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CORRELATION OF STRESS LEVEL DURING COVID-19 PANDEMIC AND THE INCIDENCE OF ACNE ON STUDENTS

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ABSTRACT

Background: Acne vulgaris (acne) is the most common inflammatory disease of the skin among adolescents and young adults (85%). Coronavirus Disease of 2019 (COVID-19) pandemic had enforced lockdowns and thus inevitably converted the conventional schooling system to online learning. These changes raised the psychological burden among students, including medical students. Psychological distress might influence the emergence of acne or add its severity.
Objective:. To know the correlation between stress levels during a pandemic and the incidence of acne vulgaris among students at the Faculty of Medicine Diponegoro University
Methods: This study used a cross-sectional design, incorporating 97 undergraduate students (batch of 2018-2020) of the Faculty of Medicine Diponegoro University, who suffered/not from acne, and had consented to participate consecutively. The exclusion criteria were diagnosed as having a psychiatric disorder, menstruating, or having other skin lesions. Data consisted of subjects' characteristics and Depression and Anxiety Stress Scale 21 questionnaire. The acne and non-acne group subjects were compared using the Chi-square test.
Results: Most of the subjects suffered from acne (60.8%), whereas the level of stress varied from normal (61.9%), mild (25.8%), moderate (9,3%), to severe (3.1%). There was no significant difference between stress levels during the COVID-19 pandemic among subjects with and without acne. (p=0,805).
Conclusion: There was no significant relationship between stress levels during the COVID-19 pandemic and the incidence of acne vulgaris among medical students

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1. Introduction

Acne vulgaris (hereinafter referred to as acne) has been traditionally considered the most common inflammatory skin disorder, affecting more than 85% of the population of adolescents and young adults aged 12-25 years.[1] Acne most often begins at puberty along with the increase of sex hormone production, which is characterized by clinical manifestations including the formation of comedones, papules, pustules, and nodules. Lesions may appear on the face, shoulders, superior extremities, chest, and back. The highest prevalence is likely found at the age of 16-17 years, specifically in 83-85% of women and 95-100% of men. [2]

Acne has multifactorial pathogenesis that can be divided into four factors, including increased sebum production, hyperkeratinization of the pilosebaceous ducts, infection with mycobacteria a, and inflammatory processes.[3] Moreover, acne is also associated with individual mental or psychological health conditions. Psychological stress might serve as a triggering factor for acne and could increase its severity. Under stress conditions, the activation of the Hypothalamus Pituitary Adrenal Axis (HPA-Axis) may result in the release of Corticotropin-Releasing Hormone (CRH), which subsequently stimulates the production of adrenocorticotropic hormone (ACTH). [4]

The Corona Virus Disease 2019 (COVID-19) outbreak, which was initially detected in China in December 2019, had become a large disruption spreading to various parts of the world. This situation further provided a great influence and became a source of stress for the community, particularly students. Referring to the study conducted by Ma et al on 821,218 students involved in the survey, 45% of the participants were found to be exposed to mental health problems. The prevalence rates of acute stress, depression, and anxiety symptoms were amounted to 34.9%, 21.1% and 11.0%, respectively. [5] This might be caused by several factors such as learning assignments, boredom levels, unpleasant learning processes, inability to engage in online learning due to

limited internet quota, and the lack of tools for practical learning applications.

The study conducted by Anandita found that students of the Faculty of Medicine were likely to experience higher stress compared to students of other study programs in the non-medical sector, 23 respondents were found to have mild stress levels (26.7%). Moreover, 52 respondents were exposed to moderate stress levels (60.5%), and respondents who had severe stress levels amounted corespondents (12.8%).[6] The increasing number of student stress levels during the COVID-19 pandemic was predicted to affect increasing acne on their skin. This was in line with a previous study Purwaningdyah, which reported that stress was a condition that might lead to acne on an individual's skin.[7]

Based on the description above, the authors were interested in conducting a study on the correlation between stress levels during the COVID-19 pandemic and the incidence of acne vulgaris in students of the Faculty of Medicine, Diponegoro University.

