The Effects of Anxiety, Stress, and Depression Due to Covid-19 Pandemic on Sleep Quality of Workers in Hospital

Pengaruh Kecemasan, Stres, dan Depresi Akibat Pandemi Covid-19 Terhadap Kualitas Tidur Karyawan Rumah Sakit

Putu Dyana Christasani[1]*, Fenty[1], Yohanes Rudianto[1], Feilycia Kristin Sugisun[1]

[1]Universitas Sanata Dharma

*Email korespondensi: putu.dyana@usd.ac.id

ABSTRACT

The cases of COVID-19 infection have increased quite rapidly in Indonesia. The COVID-19 pandemic situation makes people experience anxiety, stress, and depression, especially those who work in hospitals. It further affects their sleep quality. The purpose of this study was to determine the effects of anxiety, stress, and depression due to the COVID-19 pandemic on the sleep quality of healthcare and non-healthcare workers in a type-D hospital in Yogyakarta. This research was an analytic observational study with a cross-sectional design. The subjects of this study were 200 healthcare and non-healthcare workers who worked in type-D hospital in Yogyakarta. This research applied DASS-42 questionnaire to measure the stress levels. While for measuring the sleep quality, it used PSQI questionnaire. Furthermore, to determine the effects of anxiety, stress, and depression on sleep quality, the researchers used a Chi-Square statistical analysis with a 95% confidence level. The result indicated that anxiety and stress affected the sleep quality of health workers (*p*=0.009; *p*=0.026), while anxiety and depression affected the sleep quality of non-helath workers (*p*=0.025; *p*=0.019). Conditions of anxiety, stress, and depression are more at risk of having bad sleep quality than who don't experience it (Health workers OR value = 4.313; 5.053; 3.122, Non-health workers OR value = 4.876; 4.533; 0.551).

ABSTRAK

Kasus infeksi COVID-19 mengalami penambahan yang cukup cepat di Indonesia. Keadaan pandemik COVID-19 membuat masyarakat mengalami kecemasan, stres, hingga depresi akan tertular penyakit infeksi ini, terutama mereka yang bekerja di rumah sakit, hal ini juga berpengaruh terhadap kualitas tidur. Tujuan dari penelitian ini adalah mengetahui pengaruh kecemasan, stres, dan depresi akibat pandemik COVID-19 terhadap kualitas tidur tenaga kesehatan dan non kesehatan di salah satu RS Tipe D di Yogyakarta. Penelitian ini merupakan jenis penelitian observasional analitik dengan rancangan cross sectional. Subyek penelitian ini adalah tenaga kesehatan maupun non kesehatan yang bekerja di rumah sakit Tipe D di Yogyakarta yaitu sebanyak 200 orang. Pengukuran tingkat stress menggunakan instrumen kuisioner DASS-42 dan pengukuran kualitas tidur menggunakan kuisioner PSQI. Untuk mengetahui pengaruh kecemasan, stres, dan depresi karyawan rumah sakit dengan kualitas tidur digunakan analisis statistik Chi-Square dengan derajat kepercayaan 95%. Hasil menunjukkan bahwa kecemasan dan stres berpengaruh terhadap kualitas tidur tenaga kesehatan (p=0.009; p=0,026), sedangkan kecemasan dan depresi berpengaruh terhadap kualitas tidur tenaga non kesehatan (p=0.025; p=0.019). Kondisi kecemasan, stres, dan depresi lebih berisiko memiliki kualitas tidur yang buruk dibanding dengan yang tidak mengalaminya (OR tenaga kesehatan = 4.313; 5.053; 3.122, OR tenaga non kesehatan = 4.876; 4.533; 0.551).

