

COVID-19 PANDEMIC AFFECTS STRESS LEVELS, LIFESTYLE, OBESITY AND MENSTRUAL REGULARITY IN FEMALE STUDENTS DURING STUDY FROM HOME

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Abstract

The Indonesian government has socialized social distancing policies, physical distancing and "large-scale social restrictions" in response to the COVID-19 pandemic. The policy's implementation shifts all activities to the home affecting stress, lifestyle, obesity and menstrual regularity. The goal of this study was to look at how the COVID-19 pandemic affected stress, lifestyle, obesity and menstrual regularity in female students who were studying from home. This study was carried out at STIKES Karya Husada Kediri in July-August 2020. Cross sectional observational research of an analytical nature. This study's sample consisted of 243 female students from STIKES Karya Husada Kediri who met the inclusion and exclusion criteria using stratified proportional random sampling. The questionnaires used in this study were analyzed using the Wilcoxon Ranks Test and the McNemar Test. The findings of this study revealed that during the COVID-19 pandemic, female students' stress levels ($p=0.000$) and lifestyle ($p=0.000$) increased, while obesity ($p=0.023$) and menstrual regularity ($p=0.021$) decreased. Therefore, the results of this study can be considered to create a student mental and reproductive health service program at Karya Husada Health Center (KHHK) and improve counseling guidance services in helping to overcome academic problems to minimize the impact experienced by female students due to the COVID-19 pandemic which can lead to reproductive health problems in the future.

Keywords:

COVID-19 Pandemic; Stress, Lifestyle; Obesity; Menstrual Regularity; Study from Home

INTRODUCTION

COVID-19 was declared a pandemic by WHO on March 11, 2020 (Hussein, 2020) and spread very quickly in almost all countries of the world (Bao, Sun, Meng, Shi, & Lu, 2020). As of May 24, 2020, the number of reported COVID-19 cases was 5,204,508 cases, causing 337,687 COVID-19 patients to die with a mortality rate of 6.5% in 215 infected countries. In the Southeast Asian region, 191,966 positive confirmed COVID-19 cases have been reported with 5748 deaths (Kemenkes RI, 2020). In Indonesia, COVID-19 cases began on March 2, 2020 with the discovery of 2 positive cases (Yuliana, 2020), until May 24, 2020, COVID-19 cases continued to grow with a total of 22,271 positive confirmed cases with conditions of 1372 deaths (death rate 6.2%) spread across almost all

provinces (Kemenkes RI, 2020). For the province of East Java until May 24, 2020, data were obtained as many as 3642 confirmed COVID-19 with details that were declared cured as many as 489 cases, 294 cases died and 2840 cases were still receiving treatment with the condition of all districts and cities in East Java Province included in the red zone area (Jatim, 2020).

Given the current state of COVID-19 development, the Indonesian government declares COVID-19 disaster emergency status as a "National Non-Natural Disaster" (BNPB, 2020). Policies to prevent disease transmission imposed by the government related to this pandemic situation at the community level, namely by socializing social distancing, physical distancing (Buana, 2020) and health quarantine in the form of "large-scale social restrictions" (Gugus Tugas Percepatan Penanganan COVID-19, 2020). Meanwhile, prevention efforts at the individual level are the implementation of a clean and healthy lifestyle (Yunus et al., 2020). The implementation of the government policy causes all activities to be carried out at home such as staying at home, worshipping at home, working from home and studying from home (Zaharah, Kirilova, & Windarti, 2020).

The existence of social distancing, physical distancing and health quarantine policies imposed will have an impact on the rights of individuals at various levels of the system and social (Hussein, 2020) which can provide psychological pressure to the general public, patients, medical staff, children and older adults in the face of this pandemic (Xiao, 2020). One of those who can experience psychological distress in the face of this pandemic is students. The constant spread of epidemics, strict isolation measures, changes in the learning system to study from home and confusion over delays in studying at colleges and universities can affect students' mental health such as panic, anxiety and depression. A previous study at Changzhi Medical College in China found that 24.9% of students experienced mild anxiety while studying from home due to the COVID-19 pandemic (Cao et al., 2020).

