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The Relationship of Saliva Cortisol Levels with Stress Level of Anesthesiology Resident Participants and Intensive Care Faculty of Medicine Airlangga University in the Era of the Covid-19 Pandemic

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Abstract:-
Background: Stress in a resident's professional life can be triggered by the activities of a specialist doctor's education program who is undergoing a resident without exception anesthesiology. During the COVID-19 pandemic, the incidence of stress in anesthesiology residents at various educational centers in Indonesia is expected to increase as well as in Indonesia, namely at RSUD Soetomo Surabaya. It can be seen that the higher the level of stress experienced by a person, the higher the level of cortisol in the individual's blood. Therefore, these levels were compiled to analyze the relationship of salivary cortisol with stress levels of resident participants in anesthesiology and intensive care at Airlangga University in the era of the Covid-19 pandemic.

Methods: This study is an analytical observational study with a cross sectional design which was measured using the Depression, Anxiety, and Stress Scale (DASS)-42 and its relationship with salivary cortisol levels.

Results: Through the study, it was found that the salivary cortisol levels of resident participants Anesthesiology and Intensive Carein Medical Faculty of UNAIR before entering the RIK stagnation cycle versus 2 weeks of running RIK stagnation cycle with a median value of 0.315 g/dL versus 0.422 g/dL with (95% CI, 0.143, 0.778) g/dL versus (95% CI, 0.179, 2.802) g/dL with $p < 0.05$. From the results of the DASS-42 questionnaire obtained 2 subjects (5.7%) mild depression, 1 subject (2.9%) moderate depression, 5 subjects (14.3%) mild anxiety, 1 subject (2.9%) moderate anxiety, 1 subject (2.9%) severe anxiety, 2 subjects (5.7%) mild stress, 5 subjects (14.3%) moderate stress, 1 subject (2.9%) severe stress.

Conclusion: Thus, it can be concluded that the stress level in anesthesiology resident participants in the COVID-19 Pandemic era was not stressful or normal because almost 80% of the subjects did not experience stress. There is no significant relationship between salivary cortisol levels and stress levels.
Keywords: stress, cortisol, salivary cortisol, COVID-19 pandemic, Anesthesiology residentparticipants.

I. INTRODUCTION

Stress in a resident's professional life can be triggered by the ongoing specialist medical education program activities. They are trained to have the ability from clinical, academic, physical, and social aspects, and even work up to 80 hours per week(Katz et al., 2006). Residency education is a difficult and stressful level of professional development. This can trigger stress and various effects that arise due to stress on residents without exception anesthesiology.

In a US survey of anesthesiology residents, a high risk of fatigue was found in 41% of respondents and depression in 22%(de Oliveira Jr et al., 2013). Compared to practicing anesthesiologists, resident anesthesiologists have twice the incidence of substance abuse and three times the incidence of suicide(Fry et al., 2015). Likewise, burnout as a consequence of prolonged and excessive stress experienced by residents with an estimated prevalence ranging from 30% to more than 54%(Dyrbye et al., 2012)(Shanafelt et al., 2015).

It is known that the anesthesiologist profession is a profession with a high workload that is required to think and act quickly and precisely in critical situations. Lack of sleep, fatigue, and changes in circadian rhythms can cause stress which ultimately affects the cognitive function of the anesthetist. In previous studies it has been found that stress is closely related to cortisol. The higher the level of stress experienced by a person, the higher the level of cortisol in the individual's blood. Cortisol production has an independent circadian daily rhythm with the highest concentrations in the morning and lowest concentrations in the evening. Although the cortisol concentration in a person's blood is influenced by diurnal variations, cortisol levels can return to normal values between the above time spans (Ljubijankić et al., 2008).

SARS–CoV–2 or better known as COVID-19 is a severe acute respiratory symptom caused by infection with a new strain of the corona virus, namely the novel Corona viridae–2. The COVID-19 pandemic that is sweeping the world has caused an uproar and excitement across the country. According to data from the COVID-19 Task Force in Indonesia on May 15, 2020, 16,496 confirmed COVID-19 cases were obtained with 490 new cases, 11,617 people

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being treated, 3,803 declared cured, and 1,076 dead(O'Byrne et al., 2021).

The COVID-19 pandemic is known to contribute to a new type of stress level. Even under normal circumstances, health workers show stress exceeding the threshold "About 25% compared to 15 – 18% in the general population", said Radika Bapat, a clinical psychologist (Bhuyan, 2020). Frontline medical personnel had a higher risk of depressive symptoms (OR, 1.52; 95% CI, 1.11 – 2.09; P = 0.01), anxiety (OR, 1.57; 95% CI, 1 ,22 – 2.02; P < 0.001), insomnia (OR, 2.97; 95% CI, 1.92 – 4.60; P < 0.001), and sadness (OR, 1.60; 95% CI, 1.25 – 2.04; P < 0.001) (Brooks, 2020).