2. Methods

This study used the cross-sectional design. The inclusion criteria were students of the Faculty of Medicine, Diponegoro University, class of 2018-2020, who were suffering or not suffering from acne. The exclusion criteria for this study consisted of having psychiatric disorders such as anxiety and depression that had been diagnosed by a mental health specialist, menstruating, and suffering from skin diseases other than acne vulgaris.

The participants in this study were recruited consecutively. The independent variable of this study was the level of stress during the COVID-19 pandemic, and the dependent variable was the formation of acne. The data of the study subjects were collected initially by explaining the form of informed consent and willingness to fill out the online questionnaire and required documentation of acne lesions for study purposes. Further, the subjects then filled in the characteristic and self-reported DASS-21 questionnaire. The data were then analyzed by using the Chi-square test with the application of the IBM SPSS data analysis program. The hypothesis test was declared to have a significant difference if the p-value < 0.05 with a 95% confidence interval.

All prospective research subjects were given a complete explanation of the procedures, objectives, and benefits of the research. Research subjects were asked for consent in the form of online informed consent. In order to comply with the ethical principles of research, subjects who were willing to participate in the research will be kept confidential by not including their names.

3. Results

Description of study locations and samples

This study was conducted online through the distribution of questionnaires via google form®. The sample in this study consisted of students of the Faculty of Medicine, Diponegoro University, class of 2018-2020 who met the inclusion criteria. This study involved 97 samples consisting of 59 acne respondents and 38 non-acne respondents. The respondent's stress level was measured using the DASS 21 questionnaire, while the physical examination data for the diagnosis of acne were obtained from photographs of the patients' faces and data on acne complaints on the questionnaire.

Characteristics of Respondents

In this study, the characteristics of respondents were provided based on the demographic characteristics of acne and non-acne patients including age, gender, and family history of acne (see Table 1). Majority of the participants were at age 21 group (52.6 %), female (60.8%), class of 2018 (87.3%). More participants did not have a family history (56.7%). There were 59 (60.8%) participants who had acne (Table 2). From the distribution of stress levels according to DASS-21 during the COVID-19 pandemic in medical students in this study (see Table 3), it was observed that only 3 students (3.1%) reported severe stress level, 9 students (9,3%) reported moderate stress level, while mild stress level were reported by 25 students (25.8%). More participants in acne groups were observed in all stress level groups (See Table 4). More participants reported online learning (75.3%), academic load (78.4%), and unpleasant learning (73.2%) as the causes of stress in students during the COVID-19 Pandemic. Less participants reported boredom staying at home (43%) and the limited internet quota (87.6%).

Table 1. Distribution of respondents by age, gender, class, and family history of acne

Characteristics of Respondents	Frequency (n)	Percentage (%)
Age		
18	2	2.1
19	5	5.2
20	36	37.1
21	51	52.6
22	3	3
Gender		
Male	38	39.2
Female	59	60.8
Class		
2018	85	87.3
2019	9	9.3
2020	3	3.4
Family Acne History		
Yes	42	43.4
No	55	56.7

Table 2. Formation of Acne vulgaris

Formation of Acne	**Frequency (n)**	**Percentage (%)**
Acne	59	60.8
Non – Acne	38	39.2
Total	97	100

Table 3. Stress Levels according to DASS-21 During the COVID-19 Pandemic in Students

DASS 21 Score	**Stress Level**	**Frequency (n)**	**Percentage (%)**
0-14	Normal	60	61.9
15-18	Mild	25	25.8
19-25	Moderate	9	9.3
26-33	Severe	3	3.1
	Total	97	100

Tabel 4. The distribution of stress level according to DASS-21 between the acne and non-acne groups

DASS 21 Score	Acne Formation		Total
	Acne n (%)	Non – acne n (%)	
0-14	35 (58.3)	25 (41.7)	60 (100)
15-18	16 (64.0)	9 (36.0)	25 (100)
19-25	6 (66.7)	3 (33.3)	9 (100)
26-33	2 (66.7)	1 (33.3)	3 (100)
Total	59	38	97 (100)

