

Pediatric Acne Vulgaris: Pathophysiology, Clinical Features, and Evidence-Based Treatment Approaches

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Abstract: Acne vulgaris is a chronic inflammatory dermatosis of the pilosebaceous follicle, which affects approximately 80-85% of adolescents (13-18 years), mostly males; prevalence that is reversed in adults: 3% in males and 11-12% in females. Our research is evaluated the clinical outcomes of acne vulgaris in children, as well as it enrolled improvements of patients after treatment. A cross-sectional study was performed into children with acne vulgaris and who undergone to treatment at Karbala, Iraq, during a 12-month follow-up period among May 2024 to May 2025. Based on the global acne grading index scoring, the severity of acne lesions was classified into form categories: grade 1, grade 2, grade 3, and grade 4. All patients were undergone to different several therapies, which are (Tretinoin & Adapalene), (Benzoyl Peroxide (BPO)), (Clindamycin & Erythromycin), and Oral Isotretinoin. According to the quality of life assessment, we performed a questionnaire to evaluate patients' quality of life through three DLQI, PedsQL, and ASQoL, distributed into evaluating the performance of each therapy, their impact on patients.

This study found that family history of acne had on of a risk factors which effect on patients, including 68.6 %, the severity acne with grade 2 had 42.90% and severity acne with grade 3 had 35.70%, which almost comedones was prevalence into with all grades on 100% patients alongside with it was located in face of 78.6 % patients and aggravating factors were cosmetic/oily products had 71.4%, menstrual cycle in females had 64.9%, and stress had 54.3%. Based on treatment management, we noted that (tretinoin & Adapalene) had almost has shown superior improvement in the treatment of patients with skin's patients, although all other therapies could also managed patients. Based on the Cardiff Acne Disability Index (CADI) questionnaire, this study shown the functional impact of (Tretinoin & Adapalene) has 0.9 ± 0.5 . Based on the DLQI questionnaire, it also shown 2.1 ± 1.5 during 12 months follow-up after treatment.

The current study indicates the dramatic improvement in patients' quality of life following successful interventions for treating childhood acne, including psychological, physical, and self-esteem aspects.

Keywords: Acne Vulgaris; Pediatric; Treatments; Cardiff Acne Disability Index (Cadi); Symptoms; Lesion Types And Location; And Dermatology Life Quality Index (Dlqi).

Introduction

Acne is a frequent, chronic, and multifactorial disease, which usually occurs in adolescents; worldwide, there is a peak prevalence of 85% among 13 – 18 years of age {1, 2}. A prevalence of acne in people over 25 years of age of 3% in men and 12% in women has been found in patients over 45 years of age; this percentage decreases even further and may be as low as 1% {3}. In most individuals, acne resolves in early adulthood; however, the physical and psychological sequelae of acne are related to the duration of the disease and highlight the importance of early and effective treatment. {4}

Among