The Effect of Coffee Consumption on the Severity of *Acne vulgaris* in Students at Prima Indonesia University

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ABSTRACT

Acne vulgaris is a common skin disorder among adolescents and young adults, influenced by factors such as hormones, genetics, stress, and diet. Coffee, a caffeinated beverage widely consumed by students, may play a role in acne severity. This study aims to analyze the effect of coffee consumption on the severity of acne vulgaris in students of the Faculty of Medicine, Universitas Prima Indonesia, class of 2022–2024. This analytical observational study used a cross-sectional design with 30 purposively selected respondents. Coffee consumption was assessed using the Food Frequency Questionnaire (FFQ), and acne severity was measured using the Global Acne Grading System (GAGS). Data were analyzed with the Chi-square test at a 0.05 significance level. Most respondents were female (70%) and had a moderate level of coffee consumption (56.7%). The most common severity of acne vulgaris was in the mild category (60%). The bivariate Chi-square test showed a p-value of 0.057 (>0.05), indicating no statistically significant relationship between coffee consumption and acne vulgaris severity. Coffee consumption was not significantly related to the severity of acne vulgaris in students of the Faculty of Medicine, Universitas Prima Indonesia. The lack of a significant association (p = 0.057) suggests that other factors, such as the type of coffee, drink additives (milk and sugar), overall dietary patterns, stress levels, and genetic predisposition, may play more substantial roles in acne vulgaris development among this population.

Keywords: Acne vulgaris; coffee consumption; caffeine; students

INTRODUCTION

Acne vulgaris is a skin condition caused by inflammation of the pilosebaceous unit, characterized by non-inflammatory lesions such as open and closed comedones, as well as inflammatory lesions in the form of papules, pustules, and nodules (Misery et al., 2015; Çerman et al., 2016). To date, the etiology of *acne vulgaris* has not been clearly determined, but several factors are believed to play a role in its development, including androgen hypersecretion, increased sebum secretion, increased numbers of *Propionibacterium acnes,* microcomedone formation through hyperkeratosis, and escalation of the inflammatory response (Teresa, 2020).

The pathogenesis of *acne vulgaris* involves four elements: hyperproliferation of the pilosebaceous follicle, excessive sebum production, inflammation, and colonization by *Propionibacterium acnes*. The interaction between these factors contributes to the formation of acne. As the most common skin condition in adolescence, *acne vulgaris* affects about 85% of adolescents with varying degrees of severity, and usually appears for the first time at the age of 15-18 years, without distinguishing between males and females (Ayudianti & Indramaya, 2014).

Acne vulgaris can be influenced by a number of factors, such as genetic aspects, environmental conditions, hormonal changes, emotional stress, diet, trauma, use of cosmetic products, and consumption of medications (Kucharska et al., 2016; Lonah et al., 2024). Many patients have tried various types of therapies and medications, but often do not get the expected improvement (Ayudianti & Indramaya, 2014).

With the advancement of time, the habit of consuming coffee has developed into a widespread trend, especially in urban areas, as seen from the increase in caffeinated coffee consumption. Coffee has become one of the most popular beverages among Indonesians and internationally, alongside milk and tea (Szántó et al., 2019). As the variety and types of coffee have developed, the number of individuals who make coffee consumption part of their daily routine has continued to increase. In addition, coffee is popular among various age groups, from teenagers to adults to the elderly. This phenomenon also occurs in various other countries, where most of the population has an interest in coffee (Putri & Suwanto, 2024).

Several recent studies have explored the potential link between coffee consumption and *acne vulgaris*, yielding conflicting results. Research by Nieber (2017) demonstrated that coffee contains polyphenol compounds with antioxidant properties that may inhibit pathogenic bacterial growth, suggesting a potentially protective effect against acne. Conversely, Rodak et al. (2021) highlighted that caffeine can disrupt sleep patterns and elevate androgen hormone levels, which are known contributors to acne development. More recently, Natasha et al. (2024) found that the type of coffee consumed matters significantly: black coffee showed negative correlation with acne severity due to its antioxidant and anti-inflammatory properties, while coffee beverages mixed with milk and sugar demonstrated positive correlation with acne severity, attributed to increased insulin-like growth factor-1 (IGF-1) and high glycemic index effects. Achmad et al. (2024) reported no significant association between coffee consumption patterns and *acne vulgaris* severity (p=0.106), suggesting that the relationship may be more complex than previously understood.

