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Research Article

Epidemiology of Acne vulgaris and its Link to Lifestyle among Adolescents and Young Adults

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Abstract

Background: This study was undertaken to investigate the epidemiology of acne vulgaris and its possible link with lifestyle among adolescents and young individuals from the central region of Saudi Arabia.
Methods: The data were collected from 388 acne patients using an administration questionnaire. The data were analyzed in terms of frequencies, percentages, and Chi-squared tests. Questionnaire reliability (Cronbach's alpha) was checked on 30 randomly selected patients.
Results: Age of onset for acne in the majority of the participants (32.2%) was in between 16-17 years. Most of the study participants did not follow the keto, low carbohydrates, or any other special diet system (89.4%, 83.8%, and 80.4% of the study participants). Participants reported following other specific diet systems (other than keto or low-carb diet); noticed that their acne became better. 22% reported that they were suffering from polycystic ovarian disease and 3.1% suffered from some other endocrine disease. 5.9% of participants responded that they were suffering from a mental illness with the majority (13%) having depression.
Conclusions: Nutritional habits have an effect on acne. Bread, sweetened beverages, coffee, rice, and salty foods were the most reported foods by acne patients. Moreover, acne is associated with psychological conditions such as depression.

INTRODUCTION

Acne vulgaris is a common skin condition that affects millions of people worldwide. It is characterized by the presence of pimples, blackheads, whiteheads, and other types of lesions on the face, chest, and back. While acne is most commonly associated with adolescence, it can affect individuals of all ages, from infants to adults (Karadağ et al., , 2019). Understanding the epidemiology of acne is important for healthcare professionals as it helps inform prevention strategies and treatment interventions (Karadağ et al., , 2019; Heng et al., 2020). The prevalence of acne varies across different populations and is influenced by various factors such as age, sex, ethnicity, and environmental factors (Yang et al., 2020). In general, acne is more common during adolescence, with the majority of cases occurring during the teenage years. Studies have shown that acne affects up to 85% of teenagers, making it one of the most prevalent dermatological conditions in this age group (Karadağ et al., 2019; Heng et al., 2020; Yang et al., 2020). Both males and females can be affected by acne,

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but there are some differences in the prevalence and severity of the condition between the sexes. Acne tends to be more common and severe in males during adolescence. This is believed to be due to the higher levels of androgens (male hormones) that contribute to increased sebum production and the development of acne lesions. In females, acne is more common during adolescence and early adulthood, often associated with hormonal changes during the menstrual cycle (Borzyszkowska et al., 2022). Ethnicity also appears to play a role in the epidemiology of acne. Several studies have found that certain ethnic groups are more prone to developing acne (Mahajan et al., 2023). For instance, individuals of African descent tend to have a lower prevalence of acne compared to Caucasians. On the other hand, individuals of Hispanic and Asian descent seem to have a higher prevalence of acne compared to other ethnic groups. These differences may be influenced by genetic and environmental factors, as well as variations in sebum production and skin types (Mahajan et al., 2023; Heng et al., 2021).

There is a growing body of evidence suggesting that lifestyle and environmental factors also contribute to the development and severity of acne (Yang et al., 2020). Dietary factors, such as a high glycemic index diet and dairy consumption, have been implicated in the pathogenesis of acne. However, more research is needed to establish a definitive link between these factors and acne development (Yang et al., 2020). Other lifestyle factors, including stress, smoking, and inadequate skin hygiene, may also influence the prevalence and severity of acne (Yang et al., 2020; Alshammrie et al., 2020). It is worth noting that acne can have a significant impact on an individual's quality of life. The visible nature of acne lesions can lead to psychosocial distress, including low self-esteem, anxiety, and depression. Acne can also result in scarring, which can have long-lasting effects on an individual's physical appearance and emotional well-being (Naveed et al., 2021; Kaikati et al., 2021).

In terms of treatment, the management of acne typically involves a multifaceted approach that may include topical or oral medications, lifestyle modifications, and dermatological procedures. Topical treatments, such as benzoyl peroxide and retinoids, are commonly used as first-line therapies for mild to moderate acne. Oral antibiotics, hormonal therapies (such as oral contraceptives), and isotretinoin (a systemic retinoid) may be prescribed for moderate to severe acne (See et al., 2018; Tan et al., 2018; Eichenfield et al., 2021). Prevention strategies are also an important aspect of acne management. Health education programs aimed at promoting proper skin hygiene and the use of non-comedogenic skincare products can help reduce the risk of acne development and exacerbation. In addition, addressing lifestyle factors such as stress management and a healthy diet may play a role in preventing acne (Khan et al., 2022; Tan et al., 2018; Aziz & Khan, 2022). In view of these, this study was undertaken to investigate the epidemiology of acne vulgaris and its association with lifestyle behaviors among adolescents and young adults from Qassim region of Saudi Arabia.