Women are much more likely than men to develop anxiety and depressive disorders during adolescence and early adulthood. Women experience twice as much depression and the majority of anxiety disorders as men (Altemus et al., 2014). According to some studies, stress is linked to higher levels of anxiety and depression. Furthermore, stress can affect involvement in health behaviors and lifestyle behaviors including nutritional fulfillment habits (Mattioli, Nasi, & Farinetti, 2020). Eating behaviors, rest/sleep habits, physical activity/exercise and personal hygiene are indicators of lifestyle that are used as ways to help reduce the stress impact of the COVID-19 pandemic (Rodino, Gignac, & Sanders, 2018; Zhang & Ma, 2020). Indicators of a healthy lifestyle can be seen from weight, body composition, physical activity and nutrient intake (Fontana & Torre, 2016).

A low response to stressors will affect lifestyle changes that can affect energy availability and body mass index which has an impact on obesity and has implications for the reproductive system (Hart, 2016). The negative effects of

obesity on reproductive physiology are experiencing menstrual irregularities through ovulation disorders, endometrial pathologies and infertility (Silvestris, Pergola, Rosania, & Loverro, 2018). In a country that has a community of women and health beliefs based on culture, behaviors and practices related to puberty and menstruation implementing dietary improvements and personal lifestyle behaviors that they follow can help reduce menstrual disorders and alleviate menstrual symptoms (Hashim et al., 2019).

The emergence of problems in the health of adolescents, especially female students, will put social and emotional pressures that can have a significant effect on life, health, quality of life and work and will be the main reason for coming to health workers (Ansong, Arhin, Cai, Xu, & Wu, 2019). Such negative influences in reproductive health cause iron deficiency anemia, the prevalence of polycystic ovary syndrome becomes increasing, the incidence of uterine myoma (fibroids) and endometriosis will occur more (Hart, 2016). In the end, in the future, it will have significant implications for women's fertility rates and indirectly affect the increased risk of failed fertilization and other fertilization disorders such as abortus or ectopic pregnancy abnormalities (Joelsson, 2018).

Based on these problems, researchers are interested in analyzing and researching further on "The Effect of the COVID-19 Pandemic on Stress Levels, Lifestyle, Obesity and Menstrual Regularity in Female Students during Study from Home".

RESEARCH METHODS

This study employed an analytical observational research design with a cross-sectional approach. The variable in this study is the COVID-19 pandemic, which is defined as the period preceding and following the COVID-19 pandemic. Other variables are stress levels, lifestyle, obesity and menstrual regularity. Data on stress levels, lifestyle, obesity and menstrual regularity before the COVID-19 pandemic were taken by *the recall* method felt or experienced by respondents from September 2019 to early March 2020 while during the COVID-19 pandemic felt or experienced by respondents from the beginning of March 2020 until a study was conducted.

The population in this study was all female students of STIKES Karya Husada Kediri who came from the S1 and D3 Nursing study programs, S1 and D3 Midwifery and D3 Nutrition as many as 759 female students. The large calculation of the sample using the Slovin formula obtained 243 respondents who met the inclusion and exclusion criteria. The sampling technique uses stratified proportional random sampling by stratifying the class level of respondents in each study program. This is done by considering the number of semesters, the load of courses and the level of difficulty of the courses taken are not the same. The inclusion criteria in the study were active female students of STIKES Karya Husada Kediri, unmarried and willing to be respondents. The exclusion criteria are female students who are exposed to COVID-19 infection or include suspect or *probable* cases, have a history of

chronic diseases, obstetric diseases and operations in the abdomen, take certain medicines from doctors, have a family history of chronic diseases and disorders of the reproductive system.

The research was carried out in July-August 2020 with previously being declared ethically feasible by the Research Ethics Commission by STIKES Karya Husada Kediri No. 170/EC/LPPM/STIKES/KH/VI/2020. The type of data used is primary data by sharing questionnaires through google forms with respondents.

