

Evaluating the Association Between Dairy Consumption, Acne Development and Quality of Life Among University Students

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ABSTRACT

Background: Acne vulgaris is one of the most prevalent dermatological conditions among adolescents and young adults, often impairing self-esteem, social relationships, and quality of life. Dietary factors, particularly dairy intake, have been suggested to contribute to acne, although findings remain inconsistent. This study aimed to evaluate the association between dairy consumption, acne severity, and quality of life among the students of the International Islamic University Malaysia (IIUM). **Methods:** A cross-sectional study was conducted among 377 undergraduate students from three IIUM campuses. Data were collected using a self-administered questionnaire comprising a modified Food Frequency Questionnaire (FFQ) for dairy intake, the Global Acne Grading System (GAGS) for acne severity, and the Acne-Specific Quality of Life (Acne-QoL) questionnaire. Spearman's rank correlation was performed to determine associations between variables. **Results:** The mean daily dairy intake among students was 470.68 ± 183.88 g/day. Yoghurt and fresh milk were the most consumed dairy products. No significant association was found between overall dairy intake, fresh milk, yoghurt, or cheese with acne severity. However, commercial milk, powdered milk, and evaporated milk showed a significant positive correlation with acne severity ($p < 0.005$). Regarding quality of life, acne severity was negatively correlated with all four Acne-QoL domains (self-perception, role-social, role-emotional, and acne symptoms), with the strongest correlation observed in the acne symptoms domain. **Conclusion:** This study suggests that certain forms of dairy, particularly commercial, powdered, and evaporated milk, may contribute to acne severity among university students. Acne was also found to adversely affect multiple domains of quality of life. These findings highlight the importance of dietary counselling and holistic acne management strategies for young adults. Further research considering additional lifestyle and genetic factors is warranted.

Keywords:

Acne vulgaris; dairy consumption; university students; quality of life

INTRODUCTION

Acne vulgaris is a prevalent chronic inflammatory skin disease that commonly affects adolescents and young adults worldwide. It is characterised by comedones, papules, pustules, and nodules, which develop due to follicular hyperkeratinisation, increased sebum production, colonisation by *Cutibacterium acnes*, and inflammation (Xu et al., 2024). While acne is often considered a temporary cosmetic issue, it can have significant consequences on self-esteem, social interaction, and psychological well-being, particularly among university students navigating a critical stage of academic and personal development (Tan et al., 2022; Natali et al., 2023). Several factors contribute to acne pathogenesis, including genetics, hormones, stress, and environmental influences.

Diet has increasingly been recognised as a modifiable risk factor. High glycaemic index diets, refined sugars, and unhealthy fat intake have been associated with increased acne prevalence (Huang et al., 2018; Podgórska et al., 2021). In particular, dairy products have received growing attention due to their hormonal content and bioactive compounds. Milk and its derivatives contain insulin-like growth factor-1 (IGF-1), androgens, and progesterone, which can stimulate sebaceous gland activity, keratinocyte proliferation, and sebum production, thereby contributing to acne development (Aalemi et al., 2019).

The literature, however, remains inconclusive. Meta-analyses suggest a significant association between dairy intake, especially milk and acne (Aghasi et al., 2019), while other studies report no such correlation (Juhl et al., 2018). Differences in the study design, sample characteristics, and dietary patterns may account for these inconsistencies. Furthermore, different dairy types

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appearto exert varying effects. For instance, low-fat milk has been more strongly linked with acne than whole milk, potentially due to higher IGF-1 levels and increased insulin response (González-Mondragón et al., 2022). Conversely, fermented dairy products such as yoghurt may have beneficial effects on the skin due to their probiotic content, although results remain mixed (Aslam & Younas, 2020).

Beyond its physical manifestations, acne significantly impairs quality of life. Affected individuals often report poor self-perception, emotional distress, and social withdrawal, which can lead to reduced academic performance and psychosocial well-being (Mehra et al., 2023; Pourramzani et al., 2024). University students, in particular, are vulnerable due to lifestyle factors such as stress, irregular sleep, and changing eating habits, which may exacerbate acne and its psychological impact. Despite this, limited research has explored the link between acne and quality of life in Malaysian populations, where dietary habits reflect both traditional and Western influences.

Given the scarcity of local evidence and the inconsistent findings globally, further research is needed to clarify the role of dairy consumption in acne development and its subsequent effect on students' well-being. Therefore, this study aimed to evaluate the association between dairy intake and acne severity, as well as to examine how acne influences the quality of life among students at the International Islamic University Malaysia (IIUM).