INTRODUCTION

Coronavirus is a non-segmented RNA virus, enveloped and positive sense that originates from the Coronaviridae family and the Nidovirales order and, is widely known in humans and other mammals.[1] The COVID-19 infection was first discovered in the city of Wuhan, China, and has now rapidly spread throughout China and other countries. The number of confirmed positive patients is recorded in nearly 200 countries, one of which is in Indonesia. In April 20, 2020, there had been 2,404,791 positive cases of COVID-19 in the world, with 164,920 fatality.[2]

Indonesia has reported 6,760 cases of coronavirus infection with 590 fatalities cases as of April 20, 2020.[3] The fatalities rate in Indonesia was acounted 7.58% of the total cases, ranked below Italy, Spain, Great Britain and France worldwide. In Yogyakarta, the number of patients who have tested positive for COVID-19 by April 20 were 67, with 7 death cases. The number was spreaded across all districts in Yogyakarta, where Sleman regency had the highest percentage with 36 cases.[4]

The high workload in the hospital has caused stress and even depression to healthcare and non-healthcare workers. Based on research by Tan, *et al.*, 20.7% of non-healthcare workers in Singapore hospital felt anxious, 6.9% felt stressed, and 10.3% felt depressed. Meanwhile, healthcare workers had lower levels of anxiety, stress and depression, with 10.8%, 6.4%, and 8.1% respectively.[5] Based on research by Lai, *et al.*, in China, healthcare workers in the hospitals had an anxiety level of 44.6%, a stress level of 71.5%, and a depression of 50.4%. 34% of these healthcare workers also experienced difficulty in sleeping or insomnia.[6]

In addition, the emergence of anxiety and stress responses is caused by dysregulation of cholinergic hormones and GABA (Gamma Aminobutyric Acid) which eventually causes a person to experience insomnia or difficulty of sleeping.[7] Based on the research of El-Tantawy *et al.*, anxiety and depression have a positive correlation with the quality of one's sleep (p <0.05).[8] Patients who have a history of stress and depression have a lower sleep quality than those without the history off stress and depression. Based on research by Oh, *et al.*, 18.6% of respondents who experienced insomnia had a history of anxiety and depression. People with anxiety have 9.8 times the risk of experiencing insomnia than without anxiety, and people with depression have 19.7 times the risk of experiencing insomnia compared to people without depression.[9] The purpose of this study was to determine the effects of anxiety, stress, and depression due to the COVID-19 pandemic on the sleep quality of both healthcare and non-healthcare workers.

MATERIAL AND METHOD

This research is an analytic observational study with a cross-sectional design. The research was conducted in September 2020, and took place at a type-D hospital in Yogyakarta. The independent variables were anxiety, depression and stress, while the dependent variable was sleep quality. The DASS-42 questionnaire was used to measure levels of anxiety, stress and depression. This instrument consisted of 42 question items which contained three types of emotional states, namely depression, anxiety, and stress. Each scale had 14 questions. Each item was scored between 0-3. If the answer is 'never'. it was given a score of 0, 'sometimes' was given 1, 'often' was given 2, and 'always' was given 3. The final DASS score represented the status of anxiety, stress, and depression. Respondents were categorized as anxious if they got a final score of >7, categorized as stress if the final score was >14 and categorized as depression if the score was >9.[10,11] To assess sleep quality, the PSQI questionnaire was used. This questionnaire consisted of 9 questions, and the answers to each question had a score of 0 to 3. The scores of all questions were summed, and the results were classified into two categories, if the final score was <5, it was categorized as good sleep quality; and if the final score was >5, it was categorized as bad sleep quality.[12]

The subjects of this study were all employees (healthcare and non-healthcare workers) in a hospital in Yogyakarta who were willing to take part in the study by filling out the study questionnaire provided, and sign an informed consent. This research had also fulfilled the ethical clearance of the Health Research Ethics Commission of the University of Respati Yogyakarta No: 175.3/FIKES/PL/VIII/2020. A total of 200 respondents met the inclusion criteria and were willing to take part in the research and complete the questionnaire. Respondent characteristic data, stress level, depression, anxiety and sleep

quality were analyzed using univariate analysis. Further-more, to see the effects of anxiety, stress and depression on sleep quality, a bivariate analysis was performed using the Chi-square statistical test. The Chi-square statistical test has an expected value of less than 5, a maximum of 20% of the number of cells. If the conditions are not fulfilled, the Fisher nonparametric test is used for the 2x2 table. The limit of significance (significance/p) of the Chi-square statistical test was ≤0.05 with a Confident Interval (CI)=95% (10). Data analysis used IBM SPSS Statistic 22 which was conducted by the CE & BU Study Center of Gadjah Mada University with a certificate Number: 163/UN1/FKKMK.2/CEBU/ PT/2020.