Despite growing interest in diet-acne relationships, a significant research gap remains regarding the specific effects of coffee consumption on acne severity in Indonesian university student populations. Most existing studies have focused on Western populations or general adult cohorts, with limited attention to young adults in academic settings who constitute high coffee consumers due to academic pressures and lifestyle factors. Furthermore, previous research has predominantly examined coffee consumption as a binary variable (consumer vs. non-consumer) rather than assessing consumption frequency and quantity, which may mask important dose-response relationships.

The novelty of this study lies in its comprehensive assessment of coffee consumption patterns using validated Food Frequency Questionnaire (FFQ) methodology combined with standardized Global Acne Grading System (GAGS) evaluation among Indonesian medical students—a population characterized by high stress levels and elevated coffee consumption. This research contributes to the existing body of knowledge by: (1) providing region-specific data on coffee-acne relationships in Indonesian university contexts, (2) employing standardized and validated assessment tools for both exposure and outcome variables, (3) examining coffee consumption across multiple frequency categories rather than binary classification, and (4) generating baseline data that can inform evidence-based dietary counseling for acne management in young adult populations. Understanding this relationship has practical implications for developing targeted lifestyle modification strategies and patient education materials for university students suffering from *acne vulgaris*.

Based on the background described above, this study addresses the following research question: What is the effect of coffee consumption on the severity of *acne vulgaris* in students of the Faculty of Medicine, Universitas Prima Indonesia? The general objective of this study

is to determine the effect of coffee consumption on the severity of *acne vulgaris* in college students. Specifically, this research aims to: (1) analyze the relationship between coffee consumption frequency and the severity of *acne vulgaris*, and (2) contribute to increased community awareness regarding healthy coffee consumption patterns and their potential dermatological effects.

This research provides several important benefits. For researchers, it enhances understanding and knowledge regarding the relationship between coffee consumption and *acne vulgaris* severity through systematic empirical investigation. For healthcare providers and dermatologists, the findings contribute to the development of evidence-based *acne vulgaris* prevention strategies and dietary counseling approaches. For the academic community and future researchers, this study serves as a foundational reference and methodological guide for subsequent investigations exploring diet-skin health relationships in university populations.

METHOD

This study was based on an analytical observational design using a cross-sectional method, in which a single measurement was applied to respondents according to the inclusion and exclusion criteria. The research was conducted from March 2025 to May 2025 at the Faculty of Medicine, Universitas Prima Indonesia.

The target population consisted of students of the Faculty of Medicine, Universitas Prima Indonesia. The accessible population included students from the 2022–2024 cohorts who suffered from *acne vulgaris*. The sampling technique used in this study was purposive sampling, where respondents were selected based on specific criteria. The instruments used in the study were the Food Frequency Questionnaire (FFQ) and the Global Acne Grading System (GAGS) questionnaire.

The inclusion criteria were students of the Faculty of Medicine, Universitas Prima Indonesia, classes of 2022–2024; aged 17–19 years; and willing to participate in the study. The exclusion criteria included a history of menstrual dysfunction, a history of hormonal disorders, the use of oral medication for *acne vulgaris*, and failure to complete the questionnaire in full.