The stress level research instrument using the *Depression Anxiety Stress Scale* (DASS) 42 questionnaire consisted of 14 questions regarding stress symptoms felt before and during the COVID-19 pandemic. Before being distributed to respondents, the stress level questionnaire had been tested for validity and reliability with 63 respondents showing that the stress level questionnaire was valid and reliable. The questionnaire answers consist of never, sometimes, not bad and often then scoring. The assessment of stress levels is: (1) score 0-14 = normal, (2) Score 15-18 = light, (3) score 19-25 = medium, (4) score 16-33 = weight, (5) score > 34 = very heavy.

The lifestyle questionnaire was compiled by the research team using the *Likert* scale totaling 20 statements consisting of 9 positive statements and 11 negative statements regarding daily habits carried out before and during the COVID-19 pandemic including diet, ready-to-eat foods and snacks, exercise, rest/sleep and personal hygiene which had been tested for validity and reliability with 63 respondents who showed a valid and reliable lifestyle questionnaire. The questionnaire answers consist of very frequent, frequent, infrequent and never then scoring. Lifestyle assessments are: (1) score 20-50 = unhealthy and (2) score 51-80 = healthy.

Obesity data using BMI measured by weight (in kg) divided by height (in m²). Height and weight before and during the COVID-19 pandemic were obtained through questionnaires. The assessment of the obesity classification is: (1) thin (BMI <17.0), (2) normal (BMI 18.5-25.0) and (3) obese (BMI > 25.1) (P2PTM Kemenkes RI, 2019).

The menstrual regularity instrument was developed from the *menstrual history questionnaire* regarding questions containing the menstrual cycle consisting of menarche, regularity, cycle, length of menstruation as well as the last menstruation and previous menstrual periods experienced before and during the COVID-19 pandemic.

Data analysis was carried out univariate to produce frequency distributions presented in table form covering general characteristics (age, menarche, parental income, living with parents before and during the COVID-19 pandemic), stress levels, lifestyle, obesity and menstrual regularity. Bivariate analysis to see the effect of the COVID-19 pandemic on stress levels, lifestyle and obesity using the *Wilcoxon Ranks* test while the effect of the COVID-19 pandemic on menstrual regularity using the *McNemar* test. The software used for the statistical test is the IBM SPSS Statistic Version 22.



RESULTS AND DISCUSSION

Table 1. Frequency Distribution of General Characteristics of Respondents

Characteristic	Frequency (n)	Percentage (%)
Age		
18 years old	10	4,1
19 years old	57	23,5
20 years old	91	37,4
21 years old	58	23,9
22 years old	20	8,2
23 years old	5	2,1
24 years old	1	0,4
25 years old	1	0,4
Menarche		
Fast	11	4,5
Ideal	162	66,7
Slow	70	28,8
Parents' Income		
Under regional minimum wage	103	42,4
Above regional minimum wage	140	57,6
Living Before the COVID-19 Pandemic		
Parents	124	51
Sibling	15	6,2
Boarding house	104	42,8
Staying During the COVID-19 Pandemic		
Parents	223	91,8
Sibling	11	4,5
Boarding house	9	3,7
Total	243	100

According to Table 1 can be seen that almost half of respondents aged 20 years as many as 91 respondents (37.4%), most respondents lived with parents before the COVID-19 pandemic as many as 124 respondents (51%), parents' income above regional minimum wage as many as 140 respondents (57.6%), the ideal age of menarche as many as 162 respondents (66.7%) and almost all respondents lived with parents during the COVID-19 pandemic as many as 223 respondents (91.8%).

According to Table 2, prior to the COVID-19 pandemic a small percentage of respondents had moderate stress levels of 27 respondents (11.1%), mild as many as 23 respondents (9.5%), severe as many as 4 respondents (1.6%) and extremely severe as many as 1 respondent (0.4%). While there was an increase in stress levels during the COVID-19 pandemic, a small percentage of respondents had moderate stress levels of 34 respondents (14%), mild as many as 30 respondents (12.3%), severe as many as 12 respondents (4.9%) and extremely

severe as many as 7 respondents (2.9%). The Wilcoxon Ranks test results showed that $p = 0.000$ ($p < 0.05$) then there was an influence of the COVID-19 pandemic on the stress levels of STIKES Karya Husada Kediri female students during study from home.

