Stress, Anxiety and Depression in Survivors of COVID-19

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ABSTRACT

Introduction: Stress, anxiety and depression are the most common psychiatric disorders associated with patients infected with COVID-19. The aim of this study was identify descriptions of differences in stress, anxiety and depression in survivors of COVID-19 compared to non-survivors of COVID-19 and analyze the risk factors that most influence these events.

Method: This research is a descriptive analytic study with a cross sectional design. The population are survivors and non-survivors of COVID-19 who followed the ketofastosis diet and joined the Isoman group on the telegram application. The research subjects were COVID-19 survivors and non-COVID-19 survivors with a total of 379 subjects. Data collection from online questionnaire containing personal data and DASS 21, and then will be analyzed using Chi Square and logistic regression.

Results: The subjects of COVID-19 survivors experienced anxiety 6,8%, depression 5,5%, and stress 1,6%. The subject of non survivor of COVID-19 experienced anxiety 4,5%, depression 2,9%, and stress 1,3%. In the Chi Square analysis between stress, anxiety and depression compared to survivors of COVID-19 and non-survivors of COVID-19 were $p = 0.947$, $p = 0.335$, $p = 0.153$. While the logistic regression analysis test results for risk factors from stress in COVID-19 survivor were gender (OR=1.520) and having a chronic disease (OR=1.334), for anxiety were gender (OR= 1.743) and having a chronic disease (OR=1.641), then for depression with risk factors also for having chronic disease (OR= 1.454) and gender (OR= 0.940)

Conclusion: There were no significant differences in stress, anxiety and depression in survivors of COVID-19 compared to non-survivors of COVID-19. The most influential risk factor for stress and anxiety in COVID-19 survivors is gender while for depression is having a chronic disease.

Keywords*: stress; anxiety; depression; survivors of COVID-19.*

INTRODUCTION

Coronavirus which is the etiology of COVID-19 belongs to the betacoronavirus genus. The results of the phylogenetic analysis show that this virus belongs to the same subgenus as the coronavirus that caused the Severe Acute Respiratory Illness (SARS) outbreak in 2002-2004, namely Sarbecovirus. On this basis, the International Committee on Taxonomy of Viruses proposed the name SARS-CoV-2[1].

Stress, anxiety and depression are the most common psychiatric disorders associated with patients infected with COVID-19. This is due to the direct effect of the virus itself or in combination with significant psychological stressors from the COVID-19 pandemic. Some patients experience a variety of

psychiatric symptoms that persist or only begin to occur after months of recovery[2].

The current study also shows the severity of psychiatric symptoms associated with patients infected with COVID-19. Although there are very limited data on psychiatric symptoms related to COVID-19 at this time, survivors of COVID-19 are clinically diagnosed with PTSD (28.5%), depression (39%), anxiety disorder (32.5%) at 31 to 50 weeks after infection[2].

Another study regarding the psychological impact on COVID-19 survivors, conducted by Liu, et al (2020) found that the psychological problems most experienced by respondents were depression with a percentage of 53.5% and anxiety 44.6%. This of course will greatly affect the quality of life of COVID-19 survivors[3].

Based on these data and phenomena, researchers are interested in conducting research on stress, anxiety, and depression in COVID-19 survivors and the associated factors that influence the disease. There is still little research on this subject, especially in Indonesia, which has encouraged us to analyze this matter so that we can carry out more precise initial screening and early treatment, so that survivors can have a better quality of life. This research is also to prepare further, more in-depth research on stress management in COVID-19 survivors during the COVID-19 pandemic era.

We used the population who followed the ketofastosis diet and joined the Isoman group on the telegram application because this group contained of survivors and non survivors of COVID-19 and we wanted to study whether the ketofastosis diet was a factor that influences stress, anxiety and depression in survivors and non-survivors.

METHODS

Study setting and design

This research is descriptive analytic using a cross sectional design with a quantitative approach. Stress, anxiety and depression in COVID-19 survivors and non-survivors were measured at one time through an online setting, the subject was only measured once and subject variables were measured at the time of examination.

Study procedure

The population is survivors and non-survivors of COVID-19 who followed the ketofastosis diet and joined the Isoman group on the telegram application and filled out an online research questionnaire from 31 October to 14 November 2021. The sampling technique in this study was purposive sampling. Survivors and non-survivors of COVID-19 who filled out questionnaires and met the inclusion criteria were taken as research sample.