In determining stress levels, several stress scales are often used, such as PSS-10, KPDS-10, DASS-42, and so on. To confirm and analyze the extent to which a person is experiencing stress and to further clarify and sharpen the level of stress that is being experienced by a person, several stress scales can be used. However, the author uses the Depression, Anxiety, and Stress Scale (DASS) approach. DASS is a self-assessment scale used to measure a person's negative emotional state, namely depression, anxiety and stress (Kusumadewi & Wahyuningsih, 2020). The main purpose of measurement with the DASS is to assess the severity of the core symptoms of depression, anxiety and stress. Of the 42 items, 14 items relate to symptoms of depression, 14 items relate to symptoms of anxiety and 14 items relate to symptoms of stress.

Therefore, this study was compiled to analyze the stress level of specialist residents, especiallyAnesthesiology and Intensive Care participants at the Faculty of Medicine UNAIR Surabaya in the era of the COVID-19 Pandemic. And the relationship between salivary cortisol levels and stress. Evaluation of stress levels was measured using the Depression, Anxiety, and Stress Scale (DASS) questionnaire.

II. METHOD

This study is an observational analytic study with a cross sectional design to determine the level of stress in resident participants in Anesthesiology and Intensive Care, Faculty of Medicine UNAIR Surabaya in the COVID-19 pandemic era measured using the Depression, Anxiety, and Stress Scale (DASS)-42 and its relationship with levels of salivary cortisol. This research was conducted in RSUD Soetomo Surabaya in June-September 2021 after obtaining approval from the Ethics Commission of RSUD Soetomo Surabaya, Indonesia.

The population is all resident participants of Anesthesiology and Intensive CareFaculty of Medicine UNAIR who are studying at RSUD Soetomo and worked in a special isolation room (RIK) for the period June – September 2021. The sample studied was an affordable population that met the inclusion criteria.

III. RESULT

A. *Demographic Characteristics of Research Subjects*

Demographic data on the characteristics of research subjects in the form of gender, age, marital status, semester level, and body mass index (BMI) are presented in the form of a frequency table. Demographic data about the characteristics of research subjects can be shown as table 1 below:

Variable	N	(%)
Sex		
Men	30	85,7
Women	5	14,3
Age (Year)		
< 30	14	40
≥ 30	21	60
Marital Status		
Married	16	45,7
Single	19	54,3
Semester level		
2	1	2,9
3	8	22,9
5	5	14,3
6	6	17,1
7	5	14,3
8	6	17,1
9	4	11,4
IMT Status		
Normal	14	40
Overweight	4	11,4
Obesity degree 1	16	45,7
Obesity degree 2	1	2,9

Table 1: Demographic Characteristics of Research Subjects (n = 35)

Through the table, it can be seen that from a total of 35 subjects, there were 30 male and 5 female of demographic data 85.7% and 14.3%. Demographic data for age less than 30 years and more than or equal to 30 years are 14 people (40%) and 21 people (60%). It can be seen the results that the age of more than or equal to 30 years is dominant. Demographic data on marital status obtained the following results, married and unmarried were 16 people (45.7%) and 19 people (54.3%). That is, more subjects who are not married. Demographic data for semester level shows the following results, semester 2, 3, 5, 6, 7, 8, and 9 are 1 person (2.9%), 8 people (22.9%), 5 people (14.3 %), 6 people (17.1%), 5 people (14.3%), 6 people (17.1%), and 4 people (11.4%). It is said that semester 3 dominates research subjects while the least is semester 2. Demographic data on BMI status shows the results that normal, overweight, grade 1 obesity, and grade 2 obesity are as follows, 14 people (40%), 4 people (11 ,4%), 16 people (45.7%), and 1 person (2.9%). It can be said that almost half of the total subjects have BMI status as obesity grade 1 and the rest are normal, overweight, and obese grade 2.

B. Description of Depression, Anxiety, and Stress of Anesthesiology Residents Participant, Faculty of Medicine UNAIR

In this study, the stress level of the subject was also assessed, which was measured using the DASS-42 scale. The results were then divided into 3 categories namely, depression, anxiety, and stress and each category was grouped into normal, mild, moderate, and severe degrees.

