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Original Article

Relationship between Serum Interleukin-6 Level and Severity of Acne Vulgaris in Women

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Abstract

Background : Acne vulgaris is more common in women than men and is observed more frequently in older adolescents than younger adolescents (pre-teens). This is due to higher sebum production, which supports the growth of *Propionibacterium acnes*. *Propionibacterium acnes* contributes to initiating and maintaining inflammatory processes induced by immunological reactions. It activates the Toll-like receptor (TLR) 2 and 4 immune systems by releasing interleukin-6 (IL-6) as a core mediator of inflammation.
Aims : This study aims to determine the relationship between serum IL-6 levels and the severity of acne vulgaris in women.
Methods : This research employs an analytical observational study design with a cross-sectional approach, involving 15 female subjects diagnosed with acne vulgaris, divided into three groups. The study will occur in Semarang city from July 2024 to September 2024.
Results : This study involved 15 female students from Diponegoro University, categorized based on the severity of acne vulgaris (mild, moderate, severe). Blood samples were taken to measure serum IL-6 levels using the ELISA method. The average IL-6 levels found were: mild 1.00 ± 0.55 pg/ml, moderate 1.47 ± 0.27 pg/ml, and severe 1.99 ± 0.42 pg/ml. Analysis revealed a significant relationship between serum IL-6 levels and the severity of acne vulgaris (p = 0.011), supporting the hypothesis of a correlation between the two.
Conclusion : There is a significant relationship between serum IL-6 levels and the severity of AV in women. There is a meaningful difference in serum IL-6 levels between the mild and severe AV groups.

Keywords : Acne Vulgaris, IL-6 Levels, Severity of Acne Vulgaris.

INTRODUCTION

Acne vulgaris (AV) is a common chronic skin disorder that affects 80–100% of the population. It is caused by keratin blockage in the sebaceous gland ducts.[1] AV is characterized by both non-inflammatory lesions, such as comedones (blackheads and whiteheads), and inflammatory lesions (papules, pustules, nodules, and cysts). These lesions primarily occur in areas with a high density of sebaceous glands, such as the face, chest, and upper back.[2]

Other external factors, such as stress, diet, and the use of cosmetics, can also significantly influence the severity of acne vulgaris (AV). Psychological stress has been shown to exacerbate acne by increasing the production of sebum and triggering inflammatory responses in the skin. This stress-induced exacerbation is believed to be mediated by the activation of the hypothalamic-pituitary-adrenal (HPA) axis, which in turn stimulates the secretion of cortisol and other hormones that increase sebum production.[23] Additionally, certain dietary factors, particularly high glycemic index foods, dairy products, and foods rich in saturated fats, have been implicated in the worsening of acne. These foods may trigger an insulin-like growth factor (IGF-1) pathway that promotes sebum production and inflammation. The role of cosmetics is also a significant external factor, as many products contain comedogenic ingredients that can clog pores and contribute to the formation of acne lesions.[24] Understanding the interplay between internal (e.g., hormonal imbalances) and external factors provides a more comprehensive view of the pathogenesis of acne vulgaris.

The highest prevalence of AV is found in adolescents and young adults, with 85% of cases occurring between the ages of 12 and 25. Women tend to have a slightly higher prevalence than men. AV typically appears between the ages of 14 and 17 in women, while in men, it is most common between 16 and 19 years.[3] While acne often resolves after puberty, it can persist into the 30s, especially in women.