The inclusion criteria was subjects ≥ 18 years. The exclusion criteria were COVID-19 survivors and non-survivors with substance and alcohol abuse and with a history of psychiatric disorders before the COVID-19 pandemic. The sample for this study were all COVID-19 survivors and non-survivors who filled out a questionnaire and met the inclusion criteria. After being given a questionnaire and given a deadline of two weeks after distributing the questionnaire, 379 subjects were obtained and filled out the complete questionnaire.

Statistical analysis

The research data will be analyzed statistically with SPSS version 25. Data analysis is carried out in the following steps. First, descriptive statistical steps are used to see an overview of the basic characteristics of research subjects. Second, statistical analysis was carried out using the Chi-Square test to compare levels of stress, anxiety and

depression in survivors and non-survivors of COVID-19. Third steps of statistical analysis is a Logistic Regression Analysis test with the aim of assessing what factors have the most influence on stress, anxiety and depression in COVID-19 survivors.

Ethical clearance

The research design was approved by the Ethics Committee of the Faculty of Medicine UNS/RSUD dr. Moewardi Surakarta with registration number 912/IX/HREC/2021.

RESULT

Socio demographic and characteristics of study groups

Based on table 1, it can be seen that the total number of respondents who were willing to participate in this study was 379 people. Based on the status of COVID-19, there were 203 survivors of COVID-19 (53.7%) and 176 non-survivors of COVID-19 (46.3%). Of the COVID-19 survivors, 6 people (1.6%) experienced stress, 26 people (6.8%) were anxiety and 21 people were depressed (5.5%). In non-survivors of COVID-19, 5 people (1.3%) experienced stress, 17 people (4.5%) were anxiety and 11 people were depressed (2.9%).

Based on general age, subjects aged 18-40 years were 218 people (57.5%), 41-60 years were 137 people (36.1%) and > 60 years were 24 people (6.3%). More survivors of COVID-19 who experience stress, anxiety and depression are at the age of 18-40 years, namely 6 people (100%), 23 people (88.5%), and 17 people (81%). Meanwhile, non-survivors of COVID-19 who experienced stress, anxiety and depression were also more at the age of 18-40 years, namely 4 people (80%), 9 people (52.9%), 7 people (63.6%).

Table 1. Demographic characteristics of survivors and non-survivors of COVID-19

Charateristics	n = 379 (%)	COVID-19 Survivors n = 203 (%)	Non Survivors of COVID-19 n = 176 (%)	p
Age range (years)				
18-40 years	218 (57,5)	141 (37,2)	77 (20,3)	
41-60 years	137 (36,1)	57 (15)	80 (21,1)	< 0,001
>60 years	24 (6,3)	5 (1,3)	19 (5)	
Gender/Sex				
Female	228 (60,2)	122 (32,2)	106 (28)	< 0,001
Male	151 (39,8)	81 (21,4)	70 (18,5)	
Education				
Associate/Bachelor	234 (61,7)	140 (36,9)	94 (24,8)	< 0,001
Post Graduate	145 (38,3)	63 (16,6)	82 (21,6)	
Employment status				
Non Health Workers	99 (26,1)	66 (17,4)	33 (8,7)	< 0,001
Health Workers	280 (73,9)	137 (36,1)	143 (37,7)	
Chronic disease				
Having chronic disease	167 (44,1)	79 (20,8)	88 (23,2)	
Diabetes Mellitus	27 (7,1)	10 (2,6)	17 (4,5)	
Hypertension	52 (13,7)	21 (5,5)	31 (8,2)	
Heart Disease	18 (4,7)	6 (1,6)	12 (3,2)	< 0,001
Autoimmune Disease	12 (3,2)	5 (1,3)	7 (1,8)	
Asthma	43 (11,3)	23 (6,1)	20 (5,3)	
Obesity	52 (13,7)	29 (7,7)	23 (6,1)	
No chronic disease	212 (55,9)	124 (32,7)	88 (23,2)	
Lifestyle				
No Ketofastosis	296 (78,1)	179 (47,2)	117 (30,9)	< 0,001
Ketofastosis	83 (21,9)	24 (6,3)	59 (15,6)	

* Analyzed using normality test

Based on gender/sex in general, there were 151 male (39.8%) and 228 female (60.2%). Out of a total of 203 survivors of COVID-19 who experience stress, 3 are female (50%) and 3 are male (50%), 13 are anxious with female (50%) and are male sex 13 people (50%), while the majority who experience depression are female 13 people (61.9%). Out of a total of 176 non-survivors of COVID-19 who experienced stress, the majority were male were 3 people (60%), while those female who experienced anxiety were 12 people (70.6%) and 8 people (72.7%) feel depressed.