Data processing in this study was performed using SPSS software version 27. The data collected were analyzed using the Chi-square test to evaluate the relationship between independent and dependent variables. Ethical aspects applied in this study included ethical clearance from Universitas Prima Indonesia and the private collection of all obtained data. The researcher obtained informed consent from all respondents before they began completing the questionnaire as a sign of legal approval.
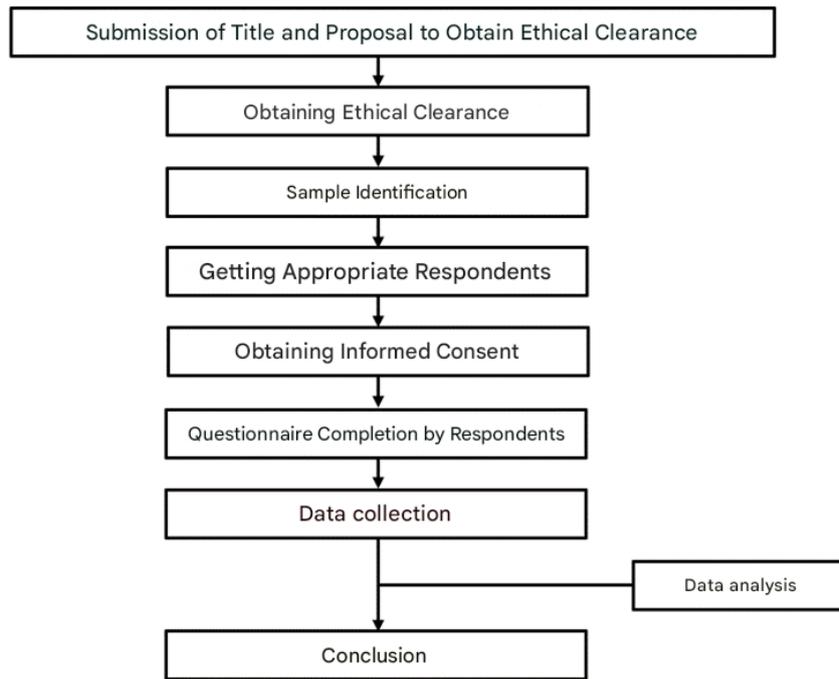
Figure 1. Research Flow

RESULTS AND DISCUSSION

This study was conducted at Prima Indonesia University, a private university located in North Sumatra. The main objective of this study was to understand the association between coffee drinking habits and the severity of *acne vulgaris* in male and female students of the Faculty of Medicine at Prima Indonesia University from the 2022-2024 cohorts who suffered from *acne vulgaris*. In this study, the sampling technique used was *purposive sampling,* with a selection process that followed specific criteria. The research was conducted from March 2025 to May 2025, with 30 female students from the 2022-2024 batch of the Faculty of Medicine as respondents.

Univariate Results

Description of Respondent Characteristics Based on Gender

Information regarding respondent characteristics was collected from a gender perspective. Through univariate analysis or frequency distribution, the following data on respondent characteristics from the Faculty of Medicine, class of 2022-2024, is presented.

Table 1. Frequency Distribution of Respondents Based on Gender

Gender	Frequency (n)	Percentage
Female	21	70
Male	9	30
Total	30	100

From the study of 30 respondents regarding gender, it was found that the female group dominated with 21 people (70%), followed by 9 men (30%).

Description of Respondent Characteristics Based on Coffee Consumption

Data collection on respondent characteristics focused on coffee consumption. By applying a univariate test through frequency distribution, the data profile of respondents from the Faculty of Medicine Class of 2022-2024 can be seen below.

Table 2. Frequency Distribution of Respondents Based on Coffee Consumption

Coffee Consumption Frequency	Frequency (n)	Percentage
None	2	6.7%
Light	4	13.3
Moderate	17	56.7
Heavy	4	13.3
Very Heavy	3	10.0
Total	30	100

A study of 30 student respondents revealed the following patterns of coffee consumption frequency: 2 people (6.7%) did not consume coffee at all, 4 people (13.3%) consumed coffee at a light level, 17 people (56.7%) consumed coffee at a moderate level, 4 people (13.3%) consumed coffee at a heavy level, and 3 people (10.0%) consumed coffee at a very heavy level. Thus, it can be concluded that most students consume coffee at a moderate frequency, i.e., 2-6 times/week or 50-200 mg of caffeine/day.

