age in UKRIDA Hospital Worker

Table 1 shows that subjects who experienced moderate to severe stress were most found at the age of less than 35 years with a percentage (44.6%) of a total of 112 workers, while those who experienced mild stress under 35 years the percentage (33.5%) of a total of 84 total workers. Female experienced more subjects experiencing moderate-severe stress, namely seventy-three workers (29.1%) out of a total of 133 workers, while the male gender experienced moderate-severe stress, namely sixty-nine workers (27.5%) of a total of 118 workers.
Table 1. Respondents’ Characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Stress Level (n, %)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mild (n=109)</td>
<td>Moderate-High (n=142)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 35</td>
<td>84 (33.5)</td>
<td>112 (44.6)</td>
</tr>
<tr>
<td>&gt; 35</td>
<td>25 (10.0)</td>
<td>30 (12.0)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>49 (19.5)</td>
<td>69 (27.5)</td>
</tr>
<tr>
<td>Female</td>
<td>60 (23.9)</td>
<td>73 (29.1)</td>
</tr>
</tbody>
</table>

Comparison between Perceived Stress Scale and HRV in Standard Deviation Normal to Normal (SDNN)
Based on table 4, it shows that 103 workers (41.0%) experienced moderate to severe stress and normal SDNN results out of a total of 142 workers, and thirty-nine workers experienced moderate to severe stress and abnormal SDNN levels (15.5%). Meanwhile, workers who experienced mild stress and normal SDNN results were eighty-one workers (32.3%) out of a total of 109 workers, and workers who experienced mild stress and abnormal SDNN levels were twenty-eight workers (11.2%).
This processing was conducted using the Chi Square test to determine whether there is a relationship between stress levels and HRV in workers at the UKRIDA FKIK Hospital. The results of this Chi square test are 0% of cells and the expected count is less than five, for analysis using Chi square the results of P=0.725 are used. The results show that there is no significant relationship between stress levels and SDNN levels.

Comparison between Perceived Stress Scale and HRV in Root Mean Square of Successive Different (RMSSD)
Based on table 5 above, it shows that the subjects who experienced more moderate-severe stress and normal RMSSD results were 120 workers (47.8%) out of a total of 142 workers, and those who experienced moderate-severe stress and abnormal RMSSD levels were twenty-two workers (8.8%). While workers who experienced mild stress and normal RMSSD results were eighty-eight workers (35.1%) out of a total of 109 workers, and workers who experienced mild stress and abnormal RMSSD levels were twenty-one workers (8.4%).
This processing was conducted using the Chi Square test to determine whether there is a relationship between stress levels and HRV in workers at the UKRIDA FKIK Hospital. The results of this Chi square test are 0% of cells and the expected count is less than five, for analysis using Chi square the results of P=0.432 are used. The results show that there is no significant relationship between stress levels and RMSSD levels. Table 4. Comparison of Stress Scale
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<table>
<thead>
<tr>
<th>Comparison</th>
<th>Stress Scale (n, %)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mild</td>
<td>Moderate</td>
</tr>
<tr>
<td>SDNN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>81 (32.3)</td>
<td>3 (1.6)</td>
</tr>
<tr>
<td>Abnormal</td>
<td>28 (11.2)</td>
<td>2 (2.9)</td>
</tr>
<tr>
<td>RMSSD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>88 (35.1)</td>
<td>3 (1.4)</td>
</tr>
<tr>
<td>Abnormal</td>
<td>21 (8.4)</td>
<td>2 (4.6)</td>
</tr>
</tbody>
</table>

**DISCUSSION**

Stress can be caused by several factors, namely: Age and gender. This discussion will also discuss the relationship between stress levels and heart rate variability used in this study, namely the SDNN and RMSSD parameters.