RESULT

The characteristics of all respondents in this study are stated in Table 1. The gender distribution of women 68.5% was more than men 31.5%. The age distribution of respondents showed that the age of <30 years 42.5% was more than those aged 30-35 years 19.5% and >35 years 36.5%. The education level of Associate Degree (D3) and below 73.5% was more than undergraduate and above 26.5%. Respondents with more than 5 year working experience (50%) had the most distribution compared to those having less than one year (10%) and 1-5 years (40%) experience. Respondents who had an income <IDR 3,000,000 (77%) were more than those who had an income >IDR 3,000,000 (23%). The distribution of respondents who were married 61.5% was more than the unmarried ones 38.5%. The depressive status of all employees in hospital D in Yogyakarta tended to be normal; 183 people (91.5%) were not depressed, and there were only 17 employees who were categorized as having depression. Similar to the depression status, the respondents' anxiety status tended to be normal; as many as 161 respondents (80.5%) were not anxious, and only 19.5% were in the anxious category. For stress status, as many as 181 respondents (90.5%) were not stressful, and just 9.5% were categorized as stressful. The number of sleep of employees who were in the good category was 102 respondents (51%), while as many as 98 respondents (49%) were in the bad category.

The results of the analysis of 114 healthcare workers in Table 2 show that the percentage of respondents who experienced anxiety had higher bad sleep quality (29.8%) than good sleep quality (9%), while respondents who did not experience anxiety (normal) had lower bad sleep quality (70.2%) than good sleep quality (91%). It proved that anxious conditions had a relationship with sleep quality as indicated by the p-value of <0.05 (p=0.009). Respondents who experienced stress had higher bad sleep quality (19.1%) than good sleep quality (4.5%), while respondents who did not experience stress (normal) had lower bad sleep quality (80.9%) compared to good sleep quality (95.5%), and it was found that there was a relationship between stress conditions and sleep quality among healthcare workers as indicated by a p-value of <0.05 (p=0.026). For that depressive conditions and sleep quality of healthcare workers, the p-value was > 0.05 (p=0.158) which shows that there was no relationship between depression status and sleep quality, but when compared to respondents who experienced depression, and those who were not depressed (normal), it shows that respondents who experienced depression had a higher bad sleep quality (12.8%) than good sleep quality (4.5%). Whereas, respondents who were not depressed (normal) had lower bad sleep quality (87.2 %) compared to good sleep quality (95.5%). Thus, even though the p-value did not indicate a relationship, it can be concluded that respondents who experienced depression tended to have poor sleep quality.

Table 1. Characteristics of Respondents

Characteristics	Health Workers		Non-Health Workers		Total	
	n = 114	%	n = 86	%	n = 200	%
Sex						
Male	27	23.7	36	41.9	63	31.5
Female	87	76.3	50	58.1	137	68.5
Age (Years)						
< 30	55	48.2	30	34.9	85	42.5
30-35	26	22.8	13	15.1	39	19.5
> 35	33	28.9	40	46.5	73	36.5
missing			3	3.5	3	1.5
Education Level						
D3 and Below	77	67.5	70	81.4	147	73.5
Undergraduate and Above	37	32.5	16	18.6	53	26.5
Work Experience						
< 1 year	13	11.4	7	8.2	20	10
1-5 years	46	40.6	34	39.5	80	40
>5 years	55	48.2	45	52.3	100	50
Incomes						
< Rp 3.000.0000	85	74.6	69	80.2	154	77
> Rp 3.000.0000	29	25.4	17	19.8	46	23
Marital Status						
Married	70	61.4	53	61.6	123	61.5
Single	44	38.6	33	38.4	77	38.5
Depression						
No	105	92.1	78	90.7	183	91.5
Yes	9	7.9	8	9.3	17	8.5
Anxiety						
No	94	82.5	67	77.9	161	80.5
Yes	20	17.5	19	22.1	39	19.5
Stress						
No	102	89.5	79	91.9	181	90.5
Yes	12	10.5	7	8.1	19	9.5
Sleep Quality						
Good	67	58.8	35	40.7	102	49
Bad	47	41.2	51	59.3	98	51