Based on recent education in general, there were 234 associate/bachelor graduates (61.7%) and 145 postgraduate students (38.3%). Out of a total of 203 COVID-19 survivors, 6 people (100%) experienced stress, 23 people had anxiety (88.5%), and 17 people had depression (81%) with the last associate/bachelor education. Out of a total of 176 non-survivors of COVID-19, 4 people (80%) experienced stress, 11 people had anxiety (64.7%) and depression 9 people (63.6%) with the last associate/bachelor education.

Based on employement status, there were 280 health workers (73.9%) and 99 non-health workers (26.1%). The number of COVID-19 survivors who experience stress is the same between health workers and non-health workers were three people, the majority of whom experience anxiety with non-health worker jobs are 16 people (61.5%), while for those who experienced anxiety and depression were more non-health workers, 16 people (61.5%) and 13 people (61.9%). In the group of non-survivors of COVID-19, stress, anxiety and depression were more common in health workers, 4 people suffered from stress (80%), 11 people with anxiety (64.7%), and 7 people with depression (63.6%).

Based on the general history of having chronic disease, 213 subjects (56.2%) had chronic disease, while 166 subjects

(43.8%) did not have chronic disease. Most of the survivors of COVID-19 who experienced stress, anxiety and depression did not have chronic illnesses, 4 people (66.7%), 14 people (53.8%) and 12 people (57.1%), while the non-survivors COVID-19 who experienced stress as many as 2 people (40%) had asthma and no chronic diseases as many as 2 people (40%). In anxiety and depression, the majority of subjects did not have chronic diseases as many as 5 people (29.4%) and 4 people (36.3%).

Based on participation in the ketofastosis diet, in general, 83 people (21.9%) followed the ketofastosis diet/lifestyle and 296 people (78.1%) did not follow the ketofastosis diet. In COVID-19 survivors, the majority of subjects who experienced stress, anxiety and depression did not follow the ketofastosis diet, 6 people (100%), 21 people (80.8%) and 19 people (90.5%). In non-survivors of COVID-19, subjects who experienced stress, anxiety and depression were more likely to follow the ketofastosis diet, 5 people (100%), 12 people (70.6%) and 10 people (90.9%).

The results of testing some of these factors with the normality test showed p <0.001 so that it could be concluded that the sample was heterogeneous and all of these factors could be tested again with logistic regression analysis to assess which factors had the most influence.

Comparison of stress, anxiety and depression in survivors and non-survivors of COVID-19.

The following table 2 describes the comparison between stress, anxiety and depression in survivors and non-survivors of COVID-19 using the Chi Square method. From the table below, the comparison of stress in survivors compared to non-survivors of COVID-19 shows a value of $X^2 = 0.004$ and p = 0.947, because the p value is > 0.05, the test results are not significant, thus means

there is no significant difference between stress in survivors of COVID-19 compared to non-survivors of COVID-19.

The comparison of anxiety in survivors compared to non-survivors of COVID-19 obtains a value of $X^2 = 0.929$ and $p = 0.335$, there is no significant difference between anxiety in survivors of COVID-19 compared to non-survivors of COVID-19.

The comparison of depression in survivors compared to non-survivors of COVID-19 obtains a value of $X^2 = 2.045$ and $p = 0.153$, there is no significant difference between depression in survivors of COVID-19 compared to non-survivors of COVID-19.

