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THE INFLUENCE OF STRESS LEVELS ON ACNE VULGARIS IN STUDENTS OF STATE ISLAMIC UNIVERSITY NORTH SUMATERA MEDAN

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Abstract

Acne vulgaris is one of the skin problems often experienced by teenagers and young adults, including students, and can be triggered by various factors, one of which is stress. This study aims to determine the effect of stress levels on the occurrence of acne vulgaris among students at the State Islamic University North Sumatera Utara. The research uses a quantitative approach with a case-control design. Data were collected from 91 respondents through the DASS-42 questionnaire and direct observation of skin conditions. The results show that the majority of respondents were female (67.0%) and male (33.0%). As many as 92.3% of respondents experienced stress, and of that number, 64.8% experienced acne vulgaris. The Chi-Square test shows a significant relationship between stress levels and the occurrence of acne vulgaris (p = 0.037), with an odds ratio of 5.900. This means that students who experience stress have a 5.9 times greater risk of developing acne vulgaris compared to those who do not experience stress. The conclusion of this study is that stress has a significant impact on the occurrence of acne vulgaris, making stress management important in preventing this skin disorder among students.

Keywords: Stress, Acne Vulgaris, Students

Introduction

Acne vulgaris is one of the most common skin diseases globally, particularly among adolescents and young adults. Acne vulgaris is a disorder of the sebaceous follicle associated with hair follicles and sebaceous glands, most frequently appearing on the face, chest, and back. Although it does not cause death, acne can be quite disruptive due to its impact on self-confidence resulting from the diminished appearance of the face (1).

Acne vulgaris is a chronic inflammatory disease of the follicle, characterized by polymorphic clinical features, including various skin lesions such as comedones, nodules, papules, pustules, and scars (2). It typically occurs more frequently in areas such as the face, back, shoulders, chest, and upper arms. The most affected group is adolescents undergoing puberty, especially those aged 15-18 years, with an incidence rate of about 85%. Although the prevalence tends to decrease gradually, in some cases, the condition can persist into the third decade of life, with varying degrees of severity (3).

Acne vulgaris is a significant skin health issue with a high global burden, especially among adolescents and young adults. Data from the Global Burden of Disease Study 2019 reports approximately 231.2 million cases of acne vulgaris worldwide, representing an increase of about 48% since 1990. In 2021, the prevalence rate reached 9,790.5 per 100,000 population among individuals aged 10–24 years, with an average annual increase of 0.43% . The highest prevalence was recorded among females and in Western Europe, while the fastest increase occurred in North Africa and the

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Middle East. However, regions with low socio-demographic indices showed slower increases, indicating a relationship between socioeconomic factors and the global distribution of acne vulgaris (4).

In Indonesia, acne vulgaris is a significant dermatological problem, with a prevalence of around 85% of the entire population, especially among adolescents and young adults aged 12–25 (5) . The highest distribution of cases is found in females aged 20–24 years (39.1%) and males aged 15–19 years (11.94%) (6). Besides the high incidence rate, challenges in managing acne vulgaris include the high resistance rate to topical antibiotics, such as macrolides, which can reach up to 60.1% (7). The use of combination topical therapies and increased interest in herbal treatments are promising alternatives to reduce dependence on antibiotics and improve the effectiveness of acne management in Indonesia (8).

Acne vulgaris is a chronic inflammatory disease of the pilosebaceous unit characterized by lesions such as comedones, papules, pustules, and nodules with varying degrees of severity. The development process is closely related to four main factors: increased sebum production, hyperproliferation of keratin in the pilosebaceous duct, colonization of skin microbial flora, especially Propionibacterium acnes, and inflammatory factors. However, the exact sequence and interactions among these factors are still not fully understood (9).

Stress acts as a trigger for the appearance of acne vulgaris and can significantly worsen existing conditions. Stress is caused by pressure or burdens perceived within an individual, usually resulting from a mismatch between expectations and reality. This condition can lead to psychological disturbances and physical illnesses. Stress can be experienced by people of all ages, from adolescents to adults, and sources include factors related to school or work, environment, family, peers, and physical appearance (10).

Furthermore, stress also contributes to the emergence of acne. It is a psychological pressure typically caused by the discrepancy between expectations and reality, which can trigger psychological and physical disturbances. Psychological stress stimulates the hypothalamus to produce Corticotropin-Releasing Hormone (CRH), which then increases levels of Adrenocorticotropic Hormone (ACTH), a hormone important in the development of acne. Androgen hormones, especially testosterone, cause the sebaceous glands to enlarge and produce excess sebum, playing a role in the pathogenesis of acne vulgaris (11).

