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Original article

Demographic Profile and Risk Factors for Acne Vulgaris Among High-School Students in Benghazi, Libya

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ABSTRACT

Acne vulgaris is a chronic inflammatory condition of the pilosebaceous unit, often emerging during puberty due to increased adrenal and gonadal androgen levels or heightened androgen receptor sensitivity. The disease process is multifactorial, involving follicular hyperkeratinization, sebaceous gland enlargement with excessive sebum production, and abnormal keratinocyte shedding that leads to follicular obstruction—all influenced by androgens. Acne affects roughly 9.4% of the global population, making it the eighth most common disease worldwide. This study aimed to determine the prevalence, demographic distribution, and risk factors of acne vulgaris among Libyan high school students. This study included 380 students from three randomly selected high schools in Benghazi, Libya. Data collection involved a detailed history covering disease onset, family history, prior treatments, drug use, seborrhea, and potential risk factors. Each participant underwent a dermatological examination of the face, chest, and back to document lesion type, site, and acne type according to the prepared proforma. In this study, acne vulgaris was identified in 210 students (55%). Among those affected, 120 (57.1%) were female, and 90 (42.9%) were male. The students' ages ranged from 15 to 18 years. Among the total ance vulgaris detected, 110 students (52.4%) were aged 15–16, while 100 (47.6%) were 17–18 years old. Regarding aggravating factors, 94 students (44.8%) reported consuming fatty foods, 55 (26.2%) cited stress, 34 (16.2%) noted hormonal changes, and 15 (7.1%) linked their acne to cosmetic use. Seborrhea (oily skin) was observed in 162 students (77.1%). The face was the most commonly affected site, seen in 198 students (94.3%), while only 8 students (3.8%) had lesions on the back. This study indicated that the prevalence of acne vulgaris was 55%. The male-to-female ratio was 1:1.3, and 52.4% were aged 15–16 years. A positive family history was noted in 65.7% of cases. Among the aggravating factors, fatty food intake was recorded in 44.8%, whereas stress was recorded in 26.2%.

Introduction

Acne vulgaris is a chronic, self-limiting inflammatory disease of the pilosebaceous unit. It commonly begins during adolescence and is often triggered by *Cutibacterium acnes* in the presence of circulating dehydroepiandrosterone (DHEA) (1,2). Clinically, acne manifests as both inflammatory and non-inflammatory lesions, primarily on the face, but may also involve the upper arms, chest, and back. The pathogenesis of acne vulgaris involves a chronic inflammatory response of the pilosebaceous unit. It typically coincides with puberty due to an increase in adrenal and gonadal androgen production or heightened sensitivity of androgen receptors (3,4).

Multiple factors contribute to the disease process, including follicular hyperkeratinization, sebaceous gland hypertrophy with excessive sebum production, and abnormal desquamation of keratinocytes leading to follicular plugging—all mediated by androgens (5, 6). Obstruction of sebum flow due to follicular hyperkeratosis results in the formation of a microcomedo, which progressively enlarges as sebum accumulates, becoming a clinically visible comedo. Within the pilosebaceous unit, triglycerides are broken down into free fatty acids and glycerol by lipases secreted by *Cutibacterium acnes* (previously known as *Propionibacterium acnes*) (6, 7). Cutibacterium acnes proliferates significantly during puberty and is a key driver of the inflammatory cascade in acne (6, 7). The liberated free fatty acids are cytotoxic and, when released into the dermis following follicular rupture, contribute to local inflammation (7). This initiates the production of pro-inflammatory cytokines—including IL-1, IL-8, IL-12—and antimicrobial peptides such as defensins by recruited immune cells, resulting in the development of inflammatory lesions like papules, pustules, and, in severe cases, nodules and cysts (8).

Serum calprotectin, a marker of systemic inflammation, has been found to be elevated in individuals with acne (9). Furthermore, recent studies indicate that Cutibacterium acnes can stimulate both innate and adaptive immune responses and that its biofilm formation may enhance follicular hyperkeratinization (10, 11). Acne vulgaris affects approximately 9.4% of the global population, ranking it as the eighth most prevalent disease worldwide (12). Most individuals aged 15 to 17 experience some degree of acne, and around 15–20% of young people may develop moderate to severe forms. The prevalence among those aged 12–24 years remains high, at about 85% (13). A survey-based study found that 35% of women and 20% of men continue to experience acne into their 30s, with 26% of women and 12% of men still affected in their 40s (14). This study was conducted to determine the prevalence and demographic distribution of acne vulgaris among Libyan high school students, and evaluate the risk factors in this age group.