Table 2. The Effect of the COVID-19 Pandemic on Stress Levels, Lifestyle, Obesity and Menstrual Regularity

Variable	Before the COVID-19 Pandemic	During the COVID-19 Pandemic	P
	n (%)	n (%)	
Stress Levels			
Normal	188 (77,4%)	160 (65,8%)	0,000
Mild	23 (9,5%)	30 (12,3%)	
Moderate	27 (11,1%)	34 (14%)	
Severe	4 (1,6%)	12 (4,9%)	
Extremely Severe	1 (0,4%)	7 (2,9%)	
Lifestyle			
Unhealthy	44 (18,1%)	25 (10,3%)	0,000
Healthy	199 (81,9%)	218 (89,7%)	
Obesity			
Underweight	38 (15,65%)	42 (17,3%)	0,023
Normal	167 (68,7%)	167 (68,7%)	
Overweight	38 (15,65%)	34 (14%)	
Menstrual Regularity			
Regular	199 (81,9%)	184 (75,7%)	0,021
Irregular	44 (18,1%)	59 (24,3%)	
Total	243 (100%)	243 (100%)	

In the lifestyle variable, it can be seen that almost all respondents are 199 respondents (81.9%) had a healthy lifestyle prior to the COVID-19 pandemic, while there was an increase in a healthy lifestyle of 218 respondents (89.7%) during the COVID-19 pandemic. The Wilcoxon Ranks test results show that $p = 0.000$ ($p < 0.05$) then there is an influence of the COVID-19 pandemic on the lifestyle of STIKES Karya Husada Kediri female students during study from home.

In the obesity variable, it can be seen that prior to the COVID-19 pandemic, a small number of respondents had an obesity rate in the overweight category of 38 respondents (15.65%), whereas the obesity rate in the overweight category decreased by 34 respondents (14%). The Wilcoxon Ranks test results showed that $p = 0.023$ ($p < 0.05$) then there was an influence of the COVID-19 pandemic on the obesity rate of STIKES Karya Husada Kediri female students during study from home.

In the variable menstrual regularity, it can be seen that prior to the COVID-19 pandemic, almost all respondents are 199 respondents (81.9%) had regular menstruation, whereas during the COVID-19 pandemic, there was a decrease in menstrual regularity, with most respondents are 184 respondents

(75.7%) having regular menstruation. The McNemar test results showed that $p = 0.021$ ($p < 0.05$) then there was an influence of the COVID-19 pandemic on the menstrual regularity of STIKES Karya Husada Kediri female students during study from home.

The global impact of the COVID-19 pandemic has been profound. As the number of infected cases and deaths rises, many countries around the world, including Indonesia, have implemented COVID-19 prevention policies such as lockdown, social and physical separation, self-isolation, working and studying from home. The policy has had an unprecedented impact on the global economy, which may have a significant impact on mental health (Buana, 2020; Holmes et al., 2020). College students are at a higher risk for mental health disorders than the general population according to multiple research (Tran et al., 2017). The COVID-19 pandemic and study from home policies have the potential to cause new stress and disruption of daily life for most students around the world (Holmes et al., 2020).

According to the findings of this study, the COVID-19 pandemic affects the stress levels of STIKES Karya Husada Kediri female students while studying from home. During the COVID-19 pandemic, female students experienced an increase in stress. Female students who experienced moderate stress from 11.1% to 14%, mild stress from 9.5% to 12.3%, severe stress from 1.6% to 4.9% and very severe stress from 0.4% to 2.9%. The findings of this study are consistent with the findings of a study conducted by Ghazawy et al (2020) on all Egyptian students majoring in health and medicine, which revealed that Egyptian students who suffered from depression were 70.5%, anxiety was 53.6% and stress was 47.8%. Sun, Goldberg, Lin, Qiao, & Operario (2021) research on students quarantined during the COVID-19 pandemic in China found that the pandemic had a 67.05%, 46.55% and 34.73% impact on psychiatric symptoms in students, including traumatic stress, depression and anxiety.