Method

The method used is a quantitative approach with a case-control design. This method was chosen based on literature from Sastroasmoro and Ismael (2014), which states that the case-control design is effective for identifying causal relationships between risk factors and disease occurrence, especially in a homogeneous population and within limited research time. By comparing two groups cases (students with acne vulgaris) and controls (students without acne vulgaris) researchers can assess the influence of stress more systematically and objectively.

The data used are primary data collected directly from respondents through a questionnaire based on DASS-42 and skin observation. After data collection, data cleaning was performed to avoid duplication and incomplete data. The data were then coded and entered into statistical software such as Microsoft Excel and SPSS. Data analysis was conducted in stages, starting with univariate analysis to examine frequency distributions, followed by bivariate analysis using Chi-Square tests to assess the relationship between stress levels and acne vulgaris.

This research was carried out through several systematic stages. The first stage is planning, which includes preparing the questionnaire instruments based on indicators of stress and acne vulgaris, as well as conducting a pilot test on a small number of respondents. This study was conducted at three faculties located at State Islamic University North Sumatera Utara Tuntungan Campus IV, namely the Faculty

of Public Health (FKM), the Faculty of Economics and Islamic Business (FEBI), and the Faculty of Science and Technology (SAINTEK). The next stage is implementation, involving the distribution of questionnaires via Google Forms and skin observation to identify acne cases. After data collection, data processing and analysis were performed using statistical software. The final stage is interpreting the results, drawing conclusions, and preparing the research report. The entire process took place from March 16 to April 30, 2025, at State Islamic University North Sumatera Utara Tuntungan Campus IV.

The measurement of respondents' stress levels using the DASS-42 questionnaire indicates that the occurrence of acne vulgaris tends to increase with higher levels of stress. Out of 91 respondents, 84 (92.3%) were classified as stressed, and among these, 59 (64.8%) experienced acne vulgaris. Conversely, of the 7 respondents who did not experience stress, only 2 (2.2%) had acne vulgaris. Statistical analysis showed a p-value of 0.037 (< 0.05), indicating a statistically significant relationship between stress levels and the occurrence of acne vulgaris. The odds ratio (OR) of 5.900 suggests that students experiencing stress are 5.9 times more likely to develop acne vulgaris compared to those who are not stressed. These findings emphasize the importance of stress management in efforts to prevent skin problems among State Islamic University North Sumatera Utara students.

Results

1. Respondent Characteristics

Tabel 1.1 Presents the distribution of State Islamic University North Sumatera Utara students' characteristics.

Characteristics of Age	F	%
19 years old	17	18,7
20 years old	44	48,4
21 years old	26	28,6
22 years old	2	2,2
23 years old	2	2,2
Total	**91**	**100**
Gender		
Female	61	67,0
Male	30	33,0
Total	**91**	**100**
Faculty		
FEIB	30	33,0
FPH	30	33,0
FST	31	34,1
Total	**91**	**100**
Descendants of the Acne-Prone Family		
Yes	51	56,0
No	40	44,0
Total	**91**	**100**

Table 1.1 shows total of 91 respondents, the majority are aged 20 years, totaling 44 individuals (48.4%). This is followed by 26 respondents (28.6%) aged 21 years, 17 respondents (18.7%) aged 19 years, and 2 respondents (2.2%) each aged 22 and 23 years. This indicates that most respondents are in the early young adult age group.

In terms of gender, female respondents are more numerous, totaling 61 individuals (67.0%), while male respondents number 30 (33.0%). This shows a higher participation rate among females.

Regarding faculty distribution, respondents come from three faculties: the Faculty of Science and Technology (SAINTEK) with 31 respondents (34.1%), the Faculty of Economics and Islamic Business (FEBI) with 30 respondents (33.0%), and the Faculty of Public Health (FKM) with 30 respondents (33.0%). This demonstrates a fairly balanced distribution across the three faculties.

Concerning family history, 51 respondents (56.0%) reported having family members with acne, while 40 respondents (44.0%) did not have such a history. This suggests a possible genetic factor influencing the tendency to develop acne among respondents.

