The correlation between interleukin-6 (IL-6) level and high sensitivity C-reactive protein (hs-CRP) level in acne vulgaris

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ABSTRACT

Background: Acne vulgaris (AV) is a common inflammation of the pilosebaceous unit. Inflammation is one of the four important factors in the genesis of AV. Interleukin-6 (IL-6) is a powerful major inducer of C-reactive protein (CRP) production and a proinflammatory cytokine. High sensitivity C-reactive protein (hs-CRP) levels can detect very low CRP concentrations. The purpose of this research is to ascertain whether the levels of IL-6 and hs-CRP in AV are related.

Methods: Forty-five subjects over 18 who had AV and 45 subjects who did not have AV served as included in this observational analytic research. IL-6 and hs-CRP levels are measured while the subject is examined, and basic statistics are recorded. Mann-Whitney and Spearman correlation tests were used to evaluate the data.

Results: In this study, AV was more dominant in women, consisting of 30 people (66.7%). The highest age in the study group was aged 18–22 years, comprising 25 people (56%). The mean IL-6 level in the AV group was 63.3 ng/L, and the control group, with an average value of 56.9 ng/L, showed a significant difference (p=0.014). There were substantial differences between the AV and control groups, as evidenced by the average hs-CRP levels of 5.48 ng/mL in the AV group and 4.27 ng/mL in the control group (p<0.001). Between the AV and control groups, there is a significant positive association between IL-6 and hs-CRP levels (r=0.700; p<0.001).

Conclusion: There is a strong correlation between IL-6 and hs-CRP levels in AV.

Keywords: Acne vulgaris, interleukin-6 (IL-6), high sensitive C-reactive protein (hs-CRP).

INTRODUCTION

A prevalent pilosebaceous unit condition that primarily affects adolescents is acne vulgaris. As part of the multifactorial etiology of acne vulgaris, four important factors are believed to contribute to the emergence of acne vulgaris lesions. Excessive sebum production, epidermal follicular hyperproliferation, the bacteria Propionibacterium acnes (formerly known as Cutibacterium acnes), inflammation, and immunological response are among these factors. Interleukin-6, also known as IL-6, is the main stimulus for the production of most acute phase proteins and multifunctional cytokines that have pro-inflammatory and anti-inflammatory effects in humans. In addition, IL-6 participates in a number of host defense mechanisms, such as immunological response and hematopoiesis, and is consequently linked to the pathophysiology of several illnesses, such as immunoinflammation.

When inflammation occurs, an acute phase reaction occurs. The acute phase response consists of regional and systemic responses that assist the inflammatory process. Vasodilation of blood arteries, platelet aggregation, neutrophil chemotaxis, and the release of lysosomal enzymes are examples of local reactions. An increase in acute-phase proteins is a hallmark of systemic reactions. Fibrinogen, C-reactive protein (CRP), serum amyloid A, and haptoglobin are among the acute-phase proteins. It is known that when inflammation occurs, the body will produce acute-phase proteins. Several cytokines that stimulate CRP production are known in hepatocytes, namely IL-1, IL-6, and TNF-α. Among these cytokines, IL-6 is a mediator that greatly influences CRP production. The liver produces high-sensitivity C-reactive protein (hs-CRP), a homopentameric acute phase protein that binds specifically to phosphorylcholine in a Ca2+-dependent way. When the body is experiencing inflammation, its levels considerably rise. Increased plasma concentrations of IL-6, mainly produced by macrophages and adipocytes, cause this rise in hs-CRP. This research aims to investigate the correlation between hs-CRP and IL-6 levels in acne vulgaris.

METHODS

This study was an observational analytic study with a cross-sectional method involving 45 acne vulgaris subject and 45 control who came to Universitas Sumatera Utara General Hospital in 2022 with inclusion criteria were ≥ 18 years old and agree to signed the informed consent. Age and family history were recorded. The exclusion criteria were subjects with skin diseases namely: chronic urticaria, autoimmune disease, atopic dermatitis, subjects who have chronic diseases of the heart and blood vessels such as: hypertension, liver...
disorders such as: Hepatitis B and C, HIV/AIDS, asthma, endocrine disorders such as hypothyroidism, hyperthyroidism, disorders of the adrenal glands, known Cushing’s Syndrome through history, subjects who consumed and used certain oral and topical medications such as antibiotics, glucocorticoids during the last 2 weeks, subjects using oral and topical retinoids for 4 weeks and acne vulgaris subjects who are pregnant or breastfeeding.

History taking and clinical examination were conducted, and the IL-6 and hs-CRP value was measured with ELISA KIT IL-6 Cat No. E1805 Hu and ELISA KIT hs-CRP Cat No. E0090 Hu at Laboratorium Terpadu faculty of medicine university of Sumatera Utara. T Data analyzed by Mann Whitney test and Spearman correlation test and it was considered to be significant if the p-value <0.05.

RESULTS

In this study, it was found that there were more female subjects in the acne vulgaris group, namely, 30 people (66.7%) compared to 15 men (33.3%), while in the control group, it was also found that the majority of women were 33 (73.3%) and men by 12 (26.7%) showed in Table 1. Table 2 reveals that this research study group had a median age of 18 to 22 years, with 25 participants (56%) in the acne vulgaris group and 27 participants (60%) in the control group.