Table 2. Comparison Between Stress, Anxiety And Depression In Survivors And Non-Survivors of COVID-19

	n = 379 (%)	COVID-19 Survivors n=203 (%)	Non Survivors of COVID-19 n=176 (%)	Total	X^2	p
No Stress	368 (97,1)	197 (52)	171 (45,1)	368	0,074	0,947
Stress	11 (2,9)	6 (1,6)	5 (1,3)	11		
No Anxiety	336 (88,7)	177 (46,7)	159 (42)	336	0,929	0,335
Anxiety	43 (11,3)	26 (6,8)	17 (4,5)	43		
No Depression	347 (91,6)	182 (48)	165 (43,6)	347	2,045	0,153
Depression	32 (8,4)	21 (5,5)	11 (2,9)	32		

* Analyzed using Chi Square

Factors that influence the occurrence of stress, anxiety and depression in survivors of COVID-19

The following table 3 describes the factors that influence the occurrence of stress, anxiety and depression in COVID-19 survivors using the logistic regression analysis method. It is found that gender is the most influential factor on the occurrence of stress (OR=1,520) and anxiety (OR=1.743) compared to other factors, with a positive B coefficient, then gender has a positive relationship to the occurrence of stress and anxiety.

It also was found that having chronic disease has the opportunity to be the most influential factor (OR=1.454) on the occurrence of depression compared to other factors, with a positive B coefficient, the history of chronic disease has a positive relationship to the occurrence of depression.

DISCUSSION

The results of this study showed that the incidence of stress in survivors and non-survivors of COVID-19 was the same as 2.9%, anxiety in survivors was 12.8% and non-survivors of COVID-19 was 9.6%, while depression in survivors was 10.3%. and non-survivors of COVID-19 is 6.2%. In survivors of COVID-19, anxiety is the most often experienced compared to depression and stress.

These results are consistent with research by Wang et al in 2020 which showed that the highest psychological impact experienced by COVID-19 survivors was anxiety at 28.8%, followed by depression at 16.5%, and stress at 8.1%. For survivors of COVID-19, this is due to the direct effects of the virus itself or in combination with significant psychological stressors when exposed to COVID-19 such as isolation, loneliness, stigma, fear, uncertainty[4].

Table 3. Factors associated with stress, anxiety and depression in Survivors of COVID-19 Identified by Multivariable Logistic Regression Analysis.

	Coefficient B	Odds Ratio (95% CI)	p
Stress Factors			
Age	-17,093	< 0,001 (< 0,001)	0,997
Gender	0,419	1,520 (0,289 – 7,997)	0,621
Education	-17,108	< 0,001 (< 0,001)	0,997
Employement status	-0,248	0,780 (0,149 – 4,086)	0,769
Having chronic disease	0,288	1,334 (0,227 – 7,829)	0,750
Ketofastosis lifestyle	-17,316	< 0,001 (< 0,001)	0,998
Anxiety Factors			
Age	-1,157	0,314 (0,084 – 1,176)	0,086
Gender	0,555	1,743 (0,723 – 4,199)	0,216
Education	-0,898	0,408 (0,106 – 1,572)	0,193
Employement status	-1,269	0,281 (0,114 – 0,694)	0,006
Having chronic disease	0,496	1,641 (0,645 – 4,176)	0,298
Ketofastosis lifestyle	0,966	1,627 (0,755 – 9,143)	0,129
Depression Factors			
Age	-0,491	0,612 (0,192 – 1,952)	0,407
Gender	-0,062	0,940 (0,361 – 2,448)	0,900
Education	-0,240	0,787 (0,224 – 2,759)	0,708
Employement status	-1,263	0,283 (0,108 – 0,743)	0,10
Having chronic disease	0,374	1,454 (0,540 – 3,917)	0,459
Ketofastosis lifestyle	-0,205	0,814 (0,163 – 4,075)	0,803

* Analyzed using Logistic Regression Analysis test

In the Chi Square analysis, there were no significant differences between stress, anxiety and depression compared to COVID-19 survivors and non-survivors. These results could be caused by potential bias due to the possibility of general distress to non-survivors or stressors that occurred during the pandemic were evenly distributed to everyone, so that non-survivors could also have the same significant psychopathological impact as COVID-19 survivors[4].

In the Logistic Regression multivariate analysis, the most influential risk factor for stress and anxiety is gender while for depression is having a chronic disease.