The increase in stress experienced by female students may be due to age. Nearly half of the respondents were 20 years old (37.4%). This is supported by previous studies that 18-20 year olds are prone to depression, anxiety and panic attacks and 75% of mental illnesses manifest themselves during adolescence (Tran et al., 2017). The female gender was discovered to be the most important predictor of post-traumatic stress disorder symptoms among pandemic survivors. After an event, women are more prone to express their feelings as a coping method and to complain about physical and psychological problems (Ghazawy et al., 2020).

Studying in college in medicine and health is also associated with the occurrence of depression in students. Several studies have found that medical and health students all over the world suffer from significant levels of psychological distress and psychiatric morbidity (Cao et al., 2020; Ghazawy et al., 2020; Sun et al., 2021). Most academic activities were halted as a result of the study from home policy, including university closures, cancellation of practical

and clinical lectures, practical exams and student concerns about their academic activities. Progress outcomes and learning values impose an additional burden and stress on female students, which can have a significant psychological impact. (Cao et al., 2020).

Although the COVID-19 pandemic has affected the stress levels of female students, the level of stress experienced by female students is still at the level of moderate and mild stress. This is likely because almost all female students live with their parents during the COVID-19 pandemic as much as 91.8%. There was an increase compared to before the COVID-19 pandemic where female students living with their parents were 51%. This is supported by the findings of Cao et al (2020), which found that student anxiety during the epidemic is related to place of residence, parent's source of income and living with parents. Due to the rising distance and communication with friends during the implementation of COVID-19 pandemic rules, anxiety disorders are more likely to arise and increase in the absence of interpersonal communication particularly with the closest individuals in this instance parents.

Another policy issued by the government of Indonesia is related to preventing the transmission of COVID-19 at the individual level, namely the implementation of a clean and healthy lifestyle (Yunus et al., 2020). With this policy, it indirectly forces to modify normal living habits and daily routines from children to the elderly to create a healthy lifestyle. The need to fulfill nutrition, physical activity and even microbiota in the body is a factor that can play an important role during the face of the COVID-19 pandemic (Clemente-Suárez, Dalamitros, Beltran-Velasco, Mielgo-Ayuso, & Tornero-Aguilera, 2020). According to the findings of this study, the COVID-19 pandemic had an impact on the lifestyle of STIKES Karya Husada Kediri female students while they were studying from home. Increased from 81.9% before the COVID-19 pandemic to 89.7% during the COVID-19 pandemic with lifestyle indicators studied including diet, ready-to-eat foods and snacks, exercise, rest/sleep, and personal hygiene.

The findings of this study are supported by Dragun et al (2021) who found differences in the quality of life of adolescents and medical students in Split, Croatia, during the implementation of lockdowns during the COVID-19 pandemic. It is manifested by an increase in the consumption of fruits, nuts, fish and sweets as well as a decrease in the consumption of ready-to-eat foods. The feeling of refreshment after a night's sleep was reported by 31.5% of college students during lockdown, compared to 8.5% before lockdown with the median length of sleep increasing by 1.5 hours while physical activity such as exercise remained stable.

The existence of healthy lifestyle changes experienced by female students is likely to be related to positive behavior changes in stress control experienced by female students due to the COVID-19 pandemic (Ismail et al., 2020). Stress can be a healthy and adaptive response to threats by mobilizing energy to find the cause of stress and trying to overcome it (Yikealo, Yemane, & Karvinen, 2018). According to the findings of a study conducted by Zhang & Ma (2020) on local

residents in Liaoning Province, China, with 41.4% of respondents aged 18 to 30, the COVID-19 pandemic had an impact on better lifestyle changes related to positive mental health. Finally, a healthy lifestyle can help reduce the stress caused by the COVID-19 pandemic.