Source: Primary Data, 2020

Table 2. Relationship of Anxiety, Stress and Depression on Sleep Quality for Healthcare Workers

Status of Anxiety, Stress and Depression	Sleep Quality				p	OR (95%CI)
	Bad Sleep Quality		Good Sleep Quality			
	n = 47	%	n = 67	%		
Anxiety	14	29.8	6	9	0.009	4.313
Not Anxious	33	70.2	61	91		(1.515-12.276)
Stress	9	19.1	3	4.5	0.026	5.053
Not Stressed	38	80.9	64	95.5		(1.288-19.822)
Depression	6	12.8	3	4.5	0.158	3.122
Not Depressed	41	87.2	64	95.5		(0.739-13.181)

Source: Primary Data, 2020

The results of the analysis of the 86 non-healthcare workers as respondents in Table 3 showed that the percentage of respondents who experiences anxiety had higher bad sleep quality (31.4%) than good sleep quality (8.6%), while those who did not experience anxiety (normal) had lower quality of bad sleep (68.6%) than good sleep quality (91.4%). It shows that for non-healthcare workers, anxious conditions had a relationship with sleep quality as indicated by a p-value of <0.005 (p=0.025). All respondents who experienced depression had poor sleep quality, while all respondents who had good sleep quality (100%) did not experience depression (normal), so that the results of non-healthcare workers with depression status had a

relationship with sleep quality as seen from the p-value of < 0.05 (p=0.019). Stress status and sleep quality had no relationship as indicated by the results of the p-value >0.05 (p=0.233), but when comparing between respondents who experienced stress and those who did not experience stress (normal), the results showed that respondents who experienced stress had higher bad sleep quality (11.8%) than good sleep quality (2.9%), whereas respondents who did not experience stress (normal) had lower bad sleep quality (88.2%) than good sleep quality (97,1%). Furthermore, the results showed that non-healthcare workers who experienced stress tended to have poor sleep quality.

DISCUSSION

According to Table 1, it can be seen that there is a difference in the proportion of education levels between healthcare and non-healthcare workers. The different proportion of education levels between those two categories of workers was also represented in the research by Zhang, *et al.* which involved 2.182 respondents, indicating that healthcare workers who had studied for > 9 years was greater (99,7%) compared to the non-healthcare workers (90,7%).[13]

In addition, the monthly income between healthcare workers and non-healthcare workers was also different; healthcare workers had higher income (25.4%) than the non-healthcareones (19.8%). Same result was also presented by Profis and Simon-Tuval, in their research, which concluded that healthcare workers had higher incomes (37,8%) than non-healthcare workers (31,1%).[14] There is no

significant difference in the proportion of respondents experiencing anxiety, depression, and stress between healthcare workes and non-healthcare workers. During the COVID-19 pandemic, some research showed that the number of respondents, both healthcare and non-healthcare workers, who experience anxiety and depression had similar proportion, 35.6% of healthcare workers, and 35.8% of healthcare workers experienced anxiety, while 19.8% healthcare workers and 20.1% non-healthcare workers experiencing depression.[15,16] The absence of a significant difference between the number of healthcare workers and non healthcare workers who experienced anxiety, depression and stress could be caused because all types of work in the hospital experienced the same impact from the pandemic.[16] The COVID-19 pandemic is a pandemic that is spreading for the first time throughout the world, including Indonesia at this time thus, all employees, both healthcare workers and non-healthcare workers who work in health service providers such as hospitals, are prone to experiencing stress, anxiety and depression.[9,17] It can be happen because of their risk of being exposed to the virus, their fear of infecting others, the lack of Personal Protective Equipment (PPE), longer working hours, and the adaptation of a new health protocol system to prevent the spread of the virus.[18,19] In this study, in general the number of respondents who had normal conditions was more dominant than those who experienced anxiety, depression and stress, this could be because the hospital where this study was not a referral hospital for COVID-19 patients, so not many respondents experienced anxiety, depression and stress.