MATERIALS AND METHODS

This descriptive study was designed to examine the prevalence and characteristics of acne vulgaris among adolescents and young adults in the Qassim region of Saudi Arabia. This article also explored the relationship between acne vulgaris and several lifestyle factors, including smoking, diet, family history, chronic diseases, and medication use. To collect data, a cross-sectional survey was conducted using a well-validated questionnaire that covered various domains such as socio-demographics, acne presence, lifestyle habits, dietary patterns, risk factors, diagnosis and treatment methods, and coexisting diseases (Alanazi et al., 2018).

The objectives of the study were clearly outlined on the initial page of the Google Form, and participation in the survey indicated the participants' consent to be part of the study. The sample size of 387 participants was determined using a formula based as described previously (Alanazi et al., 2018). Inclusion criteria of Acne vulgaris patients were patients diagnosed with Acne vulgaris; patients of a specific age group (e.g., 10-30 years); patients with a certain severity level of acne (e.g., moderate to severe); patients who are willing to participate and provide informed consent. However, there were a number of acne patients were excluded from this study such as patients with other dermatological conditions that might confound the results; patients with a history of receiving acne treatment within a certain time frame; patients with underlying medical conditions that could affect acne (e.g., hormonal disorders); patients who are pregnant or breastfeeding; patients unable to comply with study requirements or follow-up. The acne patients (n=388) were enrolled in the study over a one-month period using random selection. The ethical approval of this study was taken from the Research Ethics Committee of Qassim University (Ethical Approval # 2022-12), Saudi Arabia. The patients' consents were obtained from the distributed questionnaires. The collected data was coded, entered into a computer for analysis using SPSS version 21, with descriptive methods and statistical tests applied, considering a p-value of less than 0.05 as statistically significant.

RESULTS

The results of the survey showed that 388 participants completed the online survey with a mean age of 24.04±8.5 years. The demographic characteristics of the studied subjects are presented in Table 1. The majority of respondents were females (87.7%) compared to males (12.3%), and the majority were Saudi nationals

Table 1: Demographic characteristics of the studied acne subjects

Variables	Responses	n%	
Gender	Female	340	87.6
	Male	48	12.4
Nationality	Saudi	351	90.5
	Non-Saudi	37	9.5
Residency	Buraidah	146	37.6
	Onizah	129	33.2
	Other areas	113	29.2
Smoking	Yes	18	4.6
	No	370	95.4
Family history of acne	Yes	279	71.9
	No	109	28.1
In case of family history of acne, specify the relationship?	Parents	14	3.6
	Siblings	158	40.7
	Others	7	1.9
	>1 family member	103	26.5

Table 2: Age, height, body weight, and BMI of the studied acne subjects

Characteristics	N	Mean	Standard Deviation	Minimum	Maximum
Age (Years)	387	24.04	8.504	11	60
Height (cm)	387	160	8.26	122	189
Weight (kg)	387	62.49	15.42	34	120
BMI (kg/m^2)	387	24.38	5.62	13.84	47.03

(90.5%) with a smaller number being non-Saudi participants (9.5%). The participants were primarily from Buraidah (36.0%) and Unaizah city (31.8%), while the remaining participants were from small towns in the Qassim region. Most of the participants were non-smokers (91.1%). In addition, a significant number of participants had a sibling with acne, either a sister (23.4%) or a brother (15.5%), and a quarter of participants reported multiple family members with acne. Detailed demographic data, presented in Table 2, showed statistically significant results with a p-value of less than 0.001. The mean body mass index (BMI) of the participants was 24.09±6.06 kg/m2.

On the other hand, the frequencies of intake of selected food and drinks among the study sample are presented in Figure 1. It is noticeable that the highest frequencies of foods and drinks (once or more than once a day) were recorded for bread, sweetened beverages, coffee, rice, and salty foods (67.8%, 49%, 47.2%, 41.8, and 38.6% of the study sample, respectively).