Other factors that influence changes in lifestyle behavior include government policies, media recommendations, and COVID-19-related science news. Following this information, special attention has been paid to the fulfillment of micronutrient intake during the COVID-19 pandemic, such as the consumption of vitamins C, D and E because increased intake of fruits and vegetables is an important source of vitamins, minerals, fiber, antioxidants (Ismail et al., 2020) and has been recommended to support the improvement of the immune system (Richardson & Lovegrove, 2020).

Furthermore, sugar, fat, and salt consumption should be reduced because they can promote comorbidities (such as obesity, cardiovascular disease, and diabetes) associated with COVID-19 (Clemente-Suárez et al., 2020). This is also supported by almost half of respondents in this study having parents' income above the regional minimum wage of 57.6% so that it has an impact on meeting the nutritional needs of families during the COVID-19 pandemic. In accordance with the findings of research conducted by Gornicka, Drywien, Zielinska, & Hamulka (2020) that income affects lifestyle changes such as meeting nutritional needs during the COVID-19 pandemic in Polish society.

Adequate sleep and good sleep quality affect physical and mental health have a positive influence on reducing the risk of cardiovascular disease, diabetes and weight gain (obesity) (Song et al., 2020). Physical activity can also cause changes in muscle mass, which can affect the metabolic system by causing changes in body weight including fat mass and glycemic status. Adults and overweight elderly people may have impaired lipid profiles, increased inflammation and cardiovascular risk. Furthermore, patients with metabolic disorders are more likely to develop severe COVID-19 infection (Gornicka et al., 2020). Physical activity such as exercise can also help improve lung function, decrease full hospitalization, improve the immune system, prevent respiratory infections and prevent new incidences of COVID-19 (Clemente-Suárez et al., 2020).

Personal hygiene carried out during the COVID-19 pandemic is also trusted by female students as an action that can prevent the transmission of COVID-19. A healthy lifestyle includes frequent hand washing with water and soap, good cough etiquette, avoiding contact with infected people or people with flu-like symptoms, avoiding shaking hands and maintaining physical distance in crowded places and cleaning yourself after leaving the house. This is consistent with the findings of Olaimat, Aolymat, Elshahoryi, Shahbaz, & Holley (2020) who discovered positive behavioral practices for preventing COVID-19 transmission among students at the University of Jordan.

The findings of this study also revealed that the COVID-19 pandemic had an impact on the obesity of STIKES Karya Husada Kediri female students while they

were studying from home. It is distinguished by a reduction in obesity from 15.65% prior to the COVID-19 pandemic to 14% during the COVID-19 pandemic. The results of the study supported by the research of Dragun et al (2021) showed that one-third of adolescents and medical students in Split, Croatia reported experiencing weight loss during the implementation of lockdowns during the COVID-19 pandemic.

Changes in lifestyle to be healthier indicate changes in eating habits, sleep patterns, physical activity and personal hygiene. Reductions in macronutrient composition such as calorie restriction from fatty foods can be a major determinant of weight loss (Wadden, Webb, Moran, & Bailer, 2012). Sleep duration has also been linked to weight gain and obesity through a decrease in physical activity and an increase in caloric intake. Rathod et al (2018) discovered a significant relationship between sleep duration and body mass index in a study conducted on students at Mamata Khammam Telangana Medical College. The study discovered a significant inverse relationship between nightly sleep duration and overweight and obese medical students. These findings support sleep deprivation's role as a risk factor for obesity and overweight, as well as vice versa.

Physical activity is also essential in weight loss programs. Increased physical activity aids in the maintenance of energy balance. Furthermore, a high level of physical activity is required to compensate for the increase in energy efficiency following weight loss. Obese adults can lose 10% of their starting weight by lowering their overall energy expenditure by 300 to 500 kcal/day more than predicted. The improvement in skeletal muscle work efficiency is responsible for the decrease in energy consumed during physical activity (non-resting energy expenditure). Other advantages include avoiding fat-free mass loss, which can dilute the weight-related decrease in resting metabolic rate (Wadden et al., 2012).