Table 3. Relationship of Anxiety, Stress and Depression on Sleep Quality for Non-Healthcare Workers

Status of Anxiety, Stress and Depression	Sleep Quality				p	OR (95%CI)
	Bad Sleep Quality		Good Sleep Quality			
	n = 51	%	n = 35	%		
Anxiety	16	31,4	3	8,6	0.025	4.876
Not Anxious	35	68,6	32	91,4		(1.299-18.309)
Stress	6	11,8	1	2,9	0.233	4.533
Not Stressed	45	88,2	34	97,1		(0.521-39.441)
Depression	8	15,7	0	0	0.019	0.551
Not Depressed	43	84,3	35	100		(0.451-0.673)

Source: Primary Data, 2020

Anxiety, stress and depression experienced by health workers affect the level of sleep quality because when experiencing anxiety, stress and depression there will be dysregulation of cholinergic hormones and GABA (Gamma Aminobutyric Acid). Cholinergic is a hormone that is active in the conscious phase, while GABA hormone is a hormon that is active during a sleep, so this dysregulation can cause a person to have difficulty in sleeping.[8] There is also an increase in the epinephrine and norepinephrine-hormones which will stimulate sympathetic nerve activity thereby increasing the heart rate and sweat, as well as dilating the pupil. Thus, the effects will make a person difficult to sleep.[14,15] Huang and Zhao's research, also stated that healthcare workers had poor sleep quality because the working time and working intensity which would increase to against the pandemic, and did not have time to rest.[13]

According to the research by Wang et al., it showed that non-healthcare workers who worked in the hospital experienced anxiety, stress and depression.[6,20] Anxiety, stress, and depression are factors that make sleep quality worse because the body's response to the conditions of anxiety, stress and depression is the activation of the sympathetic nervous system and the HPA-Axis (Hypothalamus Pituitary Adrenal Axis) resulting in an increase of the excretion of CRH by the hypothalamus, followed by an increase of ACTH by the pituitary, and an increase in cortisol secretion by the adrenal glands. The continuous activation of the sympathetic nervous system and the HPA-axis will have an impact on poor sleep quality.[21,22] In addition, in the conditions of anxiety, stress, and depression, there is a decrease in the melatonin hormone, which is important for normal sleep to make a decrease of the melatonin hormone which can make sleep quality worse.[23,24]

CONCLUSION AND RECOMMENDATION

Anxiety and stress affected sleep quality of healthcare workers in the hospital (p=0.009; p=0.026). Furthermore, anxiety and depression in non-healthcare workers affected their sleep quality (p=0.025; p=0.019). Healthcare workers who experienced anxiety, stress, and depression were more at risk of having poor sleep quality than those who do not experience them with a consecutive OR value of 4.313; 5.053; and 3.122.

Whereas for non health care workers who experienced anxiety, stress and depression, the OR value are 4.876; 4.533; 0.551. For further research development, the factors that influence the incidence of anxiety, stress, and depression in hospital employees during the COVID-19 pandemic and their effects not only on sleep quality but also on performance at work can be explored deeper.

REFERENCES

1. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical Features of Patients Infected with 2019 Novel Coronavirus in Wuhan, China. *The Lancet*. 2020;395(10223):497–506.

2. WHO. Coronavirus. Geneva: World Health Organization; 2020.

3. Kemenkes RI. Situasi Terkini Perkembangan Coronavirus Disease (COVID-19). Jakarta: INFEM: Infeksi Emerging: Media Informasi Resmi Terkini Penyakit Infeksi Emerging; 2021. Available at: https://covid19.kemkes.go.id/

4. Pemerintah Daerah D.I Yogyakarta. Data Harian Covid-19 Yogyakarta. D.I Yogyakarta: Yogyakarta Tanggap Covid-19; 2021. Available at: https://corona.jogjaprov.go.id/

5. Tan BYQ, Chew NWS, Lee GKH, Jing M, Goh Y, Yeo LLL, et al. Psychological Impact of the COVID-19 Pandemic on Health Care Workers in Singapore. *Annals of Internal Medicine*. 2020;173(4):317–320.

6. Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, et al. Factors Associated With Mental Health Outcomes Among Health Care Workers Exposed to Coronavirus Disease 2019. *JAMA Network Open*. 2020;3(3):1-12.

7. K. Pavlova M, Latreille V. Sleep Disorders. *The American Journal of Medicine*. 2019;132(3):292–299.

8. El-Tantawy AA, Al-Yahya A, Raya Y, Mohamed S. Sleep Disorders and Sleep Quality Among Patients with Anxiety or Depressive Disorders in Relation to Their Quality of Life. *Egyptian Journal of Psychiatry*. 2014;35(1):56-64.