In addition, the following beverages were consumed in moderate frequency (one to 3 times a month, One to 4 times a week) by the participants: Oily and fried food, salty food, Nuts, Red meat, fish, vegetables, fruits, sweets, milk chocolate, carbonated drinks and full-fat diary. On the other hand, most participants had never consumed low-fat dairy products, Tea, Dark chocolate, or white chocolate (Figure 1). Nevertheless, the dietary pattern among the study samples is presented in Table 3. As can be seen, the majority of the study participants (68.6%) believed that diet impacts their acne status. In addition, 47.3% of the study participants used vitamin and mineral supplements. Interestingly, most of the study participants did not follow the keto, low carbohydrates, or any other special diet system (89.4%, 83.8%, and 80.4% of the study participants). The participants who reported following other specific diet systems (other than keto or low-carb diet); noticed that their acne became better. The data presented in Table 4 is showing mean age of onset for acne in majority of the participants (32.2%) was in between 16 to 17 years. However, 2.6% developed this condition before 10 years of age. Most of the participants (176%) self-diagnosed their acne where as in remaining it was diagnosed by dermatologist (39.9%), general physician (3.9%) and other health care providers (3.6%). Regarding the treatment 35.3% of participants never received any medication or therapy for acne. Whereas, local therapy (32.2%) , oral Isotretinoin (15.7%), oral antibiotics (1.5%) and topical treatment (15.4%) was received by remaining participants. We also found out that 83% of participants were not diagnosed with any other disease else than acne. However, 22% reported that they were suffering from polycystic ovarian disease and 3.1% suffered from some other endocrine disease. 5.9% of participants responded that they were suffering from a mental illness with majority (13%) having depression.

DISCUSSION

Acne vulgaris is a prevalent condition among adolescents and young adults worldwide including Saudi Arabia. This mandates the importance of identifying the factors that might contribute to the development or worsen of acne. This study also found high preva-

Table 3: Dietary patterns and their effects on the study sample

Dietary Pattern	Responses	n%	
Do you think your diet has or had an impact on your acne?	Yes	266	68.6
	No	59	15.2
	I don't Know	63	16.2
Have you been on a keto diet before?	Yes	41	10.6
	No	347	89.4
Have you been on low carb diet before?	Yes	63	16.2
	No	325	83.8
Have you been on any other diet before?	Yes	76	19.6
	No	312	80.4
Do you usually take supplemental vitamins or minerals?	Yes	183	47.3
	No	204	52.6

Table 4: Acne status, diagnosis, treatments, and impact on the studied subjects

Variables		Responses	n%
Acne diagnosed by	Dermatologist	155	39.9
	General Practitioner	15	3.9
	Other Physician Specialty	3	0.8
	Other health care provider	14	3.6
	Self-diagnosis	176	45.4
Age of onset	< 10 years	10	2.6
	10 - 15 years	155	39.9
	16-17 years	125	32.2
	18 or older	73	18.8
Treatment received	No treatment taken	137	35.3
	Local therapy	125	32.2
	Oral Isotretinoin	61	15.7
	Oral Antibiotics	6	1.5
	Topical Treatment	59	15.4
Age when acne disappeared	< 10 years	2	.5
	10 - 15 years	13	3.4
	16-17 years	25	6.4
	18 or older	96	24.7
	I still Have Acne	197	50.8
What impact does acne have on your daily life today?	No Impact	92	23.7
	Mild Impact	110	28.4
	Moderate Impact	122	31.4
	Major Impact	49	12.6
Have you been diagnosed with any other disease?	No	322	83.0
	Endocrine disease	12	3.1
	Mental illness	23	5.9
	Polycystic Ovary Disease (POD)	22	5.7
	Mental POD	2	0.5
	Endocrine+Mental	2	0.5
	Endocrine+ POD	3	0.8
	Endocrine+Mental+ POD	2	0.5
If “yes”, please specify the mental disease:	No		83.5
	Anxiety	4	1.0
	Depression	13	3.4
	Depression and anxiety	7	1.8
	Combination (mental + endocrine)	3	0.8

lence of acne among adolescents and young adults in the Qassim region of Saudi Arabia. In addition, a significant association was observed between acne occurrence and age. These findings align with previous studies conducted in Saudi Hail, Jeddah, and the Northern region of Saudi Arabia, which reported similar prevalence rates among university students and adolescent male students (Xia et al., 2021; Machiwala et al., 2019). Despite variations in assessment tools, recent studies consistently report high rates of acne in Saudi Arabia. Comparing the Saudi Arabian data with international studies, the prevalence of acne in this study was higher