The COVID-19 pandemic also affected the regularity of menstruation experienced by STIKES Karya Husada Kediri female students during study from home. This is indicated by a decrease in menstrual regularity which was 81.9% before the COVID-19 pandemic to 75.7% during the COVID-19 pandemic. Menstrual irregularities are characterized by prolonged menstrual bleeding and typically occur shortly after menarche as a result of the anovulatory cycle. Instability in the endometrial layer caused by uncontrolled estrogen production causes vasoconstriction damage and myocardial contractility. In addition, certain environmental factors such as stress and lifestyle such as diet trends, smoking and weight changes have also been reported to affect menstrual regularity experienced by women. The menstrual irregularities experienced by these female students are likely due to the slow age of menarche such as respondents in this study which showed as many as 70 respondents (28.8%) belonged to the category of slow menarche age. Menstruation is an important indicator of a woman's sexual maturity. The average age for menarche onset varies according to region, with Africans having the earliest onset. Menarche age is also important



because women who wait longer are more likely to have menstrual irregularities (Ansong et al., 2019).

Another cause of menstrual irregularities is hormonal imbalance caused by stress experienced by female students during the COVID-19 pandemic. Stress can cause abnormal, prolonged and/or excessive regulation of the body, which has the potential to cause long-term neuroendocrine changes that can affect women's fertility. Biologically, neurons in the hypothalamic paraventricular nucleus of the hypothalamic-pituitary-adrenal axis secrete vasopressin and corticotropin-releasing hormone (CRH) to mediate pituitary adrenocorticotrophic hormone (ACTH) secretion. Instead, ACTH regulates the adrenal cortex's secretion of the hormones cortisol and glucocorticoids (Sominsky, Fuller, & Hodgson, 2015).

Glucocorticoid disorders in the bloodstream alter the release of gonadotropin-releasing hormone (GnRH) in the hypothalamus. These disorders also have a significant impact on the production and use of the pituitary hormone (Palomba et al., 2018). Delays in follicular maturation and ovulation have been observed in experimental animal models, such as sheep given cortisol infusions at concentrations comparable to those produced in humans under stress. This mechanism works by weakening or blocking the increase in estrogen and the surge of luteinizing hormone (LH), causing irregular menstruation (Louis et al., 2012). This is consistent with the findings of a study conducted by Ansong et al (2019), which found a significant relationship between high stress and menstrual changes in international female students in China's Zhejiang Province, with nearly half of respondents reporting various changes in menstrual patterns after arriving in China.

In addition, the influence of lifestyle can affect body mass index (BMI) which will later be related to women's reproductive health has received great attention at this time because it is widely claimed to have a adverse impact on women's fertility (Hart, 2016; Silvestris et al., 2018). The results of this study show an increase in a healthy lifestyle in female students which is likely to have an impact on weight loss in female students during the COVID-19 pandemic who initially experienced obesity then became a normal and thin criterion. According to the findings of a study conducted by Ko et al (2017), there is a link between weight loss and menstrual irregularities. Weight loss with strict calorie restriction can cause a decrease in nocturnal urine LH concentration, which is associated with an increase in serum sex hormone binding globulin (SHBG). The condition causes menstrual disorders in women.

Menstrual irregularities can adversely affect a woman's life. It is seen that the risk of depression is high in women with menstrual irregularities especially with a large flow of menstruation. This can have an impact on distractions in work, sexual activity and quality of life. Menstrual disorders also result in infertility and raise the chance of developing illnesses like diabetes and cardiovascular disease in the future (Mahmood & Jabeen, 2013).

CONCLUSION

The COVID-19 pandemic affected stress levels, lifestyle, obesity and menstrual regularity. It is shown by an increase in stress and lifestyle as well as a decrease in obesity and menstrual regularity during the COVID-19 pandemic in STIKES Karya Husada Kediri female students during study from home. The results of this study can be considered in determining strategies to make promotive, preventive and curative efforts as well as appropriate referrals by adding the student mental and reproductive health service program at Karya Husada Health Center (KHHK). Furthermore can improving counseling guidance services in helping to overcome academic problems to minimize the impact experienced by female students due to the COVID-19 pandemic which can lead to psychological and physical health problems that can ultimately affect women's reproductive health in the future.

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