**Stress Level Based on Age**

The results of this study are in accordance with Ayyuda and Sho’im, 2015 where the results of their research stated that aged <35 years experienced high stress compared to those aged >35 years. 35 years (56.65%) experienced severe stress and (34%) experienced mild stress, while subjects >35 years (3.8%) experienced mild stress. Because the age <35 years is still in the stage of adaptation to the environment and can be influenced by several things as well, for example: currently in an adjustment period with forming a career, establishing male-female relationships, looking for a life partner, thinking about children's education, and a period of work adaptation, for example: job title and job resignation etc. Whereas for those aged > 35 years the level of stress is lower compared to those aged <35 years, because those aged > 35 years usually have more ability to control their own stress. In his research Robbins in 2006, said that the longer a person works, the more control his stress well.

**Results of Stress Levels by Gender**

The results of this study are in accordance with research conducted by Lusia and Susy, who obtained 50.3% for women and 4.9% for men. This research is also in line with research conducted by Habibi and Jefri who obtained the results of their analysis in women as much as 41.25% experienced moderate stress compared to men as much as 32.25%. In the research, Lusia and Susy said that more women experience stress, due to differences in dealing with something they are facing. In the female gender, usually if you have a problem, it can trigger negative hormones so it is easy to cause stress, because women have a negative level of awareness of problems and can cause fear and anxiety. In contrast to the male sex, usually if there is a problem, he will go through the problem and think that the problem is a positive thing so that it becomes one of the encouragements for him to solve it. In a ward hospital, various factors can contribute to stress, including high workload, long working hours, exposure to patient suffering, time pressure, and challenging patient cases. Stress among healthcare professionals in a ward hospital setting can have potential implications for their well-being, job satisfaction, and patient care.

By administering the PSS to healthcare professionals working in a ward hospital, researchers can gain insights into their perceived stress levels and understand how these stress levels may impact their experiences and performance. This information can be valuable for identifying areas of improvement, implementing interventions to reduce stress, and promoting well-being among healthcare professionals.

**Stress Level Results**

In this study, the results showed that 109 workers (43.4%) experienced mild stress, while the most common were workers who experienced moderate stress, namely 140 workers (55.8%), and two workers who experienced severe stress (8%). Stress is a physiological response, in which the stress that usually occurs in everyday life is mild stress and usually does not affect a person's physiological state. Moderate stress can usually cause physiological reactions, and someone who is experiencing moderate stress tends to focus on what he is doing and
overrides other things. Severe stress also affects a person’s physiological state, which can usually experience a decrease in perception which is usually shown to reduce the stress he is experiencing.12,13

Based on the results above, this study was compared with the research of Widyastuti, 2017 where the results of this study illustrate that the average worker experiences moderate stress, namely as much as 46.7%, this is due to differences in the types of work between one another. In addition, Mahmud and Uyun, 2016 who conducted research with an average result of experiencing moderate stress, namely 78.67%, this study also said that each person’s stress response was different related to experience, personality, health conditions, the size of the stressor, coping mechanisms.14,15

Relationship between Stress Level and Standard Deviation Normal to Normal (SDNN)

Based on the results obtained in table 4.6 using the 2x2 chi square table test, namely mild stress and moderate to severe stress and normal and abnormal SDNN, the expected value obtained is less than five and 0% of the number of cells so that the chi square test can be used for research. This. Previous research explained that there is a relationship between stress levels and SDNN because stress, which is a physiological response, can activate the sympathetic-adreno-medullary and interact within the nervous system. Stress is regulated by the ANS (Automatic Nervous System) which is part of the central nervous system, where the ANS will regulate and be responsible for the SNS and PNS. If there are physiological changes that occur in the SNS and PNS, then HRV can be disrupted by physiological changes, the SNS will be active if there is stress stimulation, which will reduce HRV and increase HR. This response is called the “fight or flight” response. On the contrary, what happens if civil servants experience body changes will increase HRV and decrease HR. In this study, the results of the chi square test showed a P-value of 0.752. The results showed that the measurement of stress monitoring on workers at the RS UKRIDA using the Perceived Stress Scale study and the heart rate variability method was not significant. The ward position and correlation with patient communication in hospital has passively factor for the insignificant result of PSS study.