Table 5. Causes of Stress in Students during the COVID-19 Pandemic

Causes of Stress in Students	Frequency (n)	Percentage (%)
Online learning		
Yes	73	75.3
No	24	24.7
Academic load		
Yes	76	78.4
No	21	21.6
Unpleasant learning		
Yes	71	73.2
No	26	26.8
Bored while at home		
Yes	43	44.3
No	54	55.7
The limited internet quota		
Yes	12	12.4
No	85	87.6

Table 6. The correlation between stress levels and acne formation

Stress Level	Acne Formation		Total	p
	Acne	Non – Acne		
Normal	35	25	60	0.805
Mild	16	9	25	
Moderate + Severe[α]	8	4	12	
Total	61	38	97	

Significant (p<0,05) Chi-square

[α] Moderate and severe stress level groups were merged due to their small number

The Correlation between Stress Levels and Acne Vulgaris Formation

To determine the relationship between stress levels during the COVID-19 pandemic and the formation of acne vulgaris, the Chi-square test was utilized in this study. There was no significant relationship was found between stress levels and acne formation in students (see Table 5).

4. Discussions

The study participants' age varied from 18 to 22 years old, with the highest proportion being 21 years old (52.6%). The distribution of respondents based on gender with the highest frequency was female (60.8%). This research also found students that who suffered from acne were higher (60.8%) than students without acne problems (39.2%).

While referring to the cause of high numbers of acne in the respondents, this could be influenced by several factors such as facial hygiene behavior that could reduce acne formation. Diet was also considered capable of influencing the formation of acne, this was in accordance with the study conducted by Ayudianti and Indramaya, which explained that the most common trigger factor in male acne patients is carbohydrate-rich food. Furthermore, hormonal factors and the use of cosmetics may also be regarded as the most common triggers in female patients.8 The results of this study also showed that the highest acne formation was found in 38 female respondents (64.4%). This was also supported by the results of the study conducted by Skroza, Tolino, and Mambrin et al, which showed that of 713 adolescent respondents aged 12-25 years, the majority of acne sufferers were women, amounting to 378 people (53%).).[9] The predominance of acne prevalence in women may be due to hormonal factors. The formation of acne in women occurs earlier than in men when associated with the onset of puberty, and acne vulgaris in women tends to be more persistent than in men. In addition, the results of the study also indicated that 33 respondents with acne had a family history of acne (78.6%). This was in accordance with the literature, which stated that family history factors could affect the formation of acne. Individuals with a family history of acne had a higher prevalence of moderate or severe acne.[19]

The results presented in Table 3 show the distribution of respondents based on stress levels, namely normal stress levels for as many as 60 people (61.9%), mild stress levels for as many as 25 people (25.8%), moderate stress levels as many as 9 people (9.3%) and severe stress levels as many as 3 people (3.1%). However, in another study conducted by Alpajri and Tanaka through the use of the DASS questionnaire, moderate levels of stress were most likely found in their study respondents. [10,11] Differences in stress levels in this study could be caused by differences in population and time.

In this study, the relationship between stress levels during the COVID-19 pandemic and the formation of acne vulgaris statistically showed no significant relationship. The results of this study were supported by Zsa Ollyvia's study on the relationship between acne vulgaris and stress in adolescents, which reported that stress levels did not have a significant relationship with acne formation.[13] However, this was contradictory to the study of Yadnya, Agung, Putra, et al which proved that there was a relationship between stress and acne formation.[14] The differences in the results of these studies might be influenced by different sample populations, where this study used samples from 3 classes, while Yadnya et al only used samples from 1 class.