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Methods

In this cross-sectional study, which included 380 students of 3 randomly selected high schools in Benghazi, Libya. The age of the students ranges from 15 to 18 years. Complete history from each student, including onset and duration of the disease, family history, site involved, drugs, and treatment used. Each student was exposed to a dermatological examination involving the face, chest, and back in order to determine the type, site, and number of lesions. Also, to determine the type of acne and the severity of the disease according to the prepared proforma.

Data obtained were analyzed using the IBM SPSS version 20.0 statistical software (IBM Corp., Armonk, NY). Descriptive statistics (means, median, mode, and standard deviation) will also be utilized. Chi-square was used to test the association. The level of statistical significance (P-value) was set at 0.05.

Results

In this study, acne vulgaris was identified in 210 participants (55%). Among these, 120 (57.1%) were female, and 90 (42.9%) were male (Figure 1). Participants ranged in age from 15 to 18 years. Of those with acne, 110 students (52.4%) were aged 15–16, while 100 students (47.6%) were in the 17–18 age group (Figure 2). Regarding the acne duration (42.9%) reported having the condition for 6–12 months, 40 (19%) for more than 12 months, and 80 (38.1%) for less than 6 months (Figure 3). A positive family history of acne was recorded in 138 students (65.7%) with the condition (Figure 4).

As for triggering factors, 94 students (44.8%) identified fatty food consumption, 55 (26.2%) cited stress, 34 (16.2%) reported hormonal changes, and 15 (7.1%) linked their acne to cosmetic use (Table 1). Hormonal changes were significantly associated with female gender (P = 0.013), occurring in 21.7% of females versus 8.9% of males. Stress and cosmetic use did not differ significantly between the two groups, with P-values of 0.651 and 0.439, respectively (Table 2). Seborrhea was observed in 162 students (77.1%) (Figure 5). The face was the most frequently involved site (198 students; 94.3%) (Figure 6)., while only 8 students (3.8%) had acne on the back (Figure 7). (Table 3).