Recent research highlights gender differences in mental health consequences during the COVID-19 pandemic. A study shows that women are more affected by economic pressures and hormonal differences during menstruation and childbirth in adulthood than men[4,5]. The cause of women experiencing the most anxiety during the COVID-19 pandemic is knowing information about the impact of economic difficulties due to the COVID-19 pandemic as much as 62.9%, information about the number of victims of COVID-19 19 60.3%, quarantine at home so they can not leave the house 44.7%, can not work as normal 42.4%, many prices of goods soar

during the pandemic and are related to the family economy as much as 37.8% and many children's tasks at home as much as 15.3%. Mazza et al (2020) said that after several months of infection, survivors of COVID-19 will experience sequelae of COVID-19 such as shortness of breath, muscle fatigue or weakness, sleep disturbances[5]. Patients will also have more severe symptoms if they previously had a history of chronic disease or obesity. Obesity can cause insulin resistance and decreased function of pancreatic beta cells. COVID-19 can directly interfere with the function of pancreatic beta cells through its interaction with angiotensin converting enzyme 2 (ACE2). In addition, excessive adipose tissue provides a reservoir for high expression of the ACE2 receptor, which is a pathway for the COVID-19 virus. This will also affect the severity of symptoms and healing in the long term so that it can lead to depression[6].

Existing literature during the COVID-19 pandemic reported that women, young people and people with low socioeconomic status reported more problems related to mental health such as depression and anxiety[6,7]. It was also explained that there were families who suffered from COVID-19 or died because the disease is an event that most often causes prolonged stress. In general, no correlation was found between socioeconomic status and major depressive disorder. A higher than average incidence of bipolar I disorder was found among the upper socioeconomic groups. For depression is more common in rural areas than in urban areas. The prevalence of mood disorders does not differ between races[8]. However, there is a tendency for examiners to underdiagnose mood disorders and overdiagnose schizophrenia in patients whose racial or cultural background differs from their own[9,10].

Depression is also most common in people who do not have close interpersonal relationships or in those who are divorced or separated. Unmarried women have a lower tendency to suffer from depression than married women, but this is inversely proportional to men [11,12]. Depression will also have more severe symptoms if they previously had a history of chronic diseases such as diabetes, hypertension and obesity. Obesity can cause insulin resistance and decreased function of pancreatic beta cells. COVID-19 can directly interfere the function of pancreatic beta cells through its interaction with angiotensin converting enzyme 2 (ACE2). In addition, excessive adipose tissue provides a reservoir for high expression of the ACE2 receptor, which is a pathway for the COVID-19 virus. This will also affect the severity of symptoms and healing in the long term so that it can lead to depression[5].

The strength of this study are the large number of samples and we did logistic regression to determine the factors that associated with stress, anxiety and depression in survivors and non-survivors of COVID-19. The limitation of this study is the small sample coverage, namely only the group of survivors and non-survivors of COVID-19 who follow the ketofastosis diet and are members of the Isoman group on the Telegram application so that they cannot represent the population of survivors and non-survivors of COVID-19 in Indonesia, filling out the questionnaire is done by including e-mail identity can make the subject tend to give better answers than actually experienced because of feelings of embarrassment to researchers, no analysis was carried out on the influence of subject characteristics (age, gender, last education, employement status, history of chronic disease, and ketofastosis lifestyle) on stress, anxiety, and depression, there were different interpretations of each question from one subject to another because there was no specific direction and guidance per question before the survey was conducted.

Another bias that makes the results of this study confusing is that there are several

factors that affect stress, anxiety and depression that occur in COVID-19 survivors but are not discussed and counted. These factors include the length of time in isolation due to exposure to COVID-19, the place of care during isolation, the severity of the psychopathological sequelae of COVID-19, marital status, general distress that occurs to the subject, presence of a family member who is infected or dies from COVID-19 , socioeconomic status, social support, family history of mental disorders. Future studies are expected to incorporate these factors to obtain more comprehensive results.

CONCLUSION

Based on the results of research on Stress, Anxiety, and Depression in COVID-19 Survivors, it can be concluded as there were no significant differences in stress, anxiety and depression in survivors of COVID-19 compared to non-survivors of COVID-19. The most influential risk factor for stress and anxiety is gender while for depression is having a chronic disease.

Competing interest

The author(s) declare no competing interest in this study.

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