2. Univariate Analysis

Tabel 2.1 Distribusi Frekuensi dan Persentase Responden Berdasarkan Kategori Stress dan Kategori Acne Vurgaris Mahasiswa State Islamic University North Sumatera Utara

Stress Category	**F**	**%**
No Stress	7	7,7
Mild Stress	8	8,8
Moderate Stress	48	52,7
Severe Stress	22	24,2
Very Severe Stress	6	6.6
Total	**91**	**100,0**
Occurrence of Acne Vulgaris	**F**	**%**
Acne	61	67,0
No Acne	30	33,0
Total	**91**	**100,0**

Table 2.1 shows the frequency and percentage distribution of respondents based on stress categories and acne vulgaris. Among the 91 respondents, most are in the moderate stress category, totaling 48 individuals (52.7%). Those with severe stress number 22 (24.2%), while 8 respondents (8.8%) experience mild stress. Additionally, 6 respondents (6.6%) are in the very severe stress category, and only 7 respondents (7.7%) report no stress. The occurrence of acne vulgaris is also quite high, with 61 respondents (67.0%) experiencing acne and 30 respondents (33.0%) not experiencing acne.

This indicates that most respondents with moderate to severe stress levels also show a high proportion of acne vulgaris cases. These findings support the hypothesis that stress contributes to the development of acne among State Islamic University North Sumatera Utara.

Tabel 2.2 Frequency Distribution of Respondents Based on Stress Categories

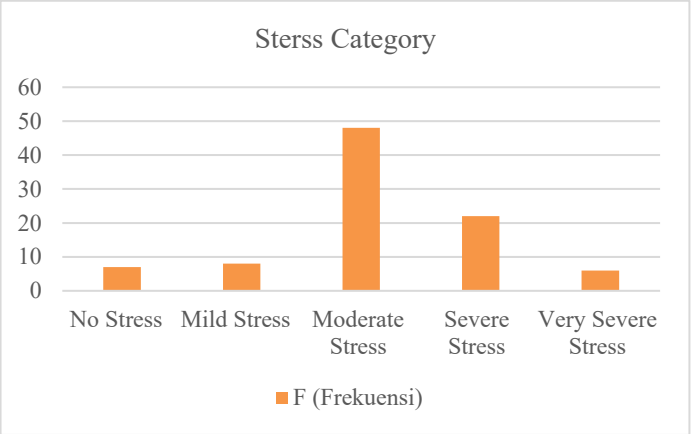

Table 2.2 shows that most respondents are in the moderate stress category, with a frequency of 48 individuals, followed by 22 in the severe stress category. The no-stress and mild stress categories each include 7 and 8 respondents, respectively, while the very severe stress category has 6 respondents. This suggests that a significant portion of respondents experience relatively high stress levels, highlighting the need for psychological interventions or stress management programs to prevent escalation.

3. Bivariate Analysis

Tabel 3.1 Results of the *Chi-Square* Test on the Relationship Between Stress Levels and Acne Vulgaris in State Islamic University North Sumatera Utara Students

Stress Category	Acne Occurrence				Total		p-value	OR
	No Acne		Acne					
	n	%	n	%	n	%		
No Stress	23	23,5	33	36,3	56	61,5	0,042	2,788
Stress	7	7,7	28	30,8	35	38,5		
Total	30	33,0	61	67,0	91	100,0		

Table 3.1 presents the results of the Chi-Square test, indicating a significant relationship between stress levels and acne vulgaris among State Islamic University North Sumatera Utara students. Out of 91 respondents, 56 (61.5%) did not experience stress, with 33 (36.3%) of them having acne and 23 (23.5%) not having acne. Conversely, among the 35 respondents (38.5%) experiencing stress, 28 (30.8%) had acne, and only 7 (7.7%) did not have acne.

Statistical analysis shows a p-value of 0.042 (< 0.05), which means there is a statistically significant relationship between stress and acne. The odds ratio (OR) value of 2.788 indicates that students who experience stress are 2.8 times more likely to develop acne vulgaris compared to students who do not experience stress. These findings underscore the importance of stress management as part of efforts to prevent and address skin issues among State Islamic University North Sumatera Utara students.

Discussion

The results of this study indicate a statistically significant relationship between stress levels and the occurrence of acne vulgaris among students of the State Islamic University of North Sumatra Medan. Out of a total of 91 respondents, 56 (61.5%) did not experience stress, of whom 23 (23.5%) had acne and 23 (23.5%) did not. Meanwhile, among the 35 respondents (38.5%) who experienced stress, 28 (30.8%) had acne, and only 7 (7.7%) did not. The statistical analysis using the Chi-Square test yielded a p-value of 0.042 (< 0.05), indicating that the relationship between stress levels and the incidence of acne vulgaris is statistically significant. The obtained odds ratio (OR) is 2.788, meaning that students experiencing stress are approximately 2.8 times more likely to develop acne compared to those who are not stressed. This finding suggests that stress is a significant risk factor in the development of acne vulgaris among students. Therefore, management of acne should include a serious approach to stress management, especially for students who are vulnerable to psychological pressure. This can aid in the prevention and control of this skin condition.