MATERIALS AND METHODS

Study Design and Setting

A cross-sectional study was conducted among undergraduate students at the International Islamic University Malaysia (IIUM). Data collection was conducted across three campuses: Gombak (Kuala Lumpur), Kuantan (Pahang), and Pagoh (Johor).

Participants and Sampling

The study population comprised undergraduate students from various kulliyahs and academic years. Postgraduate, foundation students, and those undergoing medical treatment for acne (e.g., antibiotics, retinoids, hormonal therapy), as well as students with lactose intolerance or dairy allergies, were excluded. Using Krejcie and Morgan's (1970) sampling table, a representative sample of 377 students was recruited through convenience sampling.

Ethical Approval

Ethical approval was obtained from the IIUM Research Ethical Committee (IREC) and the Kulliyah Postgraduate and Research Committee (KPGRC). Written informed consent was obtained from all participants, and confidentiality was maintained throughout the study.

Data Collection Instruments

Data were gathered through a self-administered online questionnaire consisting of four sections:

1. Sociodemographic Information – age, gender, kulliyah, campus, and year of study.
2. Dairy Consumption – assessed using a modified Food Frequency Questionnaire (FFQ) adapted from the Malaysian Adult Nutrition Survey 2014. The FFQ captured the frequency and portion sizes of six main dairy products: fresh milk, commercial milk, powdered milk, evaporated milk, yoghurt, and cheese. Mean daily intake (grams/day) was calculated using standard conversion factors (Norimah, et al., 2008).
3. Acne Severity – measured using the Global Acne Grading System (GAGS), which scores acne lesions across six anatomical regions (forehead, cheeks, nose, chin, chest, and upper back). Scores range from 0 (none) to >39 (very severe), and severity is categorised as mild, moderate, severe, or very severe (Gorelick et al., 2015).
4. Quality of Life – assessed using the validated Acne-Specific Quality of Life (Acne-QoL) questionnaire, covering four domains: self-perception, role-social, role-emotional, and acne symptoms. Items were scored on a 7-point Likert scale, with higher scores indicating less impairment (Gupta, 1998).

Pilot Study

A pilot test with 30 students was conducted to assess the reliability and clarity of the instruments. Cronbach's alpha values were acceptable for the Acne-QoL ($\alpha = 0.90$), while the FFQ and GAGS showed lower internal consistency ($\alpha = 0.30$). The relatively low value could be explained by the sensitivity of Cronbach's alpha to both sample size and the number of items, since the FFQ and GAGS consist of only a limited number of questions. No modifications were made, as both are widely validated tools in the fields of nutrition and dermatology research.

Statistical Analysis

Data were analysed using SPSS version 29. Descriptive statistics were used for sociodemographic data, dairy intake, acne severity, and quality of life scores. Normality testing indicated skewed distribution; thus, non-parametric tests were applied. Spearman's rank correlation was used to determine the association between dairy intake and acne severity, and the association between acne severity and quality of life domains. A p-value of <0.05 was considered statistically significant

RESULTS

Sociodemographic Characteristics

A total of 377 students participated in the study. The majority were female (82.5%), Malay (98.4%), and aged between 21–23 years (71.1%). Most were from the Kuantan campus (64.7%) and enrolled in the Kulliyah of Allied Health Sciences (38.2%).

Dairy Consumption

The mean total dairy intake was 470.68 ± 183.88 g/day. Among the six categories, yoghurt (57.46 ± 103.21 g/day) and fresh milk (53.69 ± 96.83 g/day) were the most consumed items, whereas cheese (10.94 ± 20.80 g/day) had the lowest intake (Table 1).

Table 1: Mean Daily Dairy Intake (g/day)

Dairy product	Mean \pm SD
Fresh milk	53.69 ± 96.83
Commercial milk	23.14 ± 39.63
Yoghurt	57.46 ± 103.21
Powdered milk	15.51 ± 48.18
Evaporated milk	21.37 ± 43.65
Cheese	10.94 ± 20.80
Total dairy intake	470.68 ± 183.88

Acne Severity

The mean GAGS score was 10.42 ± 6.97 , which falls within the mild acne category. The right cheek had the highest mean score (2.30 ± 2.21), followed closely by the left cheek (2.25 ± 2.15). The chin and nose showed relatively lower mean values (1.06 ± 1.15 and 0.90 ± 0.65 , respectively) (Table 2).