9. Oh CM, Kim HY, Na HK, Cho KH, Chu MK. The Effect of Anxiety and Depression on Sleep Quality of Individuals With High Risk for Insomnia: A Population-Based Study. *Frontiers in Neurology*. 2019;10(July):1–8.

10. Crawford JR, Henry JD. The Depression Anxiety Stress Scales (DASS): Normative Data and Latent Structure in a Large Non-Clinical Sample. British *Journal of Clinical Psychology*. 2003;42(2):111–131.

11. Masdar H, Saputri PA, Rosdiana D, Chandra F, Darmawi D. Depresi, Ansietas dan Stres Serta Hubungannya dengan Obesitas pada Remaja. *Jurnal Gizi Klinik Indonesia*. 2016;12(4):138-143.

12. Buysse DJ, Reynolds CF, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: a New Instrument for Psychiatric Practice and Research. *Psychiatry Research*. 1989;28(2):193–213.

13. Zhang WR, Wang K, Yin L, Zhao WF, Xue Q, Peng M, et al. Mental Health and Psychosocial Problems of Medical Health Workers During the COVID-19 Epidemic in China. *Psychotherapy and Psychosomatics*. 2020;89(4):242–250.

14. Profis M, Simon-Tuval T. The Influence of Healthcare Workers' Occupation on Health Promoting Lifestyle Profile. *Industrial Health*. 2016;54(5):439–447.

15. Huang Y, Zhao N. Generalized Anxiety Disorder, Depressive Symptoms and Sleep Quality During COVID-19 Outbreak in China: a Web-Based Cross-Sectional Survey. Psychiatry Research. 2020;288(June).

16. Brito-Marques JM de AM, Franco CMR, Brito-Marques PR de, Martinez SCG, Prado GF do. Impact of COVID-19 Pandemic on the Sleep Quality of Medical Professionals in Brazil. *Arq Neuro-Psiquiatr*. 2021;79(2):149–155.

17. Sahebi A, Nejati-Zarnaqi B, Moayedi S, Yousefi K, Torres M, Golitaleb M. The Prevalence of Anxiety and Depression Among Healthcare Workers During the COVID-19 Pandemic: an Umbrella Review of Meta-Analyses. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*. 2021;107.

18. Alnazly E, Khraisat OM, Al-Bashaireh AM, Bryant CL. Anxiety, Depression, Stress, Fear and Social Support During COVID-19 Pandemic Among Jordanian Healthcare Workers. PLoS One. 2021;16(3):1-22.

19. Salari N, Khazaie H, Hosseinian-Far A, Khaledi-Paveh B, Kazeminia M, Mohammadi M, et al. The Prevalence of Stress, Anxiety and Depression Within Front-Line Healthcare Workers Caring for COVID-19 Patients: A Systematic Review and Meta-Regression. *Human Resources for Health*. 2020;18(100):1-14.

20. Wang W, Song W, Xia Z, He Y, Tang L, Hou J, et al. Sleep Disturbance and Psychological Profiles of Medical Staff and Non-Medical Staff During the Early Outbreak of COVID-19 in Hubei Province, China. *Frontiers in Psychiatry Public Mental Health*. 2020;11(733):1–8.

21. Guyton A, Hall J. Buku Ajar Fisiologi Kedokteran. 12th ed. Jakarta: EGC; 2014.

22. Marisa V, Carvalho F, Lourdes M, Albuquerque R, Carvalho M, Remio F. Adrenaline and Noradrenaline: Partners and Actors in the Same Play. *Neuroscience - Dealing with Frontiers*. 2012;(March):1990–2016.

23. Stephens MAC, McCaul ME, Wand GS. The Potential Role of Glucocorticoids and the HPA Axis in Alcohol Dependence. *Neurobiology of Alcohol Dependence*. 2014;(February):429–450.

24. Sun X, Wang Y, Jiang N, Du Z. The Potential Role of Melatonin on Mental Disorders: Insights from Physiology and Pharmacology. Bipolar Disord Open Access. 2016;2(1):1–4.