Women may experience a greater psychological burden from AV due to several factors. Hormonal imbalances, such as fluctuations in androgens and estrogens, can increase sebum production, particularly during menstruation, pregnancy, or perimenopause.[4] Psychosocial factors also play a role, as AV can lead to depression and diminished self-esteem due to concerns about appearance. Additionally, cosmetics can exacerbate the condition by clogging pores and worsening acne.[5]

The prevalence of common acne (acne vulgaris) is very high across various countries and age groups, with significant variation. Epidemiological studies indicate that at least 80–90% of adolescents and young adults experience acne vulgaris to some degree, making it one of the most common skin conditions worldwide.[16] In Indonesia specifically, acne vulgaris is prevalent among adolescents and young adults, with women tending to report more persistent conditions compared to men, primarily due to hormonal fluctuations, cosmetic use, and differing skin responses during the menstrual cycle.[17] Detailed epidemiological data from various countries also indicate that the prevalence of AV in women can reach over 85% from adolescence through young adulthood, and often persists into their 30s or beyond.

The impact of AV is not only physical but also psychosocial. A visible skin condition can lead to social stigma, reduce self-confidence, and trigger emotional disturbances such as anxiety and depression, particularly in women, who often face greater social pressure regarding their appearance.[18] Women with AV are reported to be more prone to feelings of shame, a reduced quality of life, and interpersonal relationship difficulties compared to women without AV, highlighting the need for a holistic approach to AV management, including psychological aspects.[19]

In Indonesia, the Lehmann classification, established at the 2nd Round Table Meeting in Vietnam (2003), is commonly used to classify the severity of AV into three levels based on the number of lesions: mild, moderate, and severe.[3]

Acne vulgaris is caused by multiple factors, with four key contributors:[6]

- Androgen stimulation, which increases sebum production.
- Hyperkeratosis and follicular obstruction.
- Proliferation of *P. acnes*.
- Inflammation.

P. acnes triggers the immune system through TLR2 and TLR4 on keratinocytes and monocytes, releasing pro-inflammatory cytokines such as IL-1α, IL-1β, IL-6, IL-8, IL-12, and TNF-α. These cytokines contribute to prolonged inflammation. IL-6, in particular, plays a critical role in acute and chronic inflammation in acne vulgaris. It stimulates antibody production, activates Th17 cells in the adaptive immune response, and promotes hyperkeratosis in the pilosebaceous ducts. [7,8]

A study by Nauli, Putra, and Jusuf (2023) involving 45 AV patients and 45 healthy controls found higher serum levels of IL-6 and hs-CRP in the AV group.[8] Similarly, Stańkowska *et al*. (2020) reported elevated IL-6 levels in AV patients, especially men, compared to controls. However, limited research exists on the relationship between serum IL-6 levels and AV severity in women, underscoring the need for further studies to explore this connection.[9]

Previous studies have demonstrated that Interleukin-6 (IL-6) functions as a pivotal pro-inflammatory cytokine not only in acne vulgaris but also in a wide range of other chronic inflammatory and

immune–mediated conditions. IL–6, originally identified as a B–cell stimulatory factor, plays a significant role in initiating and sustaining inflammatory responses through pathways involving NF–κB and STAT3, and its dysregulation has been implicated in chronic inflammatory diseases, autoimmune disorders, and even cancer. IL–6's involvement in systemic inflammation is well documented, highlighting its central role in mediating local and systemic immune reactions across various tissues.[20]

In dermatology, IL–6 contributes to the pathogenesis of several inflammatory skin conditions beyond acne. For example, IL–6 and its receptor dynamics have been associated with inflammatory responses in psoriasis and atopic dermatitis, where chronic activation of keratinocytes and immune cells contributes to persistent inflammation and skin barrier dysfunction. Moreover, IL–6/IL–6R signaling has been shown to mediate inflammatory factor upregulation in skin exposed to UVB radiation, underscoring its role in chronic skin inflammation and pigmentation disorders. These findings suggest that IL–6 is not only a marker of acne severity but also a broader mediator of cutaneous inflammatory processes.[21]

The broader significance of IL–6 in inflammation is further supported by research showing its elevated levels in autoimmune conditions such as rheumatoid arthritis, where IL–6 activity correlates with disease progression and severity, and in chronic inflammatory states characterized by persistent cytokine production. This evidence highlights the multifaceted roles of IL–6 in both systemic and skin–specific inflammatory pathways, providing a theoretical foundation for investigating its association with acne vulgaris and its potential as a therapeutic target.[22]