Description of Respondent Characteristics Based on Acne Severity

Data collection on respondent characteristics based on acne severity. The results of univariate analysis using frequency distribution produced data on the characteristics of respondents from the Faculty of Medicine, Class of 2022-2024, as listed below:

Table 3. Frequency Distribution of Respondents Based on Acne Severity Level

Severity of Acne	Frequency (n)	Percentage
Low	18	60.0%
Moderate	6	20.0
High	3	10
Very High	3	10
Total	30	100

Based on the results of a study of 30 respondents among students, 18 people (60.0%) had mild acne, 6 people (20.0%) had moderate acne, 3 people (10.0%) had severe acne, and 3 people (10.0%) had very severe acne. Thus, it can be concluded that most students experience low acne severity with a frequency of 18 people (60.0%).

Bivariate Results

This data was obtained through a chi-square-based bivariate test, which aimed to identify the presence or absence of an association between the independent variable (coffee consumption) and the dependent variable (acne severity).

Table 4. Bivariate Analysis of the Relationship Between Coffee Consumption and Acne Severity

Coffee Consumption	Severity of Acne										P value
	Low		Moderate		High		Very High		Total		
	F	%	F	%	F	%	F	%	F	%	
No	1	3.3	1	3.3	0	0	0	0	2	6.7	
Lightweight	4	13.3	0	0	0	0	0	0	4	13.3	0.057
Moderate	11	36.7	4	13.3	2	6.7	0	0	17	56.7	
Weight	2	11.1	0	0	1	33.3	1	33.3	3	13.3	
Very Heavy	0	0	1	33.3	0	0	2	6.7	4	10.0	
Total	18	60.0	6	20.0	3	10.0			30	100	

The significance value or p-value obtained was 0.057 (>0.05), so it can be concluded that there is no significant relationship between coffee consumption habits and the severity of acne among medical students enrolled in the 2022-2024 academic year.

Discussion

The high level of coffee consumption among students of the Faculty of Medicine Class of 2022-2024 is influenced by several factors characteristic of medical education environments. The intensive academic workload, with numerous assignments requiring completion within tight deadlines, drives many students to work overnight while consuming coffee to maintain alertness and cognitive performance. Additionally, the social culture among medical students frequently involves gathering at cafes, where coffee consumption becomes intertwined with peer socialization and academic collaboration. Many students deliberately consume coffee with the explicit goal of increasing stamina, reducing drowsiness, and enhancing concentration during extended study sessions—particularly during examination periods when sleep deprivation is common. This pattern of coffee consumption as a functional beverage for academic performance enhancement has been documented in similar university populations globally, reflecting the adaptive behaviors of students facing high cognitive demands.

The results of the chi-square-based bivariate test revealed that coffee consumption is not related to the severity of acne, as the p-value reached 0.057. This confirms that there is no significant link between the two factors. Of the total 30 people observed, most (17 people) were categorized as moderate coffee consumers, with most of them (11 people) showing mild acne to a mild degree.

This study is consistent with the findings of Achmad's (2024) study, in which the analysis evaluation showed no significant association between coffee consumption patterns and the severity of *acne vulgaris*, with a p-value of 0.106 (>0.05). This implies that there is no propensity for students who consume coffee to experience severe *acne vulgaris*, nor is there a pattern that those who do not consume coffee will be spared from *acne vulgaris*. The reason may be that coffee contains polyphenol compounds that function as antioxidants and can inhibit the growth of pathogenic bacteria. In addition, other dietary factors that can cause acne, such as fatty foods, can also influence the process of acne development. (Achmad et al., 2024)

According to Natasha's research (2024), this study found that the type of coffee, between black coffee and mixed coffee drinks, has a significant effect on the severity of acne. Black coffee consumption has a negative correlation with the severity of acne, while coffee

Jaqueline Francetta*, Herlin Novita Pane, Muhammad Chairul

beverages have a positive correlation with the severity of acne. Antioxidants, anti-inflammatories, and antimicrobials can be found in coffee, and the polyphenols in coffee can reduce oxidative stress by neutralizing free radicals. In short, the contents of coffee can affect the severity of acne. Conversely, coffee beverages are influenced by additives such as milk, which increases IGF-1 (stimulating several keratinocyte proliferation factors and sebum production), and sweeteners such as sugar, which are associated with a high glycemic index that has been shown to worsen acne (stimulating an increase in IGF-1, which causes an increase in androgenic stimulation and sebum production) (Natasha et al., 2024).