Table 2: Descriptive analysis of Global Acne Grading System (GAGS)

Region	Mean \pm SD
Forehead	1.82 ± 2.07
Right cheek	2.30 ± 2.21
Left cheek	2.25 ± 2.15
Nose	0.90 ± 0.65
Chin	1.06 ± 1.15
Chest and upper back	2.08 ± 2.80
Total acne severity score	10.42 ± 6.97

Quality of Life

The Acne-QoL scores indicated that acne had the most impact on the acne symptoms domain (20.90 ± 5.63), followed by self-perception (19.91 ± 8.50), role-emotional (19.73 ± 8.73), and role-social (17.92 ± 6.73).

Association Between Dairy Intake and Acne Severity

Spearman's correlation showed no significant association between total dairy intake, fresh milk, yoghurt, or cheese with acne severity. However, commercial milk ($r = 0.103$, $p = 0.045$), powdered milk ($r = 0.114$, $p = 0.026$), and evaporated milk ($r = 0.173$, $p = 0.001$) were significantly and positively correlated with acne severity (Table 3).

Table 3: Spearman correlation between dairy intake and acne severity

Dairy product	r	p-value
Fresh milk	0.086	0.095
Commercial milk	0.103	0.045*
Yoghurt	0.033	0.528
Powdered milk	0.114	0.026*
Evaporated milk	0.173	0.001*
Cheese	0.080	0.123
Total dairy intake	0.082	0.110

Association Between Acne Severity and Quality of Life

Acne severity was negatively correlated with all Acne-QoL domains. There was a statistically significant moderate negative correlation between acne severity and the domain self-perception ($r = -0.456$, $p < 0.001$), the role emotional domain ($r = -0.454$, $p < 0.001$), the role social domain ($r = -0.369$, $p < 0.001$), and the acne symptoms domain ($r = -0.602$, $p < 0.001$) (Table 4).

Table 4: Spearman correlation between acne severity and Acne-QoL domains

Dairy product	r	p-value
Self-perception	-0.456	0.001*
Role emotional	-0.454	0.001*
Role social	-0.369	0.001*
Acne symptoms	-0.602	0.001*

DISCUSSION

Dairy Consumption and Acne Severity

The mean daily dairy intake among participants was comparable to values reported in previous Malaysian dietary surveys (MOH, 2014), suggesting that students maintain a moderate level of dairy consumption. Consistent with prior studies, yoghurt and fresh milk were the most consumed items (Aslam & Younas, 2020). Despite the high intake, neither fresh milk nor yoghurt demonstrated significant associations with acne severity in this study. This aligns with findings from Juhl et al. (2018), who reported no direct link between overall milk intake and acne among young adults in Denmark. Additionally, according to the Malaysian Dietary Guidelines (MDG 2020), adults are encouraged to consume 2 to 3 servings of milk and milk products daily, equivalent to approximately 400 to 600 g per day of dairy foods such as milk, yoghurt, or cheese (Ministry of Health Malaysia, 2020).

Interestingly, only specific dairy subtypes, which are commercial milk, powdered milk, and evaporated milk, were associated with acne severity. These results echo those of Aghasi et al. (2019), who found that skimmed and processed milk products were more strongly correlated with acne compared to whole milk. One possible explanation lies in the processing methods of these dairy products. Powdered milk and evaporated milk undergo high-temperature processing, which may alter the protein structure and increase insulinotropic effects, thereby enhancing insulin-like growth factor-1 (IGF-1) activity. Elevated IGF-1 stimulates sebaceous gland proliferation and sebum production, both of which are key contributors to acne pathogenesis.

Commercially produced milk, often fortified and homogenised, may also contain residual hormones and higher levels of whey proteins, which have been shown to elevate insulin and IGF-1 responses (Aghasi et al., 2019). By contrast, yoghurt, as a fermented product, may exert a protective effect due to the presence of probiotics, which modulate gut microbiota and systemic inflammation. The lack of significant association between yoghurt and acne severity in this study could therefore be attributed to its counteractive properties, although further research is warranted.

Consistent with previous findings (Mehra et al., 2023; Pourramzani et al., 2024), this study found that acne severity was negatively correlated with all domains of the Acne-QoL. The strongest correlation was observed with acne symptoms, indicating that the physical manifestations of acne were perceived as the most distressing aspect for students. This is consistent with Natali et al. (2023), who highlighted that visible lesions and scarring strongly impair quality of life in young adults.