In this research, the levels of IL-6 and hs-CRP were different between the acne vulgaris group and the control group. The control group’s mean value for IL-6 was lower than that of the acne vulgaris group. The mean IL-6 levels between the group with acne vulgaris and the control group were significantly different, according to the Mann-Whitney test (p=0.014). The control group’s mean hs-CRP level was lower at 4.27 ng/mL than that of the acne vulgaris group, which had an average of 5.48 ng/mL. The mean hs-CRP values between the control and acne vulgaris groups were also significantly different according to the Mann-Whitney test (p<0.001; Table 3).

Based on the statistical analysis results in Table 4, a significant correlation was found between IL-6 levels and hs-CRP in acne vulgaris (p<0.001). The resulting correlation coefficient (r-value) between the levels of IL-6 and hs-CRP in acne vulgaris is 0.700, indicating a very high positive correlation between the two. According to a favorable correlation, hs-CRP levels in acne vulgaris positively correlate with IL-6 levels.

DISCUSSION

The prevalence of acne vulgaris, a prevalent skin condition that affects 9.4% of people worldwide, is highest in adolescents. Across all ethnic groups, it affects more than 90% of males and 80% of women. Acne vulgaris prevalence in adults and adolescents differs by nation and ethnic group. In this study, it was found that there were more female subjects in the acne vulgaris group, namely 30 people (66.7%). It is in accordance with the results of a study by Jusuf et al. 2021 in Medan also found that the distribution of acne vulgaris subjects was mostly female (76.7%).

According to Tayel et al. 2020 in Egypt, women (39.1%) were significantly more likely than males (30.3%) to have acne vulgaris. According to Shah et al. (2021), around 68.3% of the subjects in epidemiological research on the prevalence of acne vulgaris in India were female. Acne vulgaris in women is known to be triggered by hormonal variables. In addition, due to the early onset of puberty in women, acne vulgaris lesions develop sooner in women than in men, and the condition is more common and persistent in women. Hormonal factors, the use of cosmetics on the face, the propensity of women to seek treatment right away when experiencing cosmetic complaints, and others are believed to affect the prevalence of acne vulgaris in women.
Table 2 demonstrates the findings of this research, which indicated that 25 people (56% of the study group) were in the age range of 18 to 22 years. According to Heng et al. 2022's research, the majority of 3,888 subjects (71.4%) with acne vulgaris were between the ages of 20 and 24 years, with an average age of 21.18 Similar results were also found in several studies conducted in Medan. The same finding was made by Rangkuti et al. in their 2021 study, who discovered that 50% of acne vulgaris patients were between 18 and 22.18 According to Donytasari et al. 2022, acne vulgaris patients were typically 22.52 years old.17 According to Marpaung et al. 2021, 18 to 23 years had the highest rates of both inflammatory and non-inflammatory acne (51.6% and 77.4%, respectively).18

In this research, the levels of IL-6 and hs-CRP were different between the acne vulgaris group and the control group. The control group's mean value for IL-6 was lower than that of the acne vulgaris group, with a mean value of 56.9 ng/L. Acne vulgaris patients had an average hs-CRP level of 5.48 ng/mL, while the control group had a mean value of 4.27 ng/mL. The average serum CRP level in patients with moderate to severe acne vulgaris who attended the hospital was 4.15 1.2 (g/ml), according to an earlier study by Armughan et al. According to the study, patients with severe acne vulgaris had significantly greater CRP levels than those with moderate acne vulgaris.19 According to Mohammed et al., acne vulgaris patients had significantly higher CRP values than controls (p<0.05). As a result, CRP serum levels in patients with acne vulgaris were significantly higher than in controls (6.9 ± 4.9 mg/l; 1.3 ± 1.5 mg/l).20

A substantial correlation between IL-6 levels and hs-CRP in acne vulgaris was discovered, according to the statistical analysis findings in Table 4. The association between serum hs-CRP levels and IL-6 levels in the acne vulgaris and the control groups has never been examined before. It is consistent with study results published in 2020 by Stankowska et al., who examined the relationship between IL-6, IL-8, IL-12p40, and CRP levels in acne vulgaris and discovered that IL-6 levels were favorably correlated with the severity of skin lesions in acne vulgaris (p<0.001).21

This research established that IL-6 and hs-CRP levels played a role in the inflammatory process in the pathogenesis of acne vulgaris and that there was a relationship between them in the acne vulgaris group compared to the control group. In the initial phases of inflammation and later on, when acute inflammation turns into chronic inflammation, cytokines are crucial to developing the inflammatory response. It demonstrates that the biological marker IL-6 levels, in combination with hs-CRP, can be used to determine when an inflammatory process in acne vulgaris occurs.

LIMITATION OF THE STUDY
This study did not classify the degree of severity of acne with levels of IL-6 and hs-CRP so that a linear relationship between IL-6, hs-CRP and the severity of acne vulgaris could not be seen.

CONCLUSION
IL-6 and hs-CRP levels have a significant impact on acne vulgaris.

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CONFLICT OF INTEREST
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AUTHOR CONTRIBUTIONS
All authors have contributed to this research process, including preparation, data gathering, analysis, drafting, and approval to publish this manuscript.


