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Correlation between Stress Scale and Severity of Acne Vulgaris



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ABSTRACT

Background: Acne vulgaris (AV) is a chronic inflammatory disease of pilosebaceous follicles with polymorphic lesions, consist of blackheads, papules, pustules and nodules with varying degree of severity. Stress is one of the triggers for acne vulgaris.

Aim: This study aimed to determine the correlation between stress scale with the severity of acne vulgaris.

Methods: This study was an observational analytic study with a cross-sectional design involving 100 patients with acne vulgaris. The dermatological examination was performed in each patient to determine the severity of acne vulgaris with Acne Grading Indonesian Acne Expert Meeting 2015 based on Lehmann Criteria, followed by Holmes-Rahe stress scale questionnaire to evaluate

stress scale. The collected data were analysed using the Spearman correlation test.

Results: Of the total 100 samples examined, the majority of patients with acne vulgaris were 17-25 years old (71%) and most of them were female (68%). The majority of research subjects were classified with moderate acne vulgaris (45%), followed by mild (43%) and severe (12%). Low-stress scale (44%) is mostly found in this study, followed by a medium stress scale (29%) and high (27%). There is a positive correlation between stress scale and the severity of acne vulgaris with moderate strength ($r = 0.456$; $p = 0.001$).

Conclusion: It can be concluded in this study that there is an association between stress scale and the severity of acne vulgaris.

Keywords: acne vulgaris, stress scale, severity of acne vulgaris.

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INTRODUCTION

Acne Vulgaris (AV) is a chronic inflammatory condition on pilosebaceous follicle with polymorphic form such as comedo, papule, pustule and nodule with various severity. This problem mostly found on face, neck, chest and back.¹⁻⁵

In Indonesia, acne vulgaris commonly found on almost 80 - 100% population.⁶ A Study conducted by Anggrenni *et al.* (2014) found that there was 182 acne vulgaris patients with the proportion of 10% of all dermato-venereology patient in Adam Malik Hospital, most of them were at the age of 16 - 20 years old which comprise of 45.6% of all population.⁶ Severe acne vulgaris were found mostly on men but in women, it is more persistent mostly on their menstrual period which means that they occur periodically.⁸

There are several predisposing factors on acne vulgaris, such as genetics, race, stress, diet, cosmetic, particular medicine, pregnancy, menarche period, alcohol consumption and smoking habit.^{3,5,8} Biological basis that is correlating stress and acne vulgaris with the facts that stress was caused by stimulus inducing a reaction in the brain which influences Hypothalamus-Pituitary-Adrenal (HPA) axis through a neuron in the paraventricular nucleus in the hypothalamus. This stimulus causes Corticotropin-Releasing Hormone (CRH) to be

released.^{10,11-14} The increasing level of CRH causes increased sebum production which will block pilosebaceous glands, which causes acne.^{3,10}

Some studies have shown a correlation between stress and acne vulgaris. In Croatia, significant stress score correlates well with the severity of acne vulgaris.^{3,14} In Medan, Perumal found that Medical Students of Sumatera Utara University who has acne vulgaris experienced in the mild, moderate and severe level of stress.¹⁵ Stress can be measured by using questionnaires such as *The Social Readjustment Rating Scale* and the *Perceived Stress Scale*. Until now, there is no proper questionnaire for measuring stress level. In this study, we chose *The Social Readjustment Rating Scale* because of its high accuracy and it measures 43 aspects of potential stress causes, which can represent causes of stress.¹⁶⁻¹⁸

This study was undertaken to determine the correlation between stress scale with the severity of acne vulgaris.

METHODS

This study was conducted after approval from the Ethics Commission in the Faculty of Medicine of Sumatera Utara University/ Adam Malik Hospital with the number of 695/TGL/KEPK FK USU-RSUP

HAM/2019. This study is an observational analytic study with a cross-sectional design involving 100 patients with acne vulgaris of Dermatology and Venereology outpatient Clinic of Sumatera Utara University Hospital from October till December 2019. Acne vulgaris diagnosed based on history taking and physical examinations. Inclusion criteria were patients who have been diagnosed with acne vulgaris, age more than 17 years, and signed informed consent. The exclusion criteria included pregnancy and breast-feeding and patients with anxiety and depression symptoms confirmed by a psychiatrist. This study has been approved by the Ethical Committee Faculty of Medicine, Sumatera Utara University.

The researcher recorded patient demographic data included age, gender, phone number and address, then patient signed the informed consent. The diagnosis of acne vulgaris was made from history taking and physical examination. The dermatological examination was performed in each patient to determine the severity of acne vulgaris with Acne Grading Indonesian Acne Expert Meeting 2015 based on Lehmann Criteria, followed by Holmes-Rahe stress scale questionnaire to evaluate stress scale. The collected data were analyzed using the Spearman correlation test.

RESULTS

The demographic characteristic of patients is described in Table 1. Samples were collected from 100 subjects with AV. Most patients in the age group 21-25 years old was 40 subjects (40%), more common than the age group <20 years old 31 subjects (31%), 26-30 years old 21 subjects (21%), 31-35 years old 7 subjects (7%), and >36 years old 1 subject (1%). Based on gender, female gender was

68 subjects (68%), more common than male gender 32 subjects (32%).

Subject distribution based on the severity of acne vulgaris is described in Table 2. In this study, we found that the majority research subjects had moderate acne vulgaris with 45 patients (45%), followed by 43 patients with mild acne vulgaris (43%) and 12 patients with severe acne vulgaris (12%).