Through the research conducted, it was also found that the level of mild and moderate depression was found in 2 people (5.7%) and 1 person (2.9%) with a median score of 3. The remaining 32 people (91.4%) were in poor condition. normal. The levels of mild, moderate, and severe anxiety were found in 5 people (14.3%), 1 person (2.9%), and 1 person (2.9%) with a median score of 5. The remaining 28 people (80%) is normal. There were 2 people (5.7%), 5 people (14.3%) and 1 person (2.9%) with a median score of 5. The remaining 27 people (77.1%) under normal conditions.

C. Description of Saliva Cortisol Levels for Anesthesiology Residents Participant, Faculty of Medicine UNAIR

In this study, the salivary cortisol levels of the Anesthesiology Residents Participants at the Faculty of Medicine UNAIR were also assessed before entering the RIK stage and 2 weeks in the RIK stage. Cortisol levels can be seen as in table 2 below:

Variable		n (%)
Saliva Cortisol		
Before RIK Station		35(100)
Min – max	0,143 – 0,778	
median	0,315	
2 Weeks RIK Station		35(100)
Walk		
Min – max	0,179 – 2,802	
median	0,422	

Table 2: Saliva Cortisol Levels Participants of Anesthesiology Residents Faculty of Medicine UNAIR Before RIK Station with 2 Weeks Running RIK Station.

From the research, the median values of salivary cortisol levels of resident participantsAnesthesiology and Intensive Care, Faculty of Medicine UNAIR before entering the RIK stagnation cycle and 2 weeks of running RIK stagnation cycles were 0.315 and 0.422 g/dL with the min-max values being 0.143 – 0.778 and 0.179 – 2.802 g/dL. Although the median value was at the normal value, there were samples that had cortisol values above normal after 2 weeks of RIK stagnations. Thus, it was obtained that there was an increase in salivary cortisol levels before entering the RIK stage with 2 weeks of running RIK stage, where the median value was used because the data was not normal.

D. Comparative Analysis of Cortisol Values Between Before RIK Stage and 2 Weeks Running RIK Stage

From this study, the results of the comparative analysis of salivary cortisol values between before RIK stage and two weeks of RIK stage were obtained. The test for changes in cortisol levels before RIK stagnation with 2 weeks of running RIK stagnation was tested using the Wilcoxon test because the cortisol data before RIK stagnation and 2 weeks of running RIK stagnation were declared abnormal, based on the Wilcoxon test results, a p-value of 0.002 was obtained where the value was <0.05 which means This means that there is a difference in the value of cortisol levels before RIK stagnation with 2 weeks of running RIK stagnation where there is an increase in cortisol levels between before RIK stagnation and 2 weeks of running RIK stagnation.

E. Analysis of the Relationship between Depression, Anxiety, and Stress with Cortisol Levels for Resident Participants in Anesthesiology and Intensive Care, Faculty of Medicine UNAIR

In this study, an analysis was also carried out to see the relationship between depression, anxiety, and stress with cortisol levels before entering the RIK stagnation cycle and 2 weeks of the RIK stagnation cycle running on residentparticipants in Anesthesiology and Intensive Care, Faculty of Medicine UNAIR/RSUD Soetomo Surabaya. It is known that the correlation test (relationship) between depression, anxiety, and stress with cortisol levels before RIK stage was tested using the Spearman test because the depression, anxiety, and stress data were in ordinal form and the cortisol level data before RIK stage was declared abnormal. Based on the results of the Spearman test, the p-value of depression is 0.065, anxiety is 0.449, and stress is 0.274 and where the value is > 0.05 which means there is no relationship between depression, anxiety, and stress with cortisol levels before RIK status in resident participants of Anesthesiology and Intensive Care, Faculty of Medicine UNAIR Surabaya.

On the other hand, testing the relationship between depression, anxiety, and stress with cortisol levels 2 weeks of RIK walking was tested using the Spearman correlation test because data on anxiety depression, and stress, were in ordinal form and data on cortisol levels 2 weeks of walking RIK were declared abnormal, based on Spearman test results obtained p-value depression 0.341 , anxiety 0.659 , and stress 0.943 where the value is > 0.05 which means there is no relationship between depression, anxiety, and stress with cortisol levels 2 weeks stagnations RIK running in resident Anesthesiology Participants and Intensive Care Faculty of Medicine UNAIR Surabaya.

IV. DISCUSSION

The COVID-19 pandemic requires resident participants to work even harder. They get a longer work schedule, reduced sleep time, unplanned schedules, high work demands, and insufficient time to interact with family. This was also experienced by resident participants in Anesthesiology and Intensive Care, Faculty of Medicine UNAIR with a workplace at RSUD Soetomo Surabaya at RIK-1. This study involved 35 respondents as research subjects with an age range from 26 to 42 years. Researchers tried to analyze the relationship between salivary cortisol levels before and after undergoing a stagnation round at RIK with the stress level of resident participantsof Anesthesiology and Intensive Care at the Faculty of

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Medicine and also analyzed the stress level as measured by the DASS-42 scale.