Furthermore, the physiological mechanism linking stress to acne involves increased androgen hormones, the release of pro-inflammatory cytokines, and heightened oxidative stress that supports the growth of Propionibacterium acnes. Additionally, stress disrupts the skin's protective functions, which

can exacerbate acne conditions. However, acne is a multifactorial disease, with other factors such as genetics and environmental influences also playing roles (12).

This finding aligns with a study (Basri et al. 202), which investigated the relationship between stress and acne occurrence among medical students at the University of Muhammadiyah Makassar. Using the Chi-Square test, the study obtained a p-value of 0.035, indicating a significant relationship. Approximately 73.1% of students experiencing stress also had acne, while only 26.9% of stressed students did not have acne. This study reinforces that stress influences androgen hormone production and sebaceous gland activity, contributing to worsening skin conditions.

Another supporting study by (13) found that stress and facial hygiene are significantly associated with acne occurrence among students at the University of Malahayati. The p-value was 0.000, and the odds ratio was 26.414, indicating that students experiencing stress are 26 times more likely to develop acne than those who are not stressed. About 55.1% of stressed respondents experienced acne, whereas only 4.4% of unstressed respondents did. These results further strengthen the evidence that stress is a significant factor in the pathogenesis of acne vulgaris.

Stress is one of the factors that can influence various skin disorders, including acne vulgaris. When a person experiences stress, androgen hormones from the adrenal glands increase, which then stimulates higher sebum production. The body's response to stress activates the hypothalamic-pituitary-adrenal (HPA) axis, leading to the release of hormones such as Adrenocorticotropic hormone (ACTH), Melanocyte-stimulating hormone (MSH), and cytokines. Activation of this system causes disturbances in the HPA axis and local steroidogenesis, contributing to inflammation in the pilosebaceous units, including acne vulgaris. Stress can also affect the development of physical illnesses through the emergence of anxiety and depression, which influence biological processes or behavioral patterns, thereby increasing disease risk. Chronic stress can have more permanent effects on emotional, physiological, and behavioral conditions, ultimately increasing susceptibility to diseases, including acne (14).

When the body receives a stress signal, the brain, particularly the cortex, responds by activating the release of corticotropin-releasing hormone (CRH) from the hypothalamus into the system. Subsequently, the anterior pituitary releases ACTH into the bloodstream, which stimulates the release of glucocorticoids and epinephrine from the adrenal cortex. This system is known as the HPA axis. If glucocorticoids are produced in high amounts continuously, it will impact the sebaceous glands and keratinocytes, leading to increased sebum production and hyperproliferation of keratinocytes. The combination of these factors increases the risk of acne development

Increased sebum production also causes the accumulation of comedogenic substances and triggers inflammation. In individuals with acne, blood levels of androgens are higher and are converted into the active form (5-alpha dihydrotestosterone), which then binds to receptors in sebum-producing cells. Skin prone to acne typically has higher activity of the enzyme 5-alpha reductase and more androgen receptors. This explains why acne lesions tend to appear in areas with dense sebaceous glands. Elevated CRH expression has also been found in sebaceous cells of acne-prone skin compared to normal skin, and its receptors react strongly to CRH. Moreover, stress can suppress immune function, increasing the risk of infection by Propionibacterium acnes. This bacterium, a normal flora of the pilosebaceous unit, plays a role in breaking down triglycerides in sebum into free fatty acids, creating an anaerobic environment that supports colonization. This colonization leads to inflammation, characterized by pustules or nodules. The environment within the follicle, which is blocked, lipid-rich, and low in oxygen, provides an ideal place for P. acnes growth.

Acne vulgaris is a common skin condition that often disrupts an individual's perception of physical appearance. This chronic disorder is characterized by inflammation that manifests as various lesions such as comedones, papules, pustules, nodules, and scars. It typically begins during adolescence and can persist into adulthood (15).