Subject distribution based on the stress scale is described in Table 3. In this study, we found that the majority research subjects had a low-stress scale with 44 patients (44%), followed by 29 patients with moderate stress scale (29%) and 27 patients with high-stress scale (27%).

Correlation between stress scale and the severity of acne vulgaris are described in Table 4. There is an association between stress scale and the severity of acne vulgaris. Stress scale and severity of acne vulgaris had a positive correlation with moderate strength and this was statistically significant ($r = 0.456$; $p = 0.001$).

DISCUSSION

Total of 100 AV patients involved in this study. Acne vulgaris mostly found in the age group 21-25 years old, with primarily female gender affected. Skroza et al. also reported that 12 – 25 years old was the majority age group of AV patient.¹⁹ El-Hamd et al. and Eyaboglu et al. also reported in their study that females were more affected by AV than male.^{21,22}

In this study, we found that the majority research subjects had moderate acne vulgaris with 45 patients (45%), followed by 43 patients with mild acne vulgaris (43%) and 12 patients with severe acne vulgaris (12%).

This study has similar finding with a study conducted by Zohra et al., where the study found that the most frequent severity of AV was moderate acne vulgaris (41,67%).²³ Nourmalydza also reported the most frequent severity of AV was moderate acne vulgaris (50%).²⁴ Another study also reported similar finding conducted by Hidayati et al., where the study found that the most frequent severity of AV was moderate acne vulgaris (40,7%).²⁵ In contrast to research conducted in Saudi Arabia by Zari et al. the majority of severe acne vulgaris was mild (72,2%).¹⁶

This study found that menstruation can be the factor that caused acne vulgaris. The study between the relationship of acne vulgaris and menstruation mentioned that the mean of non-inflammatory and inflammatory lesions number of patients with acne vulgaris in the premenstrual phase is increased and then decreased after the menstruation phase. This

Table 1 Demographic characteristics of subjects

Characteristics	Frequency (n=100)	
	Number (n)	Percentage (%)
Gender		
Male	32	32
Female	68	68
Age		
<20 years old	31	31
21-25 years old	40	40
26-30 years old	21	21
31-35 years old	7	7
>36 years old	1	1
Total	100	100

Table 2 Distribution based on the severity of acne vulgaris

Severity of acne vulgaris	Frequency (n=100)	
	Number (n)	Percentage (%)
Mild	43	43
Moderate	45	45
Severe	12	12
Total	100	100

Table 3 Distribution based on the stress scale

Stress Scale	Frequency (n=100)	
	Number (n)	Percentage (%)
Low	44	44
Moderate	29	29
High	27	27
Total	100	100

Table 4 Correlation between stress scale and the severity of acne vulgaris

	The severity of Acne Vulgaris		
	r	p	Correlation
Stress Scale	0,456	0,001	Positive

finding supports the theory about the improvement of acne vulgaris lesions after the menstruation phase and worsening in the premenstrual phase.²⁶

In this study, we found that the majority research subjects had low-stress scale with 44 patients (44%), followed by 29 patients with moderate stress scale (29%) and 27 patients with high-stress scale (27%). In other studies that using the perceived stress scale questionnaire obtained different results from the research we did. Research by Ratnasari et al. in Bali stated that the most frequently stress scale was moderate.²⁶ Meanwhile, research conducted by Tanaka et al. (2018) and Perumal et al. in Medan, the majority also had a moderate stress scale.^{16,28}

The difference in stress scale in this study can occur due to differences in population and research period. In a study conducted by Ratnasari et al., Tanaka et al. and Perumal et al. were students who have more stressors. The use of different types of questionnaires from each study can also be thought as one of the cause difference stress scale.^{16,29,30}

There is an association between stress scale and the severity of acne vulgaris. Stress scale and severity of acne vulgaris had a positive correlation with moderate strength and this was statistically significant ($r = 0.456$; $p = 0.001$). This study has a similar finding with a study conducted by Chiu et al. and Yosipovitch et al. found that an increase in the

severity of acne vulgaris is significantly associated with an increase in stress scale.^{9,29}

The pathogenesis of acne vulgaris is complex and multifactorial. One of the four main factors that play a role in the pathogenesis of acne vulgaris is an increase in sebum production. Increase of sebum productions can be triggered by the rise in CRH that stimulated during stress.

Furthermore, stress also stimulates other neuropeptides that cause neurogenic inflammation. The binding of neuropeptides with their receptors will cause an increase in the production of pro-inflammatory cytokines, resulting in proliferation, differentiation and lipogenesis of the pilosebaceous glands.^{3,10,30}

The peripheral nerves also release substance P in response to stress. Substance P is a neuropeptide that can stimulate the proliferation of sebaceous precursor cells and can increase the size of sebocytes. This condition shows that the presence of substance can cause the proliferation and differentiation of the sebaceous glands and increase of lipid synthesis in the sebocytes P.^{3,13,18}

CONCLUSION

From the result of this study, the authors concluded that there is an association between stress scale and the severity of acne vulgaris.

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AUTHOR CONTRIBUTION

All authors have contributed to all process in this research, including preparation, data gathering and analysis, drafting and approval for publication of this manuscript.

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CONFLICT OF INTEREST

The authors declare no conflict of interest regarding the publication of this article.

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