In conclusion, acne vulgaris is a multifactorial condition, influenced by both internal factors, such as hormonal imbalances, and external factors like stress, diet, and cosmetic use. IL-6 plays a significant role in the development and severity of acne, as it is involved in the inflammatory processes that characterize the condition. Given its broader impact on other inflammatory skin conditions and autoimmune diseases, IL-6 serves as a crucial mediator in both local and systemic inflammation. Therefore, understanding the relationship between IL-6 and acne vulgaris is essential for improving diagnosis and treatment strategies. This highlights the need for further research to better understand how IL-6 serum levels correlate with the severity of acne vulgaris, especially in women, to enhance therapeutic options for this common skin disorder.

METHODS

This study employed an analytical observational design with a cross-sectional approach, where data were collected at a single point in time to examine the relationship between serum Interleukin-6 (IL-6) levels and the severity of acne vulgaris (AV) in women. The study was conducted at Diponegoro University, Semarang, and included young adult female patients diagnosed with AV, selected according to specific inclusion and exclusion criteria.

The sampling process involved consecutive sampling, which is a non-probability sampling technique where participants are selected based on their availability and willingness to participate. The inclusion criteria for this study were as follows:

1. Female participants aged between 18 to 23 years.
2. Diagnosed with acne vulgaris by a certified dermatologist.
3. Willingness to provide informed consent and participate in the study, including the provision of a blood sample.

The exclusion criteria were:

1. Individuals with other skin conditions (e.g., rosacea, folliculitis) that could interfere with the diagnosis of acne vulgaris.
2. Participants with any systemic diseases such as hypertension, liver disease, or autoimmune disorders that might affect IL-6 levels.
3. Individuals who had been treated with systemic or topical antibiotics, steroids, or retinoids within one month prior to the study.
4. Pregnancy or lactating women, as hormonal fluctuations during these conditions may significantly alter serum IL-6 levels.

Data collection began with a thorough anamnesis of participants to gather relevant medical and demographic information. Informed consent was obtained from all participants after providing them with a detailed explanation of the study's purpose, procedures, and potential risks. Facial photographs were taken for later assessment of acne severity, which were reviewed by a dermatologist to classify the acne as mild, moderate, or severe using the Lehmann classification (as described in your previous work).

A 5 mL blood sample was drawn from the median cubital vein using sterile techniques, in accordance with ethical standards for human sample collection. The blood samples were then processed in the GAKI Laboratory at Diponegoro University by centrifugation to separate the serum from the cellular components. The serum was stored at -20°C until further analysis.

Serum IL-6 levels were measured using an enzyme-linked immunosorbent assay (ELISA) high-sensitivity kit, which allows for precise and sensitive detection of IL-6 concentrations in serum samples. The assay was performed according to the manufacturer's instructions, and IL-6 levels were recorded in pg/mL. This method has been validated for clinical use and is widely accepted for cytokine measurement in

inflammatory conditions.

The data were analyzed using IBM SPSS Statistics software (version 26). Descriptive statistics were used to summarize the demographic characteristics of the participants, including age, BMI, and acne severity. The Shapiro-Wilk test was first applied to assess the normality of the data. Given the small sample size, non-parametric tests were employed where necessary.

For hypothesis testing, the study used:

1. Spearman's correlation test to analyze the relationship between IL-6 serum levels and acne severity.
2. One-way ANOVA was used to compare the mean serum IL-6 levels between the three groups (mild, moderate, and severe acne). In cases of non-normal distribution, appropriate data transformation was applied, and Kruskal-Wallis test was used for comparison.
3. A post-hoc Tukey test was performed to identify specific group differences after the ANOVA test.