Medically, acne vulgaris is a chronic inflammatory disease of the pilosebaceous units that can resolve spontaneously. Its primary cause is Cutibacterium acnes (formerly Propionibacterium acnes), which proliferates during puberty under the influence of dehydroepiandrosterone (DHEA) hormones. This skin disorder often appears as inflammatory and non-inflammatory lesions, mainly on the face but can also occur on the chest, back, and upper arms (16).

Family history significantly influences the onset of acne. Studies show that acne tends to be more severe and appears earlier in individuals with a family history of acne. Twin studies, both monozygotic and dizygotic, suggest a genetic influence, although it is not dominant. Genes such as cytochrome P450-1A1 and steroid 21-hydroxylase are involved in androgen hormone production from the adrenal glands, which is highly relevant because sebaceous glands are very sensitive to these hormones. Androgens stimulate the enlargement of sebaceous glands and increase sebum production (17).

One way to prevent acne is by maintaining facial hygiene. Cleaning the face helps remove dirt that clogs pores, such as dead skin cells, dust, residual makeup, and excess oil. Products like cleansers containing antibacterial agents can inhibit P. acnes growth, preventing the appearance of acne. Additionally, skincare behaviors influence skin condition. Nowadays, skincare routines are common, especially among women and students. However, many lack proper knowledge about correct usage or frequently switch products without considering their skin type, which can worsen acne. Proper skincare aims to maintain skin moisture and protect the face from bacteria and inflammation. Skincare products include cleansers, toners, serums, moisturizers, and sunscreens, each with specific benefits (18).

Management of acne vulgaris is generally divided into non-pharmacological and pharmacological approaches. Non-pharmacological management includes avoiding squeezing lesions with unhygienic hands, choosing non-comedogenic cosmetics, and maintaining facial cleanliness. Pharmacological treatment is tailored to the severity of acne, involving topical medications, systemic drugs, minor surgical procedures, or a combination of these. Topical and systemic antibiotics are used to reduce bacteria involved in acne pathogenesis (19).

The treatment of acne vulgaris can be divided into two categories: general management and medication. General management involves avoiding lesion squeezing, choosing non-comedogenic cosmetics, and proper facial hygiene. Pharmacological treatment depends on the severity of acne and includes topical agents, systemic medications, or minor surgical procedures. Antibiotics, both topical and systemic, help reduce the bacterial load in the follicles. Additionally, non-drug therapies such as proper facial cleansing, stress reduction, healthy diet, and lifestyle are important. Pharmacological therapies include over-the-counter medications like benzoyl peroxide, sulfur, and salicylic acid. Benzoyl peroxide works by releasing free radicals to kill bacteria. Salicylic acid and sulfur act as peeling agents, helping to remove dead skin cells that clog pores (20).

Conclusion

Based on the results of this study regarding the influence of stress levels on the occurrence of vulgar acne among UIN North Sumatra Medan students, it can be concluded that there is a significant association between stress and the appearance of acne in this population. These findings indicate that stress not only impacts an individual's psychological condition but also has tangible physiological consequences, one of which is the development of acne. Using a quantitative approach with a case-control design, this study involved 91 respondents and found that individuals experiencing stress have a higher risk of developing acne compared to those who are not stressed. This is supported by statistical analysis yielding a p-value of 0.042 and an odds ratio of 2.788, indicating that stress is a significant risk factor for the occurrence of acne vulgaris. The underlying mechanism may involve the biological response to stress, such as increased androgen hormones and activation of the hypothalamic-pituitary-adrenal (HPA) axis system, which can lead to excess sebum production and inflammation in the skin.

Additionally, data from the study show that most respondents experiencing stress fall into moderate to severe categories and have a higher prevalence of acne compared to other respondents. This condition reflects that the psychological pressures faced by students, whether from academic stress, social relationships, or personal issues, can contribute to skin health disturbances.

Theoretically, this research enriches the discourse on the importance of a multidimensional approach in addressing health problems, especially in dermatology. Acne should no longer be viewed solely as a localized skin disorder but also as a manifestation of disturbed mental balance. Therefore, a holistic approach that integrates physical and psychological health is highly relevant. The findings also provide room for the development of the biopsychosocial concept in public health, emphasizing stress as a crucial variable in the etiology of physical diseases, including skin disorders. This study can serve as a starting point for further exploration of other psychosocial variables such as sleep quality, lifestyle, and social support, which may also influence skin health. The practical implications of these findings encourage the formulation of health promotion programs aimed at stress management preventively within higher education environments, as part of efforts to improve students' overall quality of life.

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