This study analyzed the salivary cortisol levels in resident participantsof Anesthesiology and Intensive Care, Faculty of Medicine UNAIR who were undergoing a stagnation round at RIK-1 RSUD Soetomo Surabaya. From the research, it was found that the salivary cortisol levels of resident participantsAnesthesiology and Intensive Care, Faculty of Medicine UNAIR before entering the RIK stagnation cycle and 2 weeks of running RIK stagnation cycles with median values of 0.315 and 0.422 g/dL with min-max values were 0.143-0.778 and 0.179-2.802 g/dL. There was an increase in salivary cortisol levels before entering the RIK stage with 2 weeks of the RIK stage running. The test for changes in cortisol levels before RIK stagnation with 2 weeks of running RIK stagnation was tested using the Wilcoxon test because the cortisol data before RIK stagnation and 2 weeks of running RIK stagnation were declared abnormal, based on the results of the Wilcoxon test, a p-value of 0.002 was obtained where the value was <0.05 which means there is a difference in the value of cortisol levels before RIK stagnation with 2 weeks of running RIK stagnation where there is an increase in cortisol levels between before RIK stagnation and 2 weeks of running RIK stagnation.

Then, the cortisol value obtained was associated with the level of stress experienced in this study. Based on the results of the Spearman correlation test, it was found that the p-value between salivary cortisol levels before entering the RIK stage cycle with depression was 0.065, anxiety was 0.449, and stress was 0.274. The value is > 0.05 which means there is no relationship between depression, anxiety, and stress with cortisol levels before RIK stagnation in residentsparticipant in Anesthesiology and Intensive Care, Faculty of Medicine UNAIR Surabaya. Likewise, the p-value between salivary cortisol levels after 2 weeks of RIK stagnation cycle with depression 0.341, anxiety 0.659, and stress 0.943 where the value is > 0.05 which means there is no relationship between depression, anxiety, and stress with blood levels. cortisol 2 weeks of RIK stagnation running on resident participantsin Anesthesiology and Intensive Care, Faculty of Medicine UNAIR Surabaya.

On the other hand, this is different from the research conducted by Andre et al (2021), where they found a correlation between cortisol levels and stress levels. The average result they got was that the average cortisol level was 0.42 g/dL in the mild stress category and 1.80 g/dL in the moderate stress category (Kurniawan & Utariani, 2021).

This research, which is a study conducted in approximately 1 year, to be precise, during the second wave of the COVID-19 pandemic, which resulted in 2 people (5.7%) and 1 (2.9%) mild and moderate depression with a median score of 3. The remaining 32 people (91.4%) were in normal condition. Mild, moderate, and severe anxiety levels were found in 5 people (14.3%), 1 person (2.9%), and 1 person (2.9%) with a median score of 5. The remaining 28 people (80%) is normal. There were 2 people (5.7%), 5 people (14.3%) and 1 person (2.9%) with a median score of 5. The remaining 27 people (77.1%) under normal conditions. Compared to previous studies by several researchers at several medical service centers that treat patients exposed to COVID-19, this study found much different results(Shen et al., 2020). Previous research conducted by Andre, et al (2021) on 40 anesthesiology residentsat RSUD Soetomo Surabaya with an age range of 28-39 years, the results showed that the resident participantswho experienced mild and moderate stress were 25 people (62.5%) and 15 people (37.5%) (Kurniawan & Utariani, 2021).

Another study conducted by Brooks, (2020) frontline medical personnel had a higher risk of depressive symptoms (OR, 152; 95% CI, 1.11 – 2.09; P=0.01), anxiety (OR, 1 ,57; 95% CI, 1.22 – 2.02; P < 0.001), insomnia (OR, 2.97; 95% CI, 1.2 – 4.60; P < 0.001), sadness (OR, 1 .60; 95% CI, 1.25 -2.04; P < 0.001) (Brooks, 2020).

On the other hand, this research took place as the second wave of attacks of the new delta COVID-19 variant began, in which almost all resident participants, starting from the 2nd semester to the last semester, had been exposed for approximately one year and began to understand how to treat COVID-19 patients. 19 according to the standard that already exists in RIK-1 and the severity of the patient is also not as bad as during the first wave of the COVID-19 Pandemic. This is what allows resident participants to reduce their stress levels.

V. CONCLUSION

From this study, it can be concluded that the stress level in Anesthesiology ResidentsParticipant in the COVID-19 Pandemic era was not stressful or normal because almost 80% of the subjects did not experience stress. There is no significant relationship between salivary cortisol levels and stress levels.

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