In this study regarding the measurement of monitoring stress on workers at RS UKRIDA with the study of the Perceived Stress Scale and the heart rate variability method. Stress can be influenced by internal and external factors, in which when there is a stressor the brain will respond which affects the hypothalamus and activates the nervous system and Corticotropin-releasing-hormone (CRH). One of these nervous systems is the ANS which consists of the SNS and PNS where if there is a change in the body it can be detected by a heart rate variability tool, and from the sympathetic-adreno-medullary it can increase NE and E secretion, later NE and E are released and will initiating the cAMP signaling pathway from the signaling results can result in contraction of smooth muscle and cardiac muscle causing vasoconstriction, increased blood pressure, increased glucose levels etc. CRH release is triggered by stress which in turn activates ACTH and activates cortisol, so that cortisol can suppress the immune system. In this study, the results of the chi-square test obtained a P-value of 0.752. The results showed that the measurement of stress monitoring on workers at the UKRIDA Hospital using the Perceived Stress Scale study and the heart rate variability method was not significant. Every ward in the hospital has a different problem with communication with patients. It has a factor influencing it. This research is in line with Adrian’s research, 2018 which said that the relationship between PSS and HRV was negatively correlated, or the relationship was not significant. faced by employees, the higher the HRV value. Another study that is in line with this research, namely Silva et al, 2015 which said that PSS and HRV with the SDNN parameter had no significant correlation. This study used the Spearman test which showed negative Spearman results (-0.207, and P 0.233).
significant with LF, this can be because it is known that what can cause morphological and physiological changes in the neuroregulation system is chronic psychological stress and this research also says that there is a possibility that if HRV is disrupted, that is, a decrease occurs as a result of adaptation of the nervous and endocrine systems activated by stress this will contribute throughout life to the pathophysiology of cardiovascular disease, another reason is that this study is meaningful with the LF parameter being influenced by a smaller number of subjects causing no significant relationship between stress and HRV parameters SDNN and RMSSD. This research is also in line with the research of Clays, et al, 2011 which said that there is no significant relationship between work stressors and SDNN with a P-value (0.769).16, 17, 18

**Relationship between Stress Level and Root Mean Square of Successive Different (RMSSD)**

Based on the results obtained in table 4.7 using the chi square table 2x2 test, namely mild stress and moderate to severe stress and normal and abnormal RMSSD, the expected value obtained is less than five and 0% the number of cells so that the chi square test can be used for this research. In this study, the results of the chi square test obtained a P-value of 0.432. These results indicate that the measurement of stress monitoring on workers at UKRIDA Hospital using the Perceived Stress Scale study and the heart rate variability method is not significant.

This research is not in accordance with the research conducted by Castaldo, et al. 2015. The results in this study showed that there was a relationship between stress and HRV in the RMSSD parameter. Repeated examinations on stress condition and rest to minimize circadian effects with the subject in the same position. 19,20,21

**CONCLUSION**

Based on the results of research and analysis of the relationship between stress levels and heart rate variability in UKRIDA Hospital workers held in June 2022 concluded: The results of this study found that there were more UKRIDA Hospital workers who experienced moderate to severe stress at the age of <35 years (44.6%) compared to those aged >35 years (12.0%). The results of this study found that there were more UKRIDA Hospital workers who experienced moderate to severe stress in women (29.1%), compared to men (27.5%). The results of this study found that there were more UKRIDA Hospital workers who experienced moderate stress (55.8%), while as much as mild stress (43.4%) and as much as severe stress (8%). The results of this study using the normal HRV SDNN method were found to be more common at the age of <35 years (60.6%), compared to ages >35 years (12.7%). The results of this study using the normal SDNN HRV method were found more in women (40.6%) compared to men (32.7%). The results of this study found that there was no significant relationship between stress levels and Standard Deviation Normal to Normal (SDNN) in UKRIDA Hospital workers (P> 0.05). The results of this study found that there was no significant relationship between stress levels and the Root Mean Square of Successive Different (RMSSD) in UKRIDA Hospital workers (p>0.05).

**REFERENCES**