Ethical approval for this study was granted by the Medical and Health Research Ethics Committee of the Faculty of Medicine, Diponegoro University, under the approval number 198/EC/KEPK/FKUNDIP/V/2024. All participants were informed of the study's procedures and provided their consent to participate.

RESULTS

Table 1 shows the characteristics of the 15 female subjects in this study, categorized by age, BMI, and severity level of acne vulgaris.

Table 2 shows the analysis of the relationship between serum IL-6 levels and the severity of acne vulgaris (AV) using the Spearman correlation test. The *p*-value obtained was 0.005, which is less than 0.05, indicating a significant relationship between serum IL-6 levels and the severity of AV. The correlation coefficient (r = 0.680) suggests a strong positive correlation, meaning that as the severity of AV increases, the serum IL-6 levels also increase. The correlation coefficient indicates a strong positive correlation since it is above 0,5.

Table 3 presents the results of the one-way ANOVA test to compare IL-6 serum levels across the different severity levels of AV. The data passed the normality test (Shapiro-Wilk, $p = 0.534$), indicating that the distribution of IL-6 serum levels is normal. The ANOVA test showed a significant difference in serum IL-6 levels among the three severity groups ($p = 0.011$), suggesting that IL-6 levels vary based on the severity of acne vulgari.

Table 4 shows the post hoc test results, indicating a significant difference between the mild and severe AV groups (p=0.008, p<0.05). However, no significant

TABLE 1
Characteristics of Study Subjects

Characteristics	Frequency (n)	Percentage (%)
Age		
19 years	1	6.7
20 years	4	26.7
21 years	7	46.7
22 years	3	20.0
Gender		
Female	15	100
Male	0	0
BMI		
Underweight	5	33.3
Normoweight	8	53.3
Overweight	2	13.3
Severity Level		
Mild	5	33.3
Moderate	5	33.3
Severe	5	33.3

TABLE 2
Relationship Between Serum IL-6 Levels and Severity of Acne Vulgaris

Variable	*p*	r	Description
Severity Level IL–6	0.005	0.680	Significant, Positive, Strong

Note: Spearman test, significant ($p<0.05$)

TABLE 3
Serum IL-6 Levels Based on the Severity of Acne Vulgaris

Variable	Severity of Acne Vulgaris			*p* value
	Mild	Moderate	Severe	
IL–6 (pg/ml)	1.00 ± 0.55	1.47 ± 0.27	1.99 ± 0.42	0.011*

Note: *One-way ANOVA test, significant ($p<0.05$)

difference was observed between the mild and moderate groups, or between the moderate and severe groups, with *p*-values of 0.227 and 0.177, respectively ($p > 0.05$).

Several previous studies have examined the relationship between IL–6 levels and acne severity, supporting the inflammatory role of IL–6 in acne pathogenesis. For example, research has shown that serum IL–6 levels are significantly elevated in individuals with acne vulgaris compared to controls, and higher IL–6 concentrations are associated with more severe lesions, indicating a strong positive correlation between IL–6 and disease severity. This aligns with our findings that serum IL–6 levels increase as acne severity worsens.[26]

Not all studies report consistent results; some research has found that differences in IL–6 levels between acne patients and controls are not always statistically significant, especially when other interleukins such as IL–8 and IL–17 are considered primary drivers of inflammatory responses in acne.

Genetic studies investigating IL–6 gene promoter polymorphisms suggest that while IL–6 may play a role in susceptibility to acne vulgaris, its direct association with severity is not always evident across different populations (Ragab *et al*., 2021). These variations highlight the complexity of cytokine involvement in acne and underscore the need for further research to clarify how IL–6 interacts with other inflammatory mediators in determining disease progression and clinical outcomes.[28]