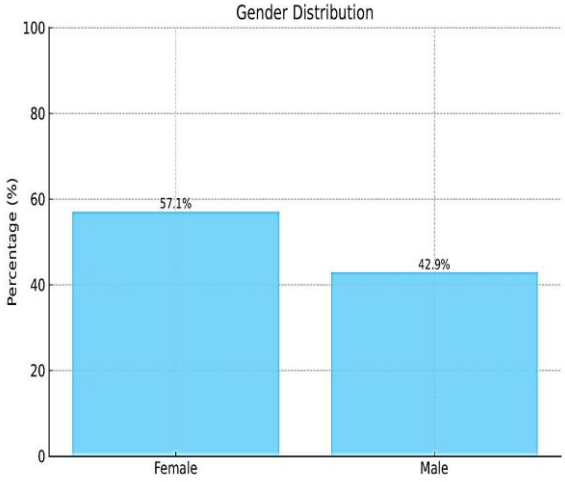

Figure 1. Gender distribution

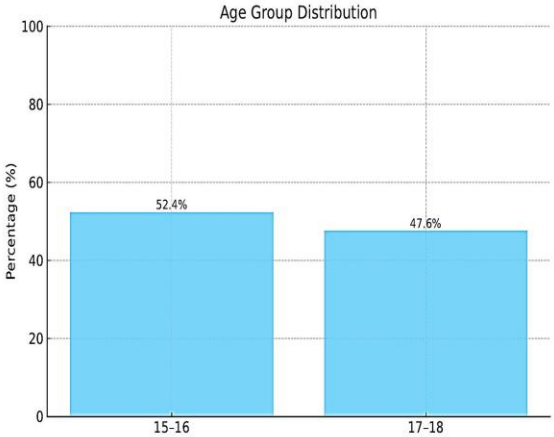

Figure 2. Age group distribution

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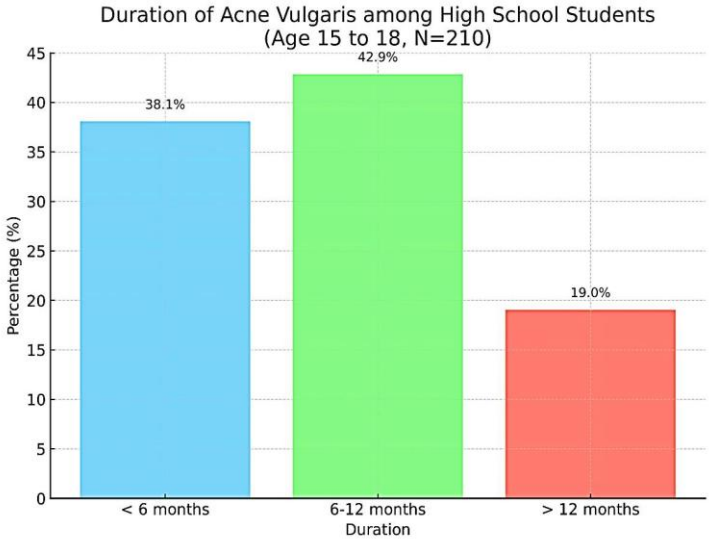

Figure 3. Duration of acne vulgaris

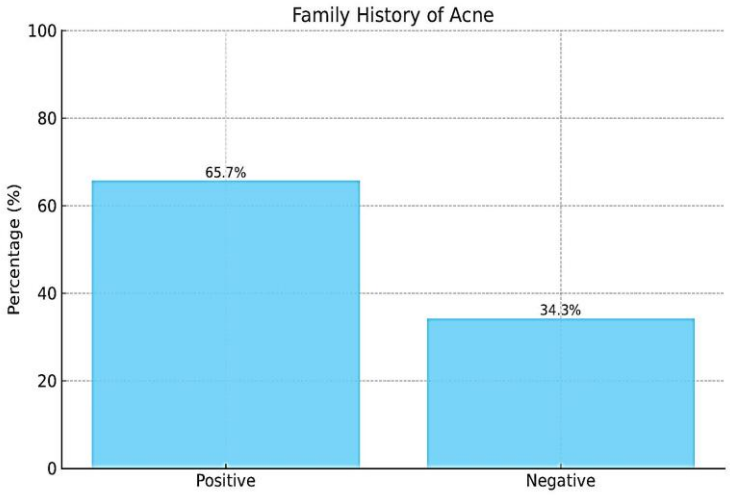

Figure 4. Family history of Acne

Table 1. Aggravating Factors

Aggravating Factor	Frequency	Percentage
Fatty food	94	44.8%
Stress	55	26.2%
Hormonal changes	34	16.2%
Cosmetics	15	7.1%
Others	12	5.7%

Table 2. Association between gender and aggravating factors

Aggravating Factor	Male (n=90)	Female (n=120)	Total	Chi-square (df=1)	P-value
Fatty food	42 (46.7%)	52 (43.3%)	94	0.231	0.631
Stress	25 (27.8%)	30 (25.0%)	55	0.205	0.651
Hormonal changes	8 (8.9%)	26 (21.7%)	34	6.188	0.013
Cosmetics	5 (5.6%)	10 (8.3%)	15	0.598	0.439
Others	10 (11.1%)	2 (1.7%)	12	8.515	0.004

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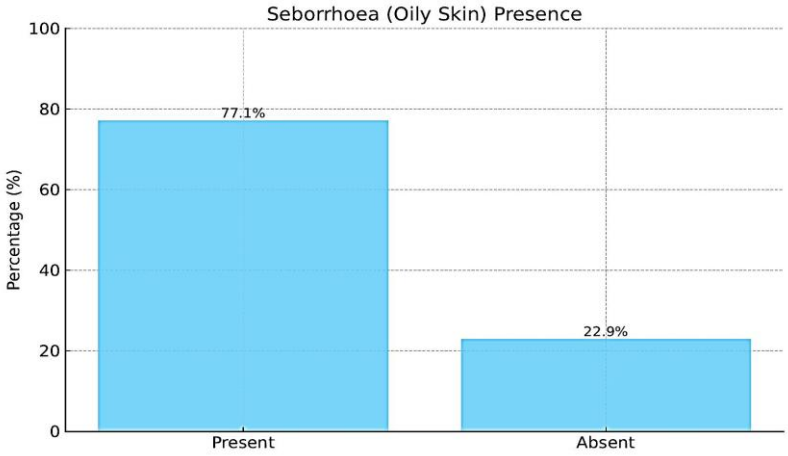