The negative correlation with self-perception and role-social domains underscores the impact of acne on self-image and social relationships. Students with higher acne severity reported poorer confidence, avoidance of social gatherings, and heightened self-consciousness, findings that align with reports from Europe and the Middle East (Machala-Cwikla et al., 2024; Aalemi et al., 2019). Additionally, the significant correlation with the role-emotional domain suggests that acne contributes to mood disturbances, irritability, and feelings of embarrassment, further emphasising the multifaceted burden of the condition.

The results of this study partially support the hypothesis that dairy intake is associated with acne, though only for specific dairy products. While several studies in Western populations have linked all forms of milk to acne risk (Aghasi et al., 2019; González-Mondragón et al., 2022), the present findings suggest that Malaysian students may respond differently, potentially due to differences in dietary habits, dairy processing methods, and genetic predispositions. The higher consumption of yoghurt and traditional dairy products in Malaysia may mitigate acne severity compared to populations with higher reliance on processed dairy.

The quality-of-life findings are consistent across international literature, reinforcing the global nature of acne's psychosocial burden. However, the magnitude of impairment may vary depending on cultural perceptions of beauty and societal pressure. In collectivist cultures such as Malaysia, where physical appearance plays a role in social acceptance, acne may disproportionately affect students' self-esteem and social functioning (Tan et al., 2022).

Strengths and Limitations

A key strength of this study lies in its relatively large sample size (N = 377), covering students from three different campuses, which enhances representativeness. The use of

validated tools (FFQ, GAGS, and Acne-QoL) also strengthens reliability. Importantly, the study distinguishes between different types of dairy, providing nuanced insights often overlooked in previous research.

However, limitations must be acknowledged. The cross-sectional design prevents causal inference, as the temporal relationship between dairy intake and acne cannot be established. Dietary data were self-reported, which may introduce recall bias. Additionally, other dietary and lifestyle factors such as glycaemic load, stress, and sleep patterns were not measured, though they may confound the observed associations. Finally, the predominance of female participants (82.5%) may limit generalisability to male students.

CONCLUSION

This study found that while overall dairy consumption was not significantly associated with acne severity among IIUM students, specific processed dairy products namely commercial milk, powdered milk, and evaporated milk showed a positive correlation with acne severity. In contrast, fresh milk, yoghurt, and cheese demonstrated no significant associations. Additionally, acne severity was found to negatively impact students' quality of life across all domains, with the strongest effect observed in the acne symptoms domain, followed by self-perception, social roles, and emotional well-being.

These findings suggest that dietary counselling for acne management should emphasise moderation of processed dairy products, while recognising that fermented products such as yoghurt may not exert the same adverse effects. Furthermore, acne management should adopt a holistic approach, addressing both physical symptoms and the psychological burden experienced by students.

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REFERENCES

Aalemi, A. K., Anwar, I., & Chen, H. (2019). Dairy consumption and acne: A case control study in kabul, afghanistan. *Clinical, Cosmetic and Investigational Dermatology*, 12, 481–487. <https://doi.org/10.2147/CCID.S195191>

Aghasi, M., Golzarand, M., Shab-Bidar, S., Aminianfar, A.,

Omidian, M., & Taheri, F. (2019). Dairy intake and acne development: A meta-analysis of observational studies. *Clinical Nutrition*, 38(3), 1067–1075. <https://doi.org/10.1016/j.clnu.2018.04.015>

Aslam, M., & Younas, M. (2020). Association Between Dietary Practices and Acne in Young Adults; A Review. *Journal of Dermatology Research Reviews & Reports*, 1–8. [https://doi.org/10.47363/JDMRS/2020\(1\)114](https://doi.org/10.47363/JDMRS/2020(1)114)

González-Mondragón, E. A., Ganoza-Granados, L. D. C., Toledo-Bahena, M. E., Valencia-Herrera, A. M., Duarte-Abdala, M. R., Camargo-Sánchez, K. A., & Mena-Cedillos, C. A. (2022). Acne and diet: a review of pathogenic mechanisms. *Boletín Médico Del Hospital Infantil de México*, 79(2), 83–90. <https://doi.org/10.24875/BMHIM.21000088>

Gorelick, J., Daniels, S. R., Kawata, A. K., Degboe, A., Wilcox, T. K., Burk, C. T., & Douse-Dean, T. (2015). Acne-Related Quality of Life Among Female Adults of Different Races/Ethnicities. *Journal of the Dermatology Nurses' Association*, 7(3), 154–162. <https://doi.org/10.1097/JDN.000000000000129>

Gupta, M. A., Johnson, A. M., & Gupta, A. K. (1998). The development of an Acne Quality of Life scale: reliability, validity, and relation to clinical severity. *British Journal of Dermatology*, 139(3), 435–440.