In this study, the distribution of serum IL–6 levels varied across the mild, moderate, and severe acne vulgaris groups, reflecting the inflammatory burden associated with increasing severity. The mean IL–6 levels rose progressively from 1.00 ± 0.55 pg/ml in the mild group to 1.99 ± 0.42 pg/ml in the severe group (Table 4), which suggests a gradation of inflammatory response corresponding to clinical severity. This pattern aligns with current understanding that IL–6, as a pro–inflammatory cytokine, is upregulated in proportion to the level of tissue inflammation seen in more severe acne lesions, as has been demonstrated in other studies of chronic inflammatory skin diseases where higher cytokine levels correlate with increased disease activity.[29]

It is important to note that cytokine data can be inherently variable due to the biology of these molecules. Cytokines like IL–6 are produced in low concentrations, have short half–lives, and can be influenced by systemic factors beyond local skin inflammation, which may affect their distribution patterns in serum. Accurate measurement using ELISA, while reliable, may still be affected by analytical variability and biological noise, such as transient elevations due to minor infections, stress responses, or inter–individual differences in immune activation.[30]

In addition, potential confounding factors could influence the observed distribution of IL–6 levels. For example, genetic variation in immune response pathways has been shown to contribute to individual differences in acne severity and cytokine expression, independent of clinical lesion counts. A systematic review on genetic variants associated with acne severity supports the notion that host genetic factors may modulate cytokine production and inflammatory responses, potentially affecting IL–6 serum levels in a way that is not solely dependent on lesion severity.[26]

Other confounders that could bias the serum IL–6 distribution include demographic characteristics (e.g., age, BMI), lifestyle factors (diet, stress, smoking), and subclinical infections that were not controlled for in this

TABLE 4
Post Hoc Test for Serum IL-6 Levels Based on the Severity of Acne Vulgaris

Severity of Acne Vulgaris	Severity of Acne Vulgaris	*p*
Mild	Moderate	0.227
	Severe	**0.008***
Moderate	Mild	0.227
	Severe	0,177
Severe	Mild	**0.008***
	Moderate	0.117

Note: * post hoc Tukey HSD test, significant (p <0.05)

cross–sectional design. These variables can independently alter systemic inflammatory markers and may lead to overlapping IL–6 values between severity groups. Moreover, the relatively small sample size in this study also limits the statistical power to fully account for such variabilities, which could explain why some comparisons do not reach significance despite apparent trends in average IL–6 levels across groups. Future studies with larger cohorts and multivariate adjustment for potential confounders are needed to clarify these influences.

DISCUSSION

The study found that all participants were women. According to Ruba *et al*. (2020), the incidence of acne vulgaris is higher in women (70.9%) than in men (29.1%). 10 Women tend to experience more severe acne earlier, likely due to higher sensitivity of androgen receptors and an earlier onset of puberty. Acne is also more persistent in women, who are often more concerned about their appearance and may use cosmetics. About 89.1% of women develop acne as a result of improper use of cosmetics.[11,12]

This study observed the highest prevalence of acne vulgaris in 21-year-olds (46.7%). Acne typically affects individuals between 12 and 25, peaking in adolescence. Ruba *et al*. (2020) reported that 26.7% of participants were aged 15–20, and 34.7% were aged 21–25.[10] Heng *et al*. (2022) also reported a high prevalence in the 2024 age range.[1] In Pakistan, Luqman *et al*. (2020) observed that 72% of acne vulgaris patients were women, highlighting the gender difference in prevalence.[13]

Most participants in this study had a normal body mass index (BMI), with 53.3% falling within the normal weight range. Lajevardi *et al*. (2014) found that while severe acne was less common in underweight individuals (BMI < 18.5), there was no significant correlation between BMI and acne severity among participants in their study.[14]

This research involved 15 women students from Diponegoro University, categorized by the severity of acne vulgaris (AV) into three groups: mild, moderate, and severe. Blood samples were collected to measure serum IL-6 levels using a high-sensitivity (HS) kit with the ELISA method. The results indicated that the mean IL–6 levels were 1.00 ± 0.55 pg/ml for mild acne, 1.47 ± 0.27 pg/ml for moderate acne, and 1.99 ± 0.42 pg/ml for severe acne. Bivariate analysis revealed a significant positive relationship between serum IL-6 levels and AV severity (p=0.011, p<0.05), supporting the hypothesis that increasing AV severity is associated with elevated serum IL-6 levels.