Figure 5. Seborrhea in the study group

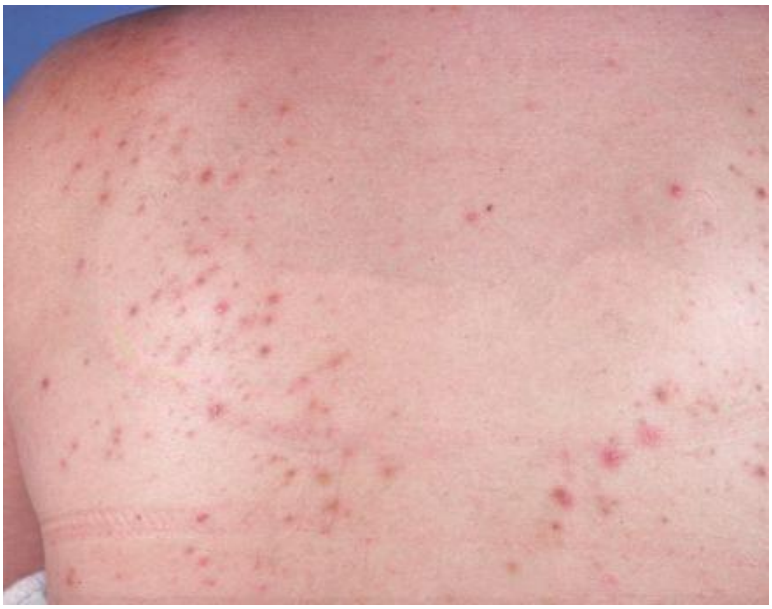

Figure 6. Mild acne, back

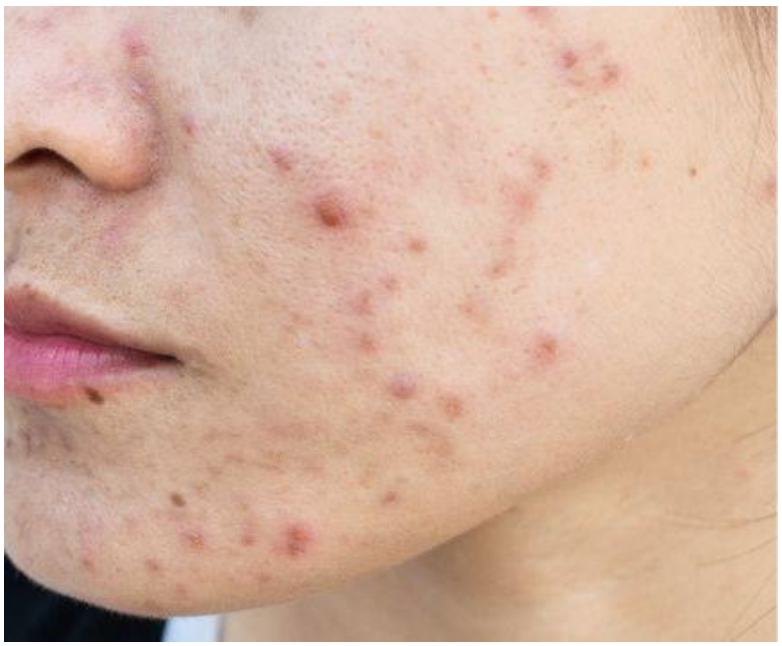

Figure 7. Moderate acne, Face

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Table 3. Site of Lesion

Site of Lesion	Frequency	Percentage
Face	198	94.3%
Back	8	3.8%
Chest	4	1.9%

Discussion

Acne vulgaris is among the most prevalent dermatological disorders in adolescents, particularly in high school-aged individuals, primarily due to hormonal changes during puberty (3, 4). A cross-sectional study conducted by Sharma et al. (2017) in Indian schoolchildren reported an acne prevalence of 72.3%, with a notable negative impact on quality of life (15). Similarly, an Egyptian study involving 994 secondary school students found that 333 students (33.5%) were affected by acne vulgaris (16). In comparison, our study observed a prevalence of 55% among high-school students. Karimkhani et al (17), in a large population-based study in Australia, reported an overall acne prevalence of 36.1%, with a marked increase by age, ranging from 27.7% in 10–12-year-olds to 93.3% in the 16–18-year age group.