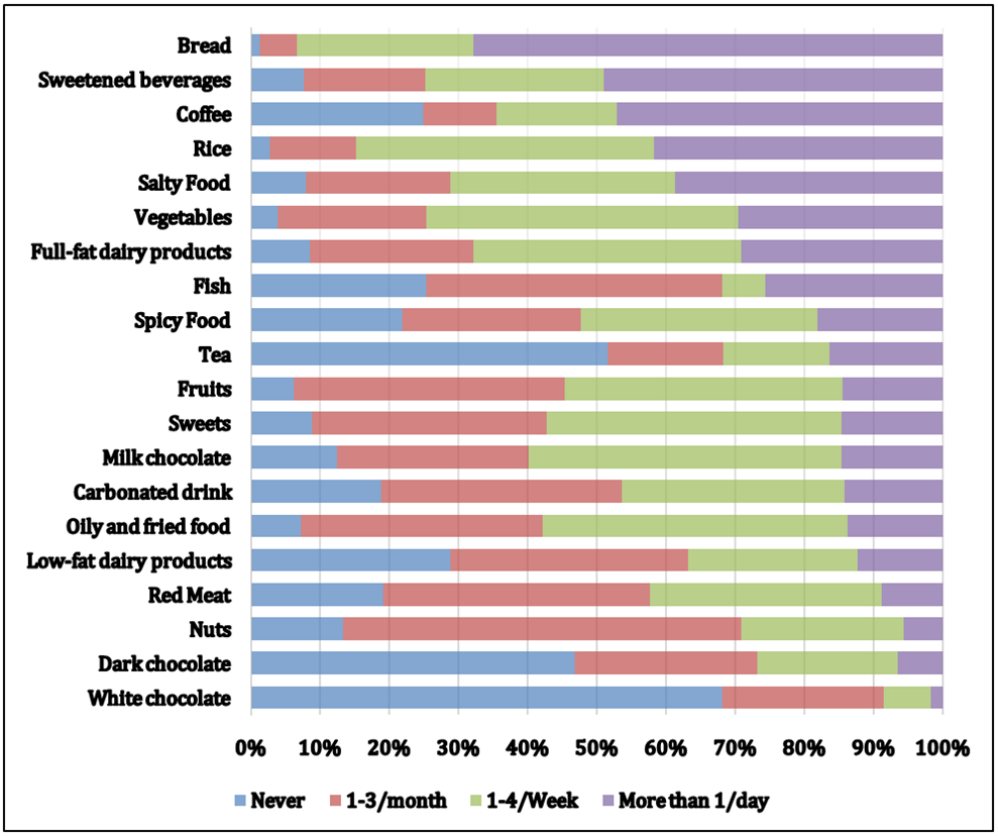

Figure 1: Frequency of intake of food and drinks by the studied acne subjects. The data in different colors show different food products taken by acne subjects against time of utilization.

than that reported in an Australian study (Alrabiah et al., 2022). Similar findings were also reported among teenage females in Makkah, Saudi Arabia (Alfalogy et al., 2018). On the other hand, the prevalence of acne in Tehran, Iran was remarkably higher, possibly due to genetic predisposition, skin type, and certain dietary habits in the population (Kutlu et al., 2023). It's worth noting that in this study population in Qassim consisted of adolescents and young adults, who are more commonly affected by acne. The difference in prevalence rates between studies may also be influenced by variations in diagnostic criteria.

In this study, a significant association was found between high body mass index (BMI) and the occurrence of acne. These findings are consistent with a study conducted in Taiwan among school children, which found that students with acne had a higher mean BMI compared to unaffected students. Similar associations between acne and overweight/obesity have been observed in studies among Saudi women with polycystic ovary syndrome and obese female schoolchildren in Eastern Saudi Arabia. Overall, this article highlights the high prevalence of acne in the surveyed population in Qassim province of Saudi Arabia, especially among adolescents and young adults. The findings are consistent with previous studies in different regions of Saudi Arabia and provide valuable insights into the factors associated with acne, such as age and BMI. Furthermore, i n this study, we also found that those who suffer from acne were more likely to consume sweetened beverages, coffee and bread more heavily than the other type of foods. This was in conjunction with a cross sectional study performed in France of 24452 participants which found an association between sugary products and beverages and acne vulgaris in adult (Penso et al., 2020). In another study among polish adolescents a greater intake of white bread (p0.0001) was seen in the respondents of whom quality-of-life was altered by acne (Łożyńska & Głąbska , 2022). On other hand, the majority of those in this study who suffer from acne reported having never consumed low-fat dairy products, tea, dark, or white chocolate. However, some of these products were shown to be associated with exacerbation of acne. A study done in Thailand showed that when ingested in reasonable amounts over the course of four weeks, dark chocolate can aggravate acne in male individuals with acne-prone skin. Conversely, a clinical trial of 57 male patients with mild to moderate acne randomized into 3 groups in which 2 groups received either 100% white chocolate or dark chocolate and the last group received no chocolate for 30 days and study reported that eating white chocolate rather than dark chocolate is associated with acne exacerbations (Lee et al., 2020). In this study, the famous specific diet plans like Keto diet and low carb diet weren't followed by any participants. However, it was noticed by those who reported following a specific diet (other than keto or low carb diet) that their acne condition improved. These finding are in conjunction with study demonstrated the low glycemic