These findings are consistent with those of Stankowska *et al*. (2020), who reported higher IL-6 levels in 47 patients with acne vulgaris compared to 41 controls (p=0.0319). The IL-6 levels in the acne patients ranged from 1.39 to 67.41 pg/ml, while in the control group, levels ranged from 1.00 to 14.24 pg/ml.[9] Similarly, Nauli *et al*. (2023) observed increased IL-6 and hs-CRP levels in acne vulgaris patients, with a mean IL-6 of 63.3 ng/L compared to 56.9 ng/L in controls (p = 0.014).[8] Elhanboli *et al*. (2021), in a meta-analysis, also found elevated IL-6 levels in acne vulgaris patients and a significant correlation between IL-6 levels and lesion severity.[15]

IL-6 plays a pivotal role in the pathogenesis of acne vulgaris. Lipopolysaccharides from bacteria induce it and activate Th17 cells, which produce inflammatory cytokines like IL-8, contributing to inflammation in acne lesions. Moreover, IL-6 can induce hyperkeratosis in the pilosebaceous ducts, inhibit serum flow, and facilitate the colonization of *P. acnes*, exacerbating acne severity.[7]

One of the key mechanisms by which IL–6 contributes to the pathogenesis of acne vulgaris is through its regulation of both innate and adaptive immune responses. IL–6 is a pleiotropic cytokine that is secreted by various cell types, including keratinocytes, macrophages, and sebocytes, in response to stimuli such as Cutibacterium acnes colonization and Toll–like receptor activation. Once released, IL–6 can activate the

NF–κB signaling pathway, which amplifies the expression of other pro–inflammatory cytokines and chemokines, thereby sustaining inflammation in the pilosebaceous unit. This cascade promotes recruitment of neutrophils and other immune cells, contributing to lesion formation and progression from mild to more severe inflammatory acne.[32]

Beyond these effects on innate immunity, IL–6 also influences the adaptive immune response by facilitating the differentiation of naïve CD4+ T cells into Th17 cells a subset of pro–inflammatory T helper cells. The Th17 pathway has been shown to be significantly activated in inflamed acne lesions, with IL–6 serving as a critical driver of Th17 polarization and IL–17 production. This IL–6–mediated Th17 response further amplifies inflammation by inducing additional cytokines (e.g., IL–17 and IL–8) that increase neutrophil recruitment and sustain chronic inflammation in acne–affected skin.[33]

As acne severity increases, this complex interplay between IL–6, Th17 cells, and other inflammatory mediators becomes more pronounced. In mild acne, IL–6 levels may be elevated primarily due to early innate immune activation, while in moderate to severe acne, adaptive immune mechanisms particularly Th17–driven inflammation play a larger role in lesion persistence and severity. The differential activation of these pathways helps explain why serum IL–6 levels correlate with acne severity in many studies and highlights the central position of IL–6 as both an initiator and amplifier of inflammatory signaling in acne vulgaris.[29]

The role of IL–6 in chronic skin inflammation extends beyond acne vulgaris and has been documented in other dermatological conditions with similar immunopathogenic pathways. For instance, elevated serum IL–6 levels have been observed in patients with psoriasis, a chronic immune–mediated inflammatory skin disease, where IL–6 contributes to keratinocyte proliferation and amplifies immune responses through the JAK–STAT signaling pathway, thereby driving persistent inflammation and lesion severity. Elevated IL–6 in psoriasis has also been associated with the severity of disease and neurogenic inflammatory processes, suggesting that IL–6 acts as a central mediator of skin inflammation across different conditions. Similarly, in rosacea another chronic inflammatory disorder of the face higher serum IL–6 levels have been reported compared to healthy controls, indicating its involvement in disease pathogenesis and severity. These parallels support the notion that IL–6 functions as a common pro–inflammatory mediator in various skin diseases, reinforcing the significance of our finding that IL–6 increases with acne severity.[34]