Likewise, Yahya (28) conducted a study in Nigeria among 539 students aged 11–19 years (mean age 16), reporting a high prevalence of 90.7%. No significant gender differences in acne occurrence were noted in that population. In our study, participants ranged in age from 15 to 18 years, with 52.4% (110 students) in the 15–16-year group and 47.6% (100 students) in the 17–18-year group. A cross-sectional study conducted among university students in Northeast China reported an overall prevalence of acne at 51.3%, with a slightly higher incidence in males (52.74%) compared to females (49.65%) (19). Similarly, a European survey targeting individuals aged 15–24 years found a prevalence of 57.8%, again showing a marginal male predominance (58.28% in males vs. 56.97% in females) (20). In contrast, research from Singapore indicated that acne during adolescence was more prevalent in males (61.3%), while post-adolescent acne was more frequent among females (69.0%) (21). In our study, however, acne vulgaris was more common among female students (57.1%) than males (42.9%). This trend aligns with findings from a study where 60% of cases were female and 40% male (16).

A twin study conducted in the UK by Bataille et al. (2002) demonstrated that up to 81% of the variance in acne occurrence could be explained by genetic factors, indicating a strong hereditary component (22). Adolescents with a family history, particularly involving first-degree relatives, are more likely to develop acne and experience more severe forms. In our current study, a family history of acne vulgaris was present in 138 students (65.7%) among those affected, reinforcing the role of heredity in acne pathogenesis (22).

In a study by Sharma et al. (2017) (15), acne most frequently affects the face (up to 99% of cases), with less common involvement of the back (around 60%) and chest (15%). Similarly, a study conducted by Adityan and Thappa (2009) in India involving 309 patients with acne vulgaris reported universal facial involvement, followed by lesions on the back, chest, neck, and arms (4). In our study, the face was also the most commonly affected site (94.3%), followed by the back (3.8%), with minimal involvement of the arms and chest (<1%). This pattern is consistent with prior studies emphasizing the face as the primary site of acne lesions.

Stress plays a significant role in the pathophysiology of acne by activating several physiological pathways, including the hypothalamic–pituitary–adrenal (HPA) axis (23) and the adrenergic and cholinergic systems. These pathways can impair skin barrier integrity, delay wound healing, and increase vulnerability to cutaneous infections. Stress-induced catecholamine release has been shown to enhance bacterial adhesion and proliferation on the skin surface (24). A study by Sharma et al. (2017) (15) reported a statistically significant association between acne and psychological stress (P = 0.001), as well as with premenstrual flare in females (P = 0.000). Consistently, Enaairi et al. (18) found a significant relationship between acne vulgaris and regular menstrual cycles in Libyan females, further supporting the role of hormonal fluctuations. However, no significant relationship was observed between acne and factors like diet, hygiene, climate, family history, or smoking in that study. In our study, hormonal changes were significantly associated with female gender (P = 0.013), occurring in 21.7% of females versus 8.9% of males, which aligns with the known influence of menstrual cycles on acne flares.

Conversely, no significant gender differences were observed for stress (P = 0.651) or cosmetic use (P = 0.439), suggesting that these factors may affect both sexes equally in this age group. Recent observational studies have consistently linked skim milk consumption with the development of acne, suggesting that its acne-promoting effect is not due to fat content but rather to bioactive molecules such as insulin-like growth factor-1 (IGF-1), 5α-reduced steroids, and α-lactalbumin. These compounds may remain biologically active even after milk processing and are thought to influence the pilosebaceous unit (25). Increased milk intake also raises IGF-1 levels, which can stimulate ovarian androgen production, particularly in premenarchal girls, thereby contributing to acne in both adolescents and adult women. In

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contrast, there is insufficient evidence supporting a direct association between acne and consumption of chocolate, saturated fats, or salt (26). A study by Huei et al. (2022) also found no significant correlation between acne vulgaris and the intake of common dietary items such as chocolates, sweets, potato chips, yogurt, milk, fried foods, nuts, or carbonated beverages ($p > 0.05$) (27).

Conclusion

Out of the 380 high school students examined, the prevalence of acne vulgaris was detected in 55%. The male-to-female ratio was 1:1.3, with a greater number of affected students aged 15–16 years (52.4%). A positive family history was noted in *65.7*% of cases. Among the aggravating factors, 44.8% reported fatty food intake and 26.2% reported stress. The face was the most frequently involved site.

Consent

The authors confirm that informed consent was obtained from all patients involved in the study.

Ethical approval

The authors declare that ethical approval was secured prior to conducting the research.

Disclaimer (artificial intelligence)

Author(s) hereby declares that no generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) And text-to-image generators have been used during the writing or editing of this manuscript.

Competing interests

Authors have declared that no competing interests exist.

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