Coffee contains a compound called caffeine which is a bioactive substance that has been hypothesized to potentially trigger *acne vulgaris* through several physiological mechanisms. Excessive caffeine consumption can interfere with sleep architecture and quality, leading to sleep deprivation—a condition that stimulates increased production of stress hormones including cortisol and androgens, which are well-established factors contributing to sebum overproduction and acne exacerbation. However, the current study's findings suggest that at moderate consumption levels typical of this student population, such effects may not manifest clinically significant impacts on acne severity. It is important to recognize that *acne vulgaris* is fundamentally a multifactorial condition influenced by numerous interacting variables including genetic predisposition (which determines individual susceptibility to hormonal fluctuations and inflammatory responses), hormonal fluctuations (particularly androgens that stimulate sebaceous gland activity), bacterial colonization by Propionibacterium acnes (which triggers inflammatory cascades), cosmetic product usage (which may cause comedogenic occlusion), sebum production rates (influenced by both genetic and environmental factors), and psychological stress (which affects hormone levels and immune function). The complex interplay among these diverse factors means that isolating the independent effect of any single dietary component, including coffee, presents substantial methodological challenges and may require larger sample sizes and more sophisticated analytical approaches than employed in the current study.

From a public health perspective, these findings have several important implications for university students and young adults concerned about acne management. First, moderate coffee consumption (2-6 times per week or 50-200 mg caffeine daily) does not appear to significantly worsen acne severity, suggesting that students need not eliminate coffee entirely from their diets for acne control. However, students should be counseled to consider the type of coffee consumed—favoring black coffee over heavily sweetened or milk-based coffee beverages, which may have adverse effects through high glycemic load and IGF-1 stimulation. Second, healthcare providers and dermatologists should adopt a holistic approach to acne counseling that addresses multiple modifiable risk factors simultaneously, including overall dietary quality (emphasizing low glycemic index foods, reduced dairy intake), stress management techniques, adequate sleep hygiene, and appropriate skincare practices, rather than focusing narrowly on single dietary items like coffee. Third, university health services should develop comprehensive acne prevention and management programs tailored to the unique lifestyle characteristics and stressors of medical students, recognizing that academic pressures, irregular sleep patterns, and dietary habits collectively influence skin health.

Future research directions should address several important gaps identified by this study. First, larger prospective cohort studies with extended follow-up periods are needed to

examine potential dose-response relationships and temporal patterns between coffee consumption and acne development. Second, studies should systematically differentiate between types of coffee beverages (black coffee vs. coffee with various additives) and account for preparation methods, which may significantly influence the bioavailability of protective compounds. Third, future investigations should employ multivariate analytical approaches that simultaneously assess multiple dietary factors (glycemic load, dairy intake, fatty acid composition), lifestyle variables (sleep quality, stress levels, physical activity), and genetic markers to better understand the complex etiology of *acne vulgaris*. Fourth, intervention studies examining the effects of dietary modification, including specific changes in coffee consumption patterns, on acne outcomes would provide stronger evidence for causality than the cross-sectional design employed here. Finally, research should explore potential gene-diet interactions that may explain individual variability in response to dietary factors like coffee, potentially enabling personalized dietary recommendations for acne management in the future.

CONCLUSION

The analysis of coffee consumption and acne severity among 30 medical students from the 2022–2024 cohort showed that most respondents were moderate coffee consumers, and the majority experienced mild *acne vulgaris*. Statistical testing (p = 0.057, >0.05) indicated no significant relationship between coffee intake and acne severity, suggesting that moderate coffee consumption was not a major factor influencing acne in this population. However, due to the study's limited sample size, cross-sectional design, and lack of detail on different coffee types, the findings should be interpreted with caution. Future research should involve larger, longitudinal samples and incorporate variables such as coffee composition, dietary habits, stress, sleep, and hormonal influences to gain a more comprehensive understanding of how these factors interact in the development of *acne vulgaris*.

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