diets generally improved acne outcomes, possibly by lowering the levels of inflammatory markers and IGF-1 (Baldwin & Tan, 2021). Interestingly, the obtained results showed that coffee was associated with a reduction of acne severity.

In short, in this study the majority of the participants were females and the age of onset for acne was most commonly between 16-17 years, although a small percentage developed acne before the age of 10. Most participants did not follow specific diet plans like keto or low-carb diets, but those who followed other specific diet systems reported improvement in their acne. A significant portion of the participants reported having polycystic ovarian disease, and other had endocrine diseases. Moreover, few of respondents reported suffering from a mental illness, with the majority experiencing depression. Importantly, the studied acne patients did not adhere to well-known specific diet plans such as Keto or low carb, but individuals who reported following a different specific diet experienced improvements in their acne condition. In spite of these valuable novel findings from the Qassim region of Saudi Arabia, this study has several limitations the most obvious limitation was the study survey was conducted online. Conducting surveys online can introduce selection bias, as it may not capture a representative sample of the entire population. Online surveys may attract certain demographics more than others, potentially leading to skewed results. Another limitation is the self-reporting of acne diagnosis and severity by the participants. The accuracy and reliability of self-reported data can be affected by subjective perceptions or incomplete understanding of the condition. Ideally, future studies should include objective assessments by dermatologists or healthcare professionals to ensure accurate diagnosis and severity classification. Furthermore, the study focused on a specific region of Saudi Arabia (Qassim), which may limit the generalizability of the findings to the entire country or other populations. The prevalence and lifestyle factors associated with acne can vary across different regions and cultural contexts. Therefore, caution should be exercised when extrapolating these findings to other populations. Moreover, the study primarily relied on self-reported lifestyle and nutritional habits, which introduces the potential for recall bias. Participants may not accurately remember or report their past dietary choices, leading to misclassification or inaccurate assessment of the association between certain foods and acne. To enhance the improvement of future studies, it would be beneficial to incorporate objective assessments by medical professionals, and consider conducting multi-center studies to obtain more diverse and representative data. These improvements would strengthen the validity and generalizability of the findings.

CONCLUSION

The findings of this study provide compelling evidence that nutritional habits play a role in the development and severity of acne among adolescent patients in the Qassim region of Saudi Arabia. Bread, sweetened beverages, coffee, rice, and salty foods were commonly reported by acne patients, suggesting a potential link between these dietary components and acne symptoms. Additionally, we found a significant association between the consumption of milk chocolate and higher acne severity. These findings emphasize the need for further research, including controlled trials, to explore the benefits of well-defined specific diet regimens in managing acne. By expanding our knowledge in this area, we can enhance acne management strategies and improve the quality of life for individuals affected by this common skin condition .

ETHICAL APPROVAL

Ethical approval of this study was taken from the Research Ethics Committee of Qassim University (Ethical Approval # 2022-12), Saudi Arabia. The patients' consents were obtained from the distributed questionnaires.

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AVAILABILITY OF DATA AND MATERIALS

The data sets used in this study are available with corresponding author and will be provided on a reasonable request.

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AUTHOR CONTRIBUTIONS

AA , MSA, AS, HTA, EMH, MMA, MMA, THA, AKA, NA, WAA contributed to the study concepts, study design, and manuscript drafting and guarantor of integrity of the entire study; ZR particularly contributed manuscript drafting; All authors contributed in conception of the work, data acquisition, analysis, and interpretation of the data and manuscript drafting. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

DECLARATIONS

Conflict of interest: The authors have no relevant financial or non-financial interests to disclose. The authors declare no conflict of interest.

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