The hypothesis in the study that emphasized the relationship between stress levels during the COVID-19 pandemic and acne formation in students of the Faculty of Medicine, Diponegoro University was not proven. This may be due to various factors, particularly the level of stress, which may be influenced by each student's ability to cope with stress. As stated by Folkman and Lazarus, there are two types of stress coping that can be done, specifically; (1) Problem-focused coping, which was regarded as a type of coping strategy to eliminate or change stressors. In other words, it was a process to eliminate the source of stress or reduce its impact through individual actions, and (2) Emotional-focused coping, which was defined as a strategy to change the way individuals feel or emotionally react to stressors. This strategy made it capable of reducing the emotional impact of the stressor and enabling it to solve problems more effectively.[15] Students who engaged in online learning were able to reduce their stress by employing problem-focused coping strategies, such as diverting their minds by doing other activities or sleeping. When they are faced with internet signal problems, students would likely follow the lesson by looking for a place that had more adequate internet network access. Meanwhile, students who adopted an emotional focused coping strategy would

change their perspective on the stress experienced during online learning. [16]

The highest factors determined as the most stressful thing during the pandemic era was the online learning (75.3%), where students' adaptability and coping strategies also played a role in the body's response to stress. Individuals who are less able to adapt will likely fail to handle stress, thus causing a negative impact. Online learning required students to be more active in independent learning during online classes. The number of assignments received by students and many limitations in the online learning process, as well as a sense of student dissatisfaction during the online learning process will result in students finding it difficult to understand the lecture material. According to Andiarna's study many students, face-to-face learning was better able to promote students' abilities to more easily understand lecturers' explanations. [17]

In addition, stress was also influenced by the academic load of students during online learning (78.4%), because students tended to be confused about online learning methods accompanied by large number of assignments. This was also supported by the study conducted by Livana, Mubin, and Basthomi, which showed that learning assignments or academic workloads were the main factors causing student stress during the COVID-19 pandemic. [18] Unpleasant learning was also found to be a cause of stress for students during the pandemic (73.2%), this was also in line with the study conducted by Agustin, Hidayatullah, and Aminoto, which stated that the way lecturers teach provided a significant effect on students' stress levels.[19]

Bored while at home was also capable of leading to stressful conditions in students during the pandemic (44.3%), students could feel bored because they were required to continue to stay at home during online learning activities. This was in accordance with the study by Al-Dabal et al who regarded that teaching methods and learning environments were one of the causes of stress for both medical and non-medical students.[20] In addition, the limited quota for online learning was also able to result in student stress (12.4%), this could be due to the current online learning environment where most people were always connected to internet network access at home.

This study had several limitations. First, this study was only limited to the evaluation of acne formation, not exploring the degree of acne severity. Third, the discussion should also be more detailed regarding other factors that cause acne such as food, hormonal factors, etc. Fourth, physical examination in this study was carried out using patient's photos and an assessment of the respondents' symptom complaints based on the questionnaire. This was because the COVID-19 pandemic that made the study need to be conducted online.

5. Conclusion

It can be concluded that there was no significant relationship between stress levels during the COVID-19 pandemic and the formation of acne vulgaris in students of the Faculty of Medicine, Diponegoro University. Further researchers are advised to conduct a study on the relationship between stress levels during the COVID-19 pandemic and the degree of acne with other study designs, such as case-control or cohorts, and to examine in more detail other factors that cause acne. Further study can be carried out by involving subjects from outside the students of the Faculty of Medicine, Diponegoro University. Moreover, further study can be conducted offline, so that physical examinations can be carried out in person

Ethical Approval

The research subjects were given e-money as a reward. This research obtained ethical clearance by letter number 248/EC/KEPK/FK-UNDIP/VII/2021 dated July 23, 2021, from the Research Ethics Commission of the Faculty of Medicine, Diponegoro University.

Conflicts of Interest

The authors declare that there was no conflict of interest.

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Author Contributions

Conceptualization, FAS, BP, WD, and FS; methodology, FAS, BP; software, FAS, BP; validation, WD and FS; formal analysis, FAS, BP; investigation, FAS, BP; resources, FAS, BP; data curation, FAS, BP; writing—original draft preparation, FAS, BP; writing—review and editing, FAS, BP, WD, FS;

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