Huang, X., Zhang, J., Li, J., Zhao, S., Xiao, Y., Huang, Y., Jing, D., Chen, L., Zhang, X., Su, J., Kuang, Y., Zhu, W., Chen, M., Chen, X., & Shen, M. (2018). Daily Intake of Soft Drinks and Moderate-to-Severe Acne Vulgaris in Chinese Adolescents Article In Press The Journal Of Pediatrics • www.jpeds.com. *The Journal of Pediatrics*. <https://doi.org/10.1016/j.jpeds>

Juhl, C. R., Bergholdt, H. K., Miller, I. M., Jemec, G. B., Kanters, J. K., Ellervik, C., & Johansen, J. D. (2018). Dairy intake and acne vulgaris: A systematic review and meta-analysis of observational studies. *Nutrients*, 10(8), 1049. <https://doi.org/10.3390/nu10081049>

Machała-Ćwikła, E., Ćwikła, P., Zdziebło, P., Łapińska, U., Machała, K., & Machała, D. (2024). Acne vulgaris in the age of social media. *Our Dermatology Online*, 15(e), e42–e42. <https://doi.org/10.7241/ourd.2024e.42>

Mehra, A., Kamat, D., Narang, T., Avasthi, A., Sahoo, S., & Grover, S. (2023). Psychological Morbidity and Body Dysmorphic Disorder among Patients with Acne. *Journal of Mental Health and Human Behaviour*, 28(2), 154–161. https://doi.org/10.4103/jmhbb.jmhbb_123_23

Ministry of Health Malaysia. (2020). *Malaysian Dietary Guidelines 2020*. Putrajaya: National Coordinating Committee on Food and Nutrition, Ministry of Health Malaysia.

Ministry of Health Malaysia (MOH). (2014). *Malaysian Adult Nutrition Survey (MANS) 2014: Volume 1:*

- Methodology and General Findings*. Institute for Public Health, Ministry of Health Malaysia.
- Natali, O., Ayu Athifa Serena, P., & Sari Mutia, M. (2023). The Relationship Between the Severity of Acne Vulgaris and the Quality of Life of Prima Indonesia University Medical Faculty Students. *International Journal of Social Health*, 2(11), 846–855. <https://doi.org/10.58860/ijsh.v2i11.123>
- Norimah AK, Safiah M, Jamal K, Haslinda S, Zuhaida H, Rohida S, et al. Food consumption patterns: findings from the Malaysian Adult Nutrition Survey (MANS). *Mal J Nutr*. 2008;14:25–39.
- Podgórska, A., Puścion-Jakubik, A., Markiewicz-żukowska, R., Gromkowska-Kępką, K. J., & Socha, K. (2021). Acne vulgaris and intake of selected dietary nutrients— a summary of information. In *Healthcare (Switzerland)* (Vol. 9, Issue 6). MDPI AG. <https://doi.org/10.3390/healthcare9060668>
- Pourramzani, A., Nejad, K. G., & Ghavami, S. S. (2024). Evaluation of the feelings of loneliness and suicidal thoughts in individuals with acne vulgaris. *Iranian Journal of Dermatology*, 27(2), 67–74. <https://doi.org/10.22034/ijd.2024.421679.1768>
- Tan, J., Beissert, S., Cook-Bolden, F., Chavda, R., Harper, J., Hebert, A., Lain, E., Layton, A., Rocha, M., Weiss, J., & Dréno, B. (2022). Evaluation of Psychological Wellbeing and Social Impact of Combined Facial and Truncal Acne: a Multi national, Mixed-Methods Study. *Dermatology and Therapy*, 12(8), 1847–1858. <https://doi.org/10.1007/s13555-022-00768-0>
- Xu, W., Zhang, Y., Sinaki, D. G., Zhang, Z., Tang, Y., & Chen, Y. (2024). Acne-induced pathological scars: pathophysiology and current treatments. In *Burns and Trauma* (Vol. 12). Oxford University Press. <https://doi.org/10.1093/burnst/tkad060>