IL–6 signaling has broader relevance beyond local skin inflammation. Hirano (2021) described IL–6 as a pleiotropic cytokine involved not only in acute inflammation but also in autoimmunity and tumorigenesis, acting through both classic membrane-bound receptor signaling and trans-signaling via soluble IL–6 receptor (IL–6R).[20] This dual signaling capacity may explain why even modest elevations in serum IL–6, such as those observed in mild acne in the present study, can still translate into measurable inflammatory activity at the tissue level. In addition, Inoue *et al*. (2025) demonstrated that IL–6R expression in keratinocytes is upregulated by external stressors such as UVB exposure and increases with age, sensitizing skin cells to IL–6-mediated inflammatory signaling.[21] This suggests that environmental and hormonal factors relevant to young women, including sun exposure and skin maturation, may modulate individual susceptibility to IL–6-driven acne severity, independent of absolute serum IL–6 concentration. Supporting a genetic contribution, Ragab *et al*. (2021) reported that polymorphisms in the IL–6 gene promoter are associated with both the presence and severity of acne vulgaris, indicating that variability in IL–6 production between individuals may be partly determined by genetic background rather than disease activity alone.[27] These findings align with a more recent clinical study by Triatmakusuma *et al*. (2024), who similarly found a positive correlation between serum IL–6 levels and acne vulgaris severity, reinforcing the consistency of this relationship across different populations.[28] Given the central role of IL–6 in this inflammatory cascade, IL–6 receptor blockade has been explored therapeutically in other chronic inflammatory conditions; Aletaha *et al*. (2021) summarized consensus recommendations on IL–6 and IL–6 receptor inhibition in inflammatory disease, raising the possibility that similar targeted anti-inflammatory strategies could eventually be adapted for severe, treatment-resistant acne vulgaris.[22]

Several limitations should be considered when interpreting these findings. The sample size of 15 participants, while sufficient to detect a statistically significant association, limits the generalizability of the results and reduces statistical power to detect smaller effect sizes between severity subgroups. As a cross-sectional study, this design captures serum IL–6 levels at a single time point and cannot establish causality or describe how IL–6 levels change over the course of acne development and resolution. Furthermore, Knight and Sepiashvili (2025) highlighted that cytokine measurements, including IL–6, are highly sensitive to pre-analytical factors such as sample handling, storage time, and assay platform, which can introduce variability between studies and complicate direct comparison of absolute IL–6 values across different research settings.[30] Future studies with larger, more diverse cohorts, longitudinal follow-up, and standardized cytokine assay protocols are needed to confirm the role of serum IL–6 as a reliable biomarker of acne vulgaris severity. Additionally, standardizing acne severity grading criteria across future studies, alongside serum IL–6

measurement, would further strengthen the reproducibility and clinical applicability of these findings in dermatological practice.

CONCLUSION

This study demonstrates a significant relationship between serum IL-6 levels and the severity of acne vulgaris (AV) in women. The findings reveal that IL-6 levels progressively increase with the severity of acne, with a notable difference between the mild and severe AV groups. These results support the hypothesis that elevated IL-6 is associated with greater acne severity, reinforcing the central role of IL-6 in driving inflammation in acne lesions. Furthermore, the study highlights the importance of understanding the inflammatory processes underlying AV, which can contribute to the development of targeted therapeutic approaches. Future research with larger sample sizes and broader demographic groups will be crucial to validate these findings and explore the potential of IL-6 as a biomarker for monitoring acne progression.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest related to this study.

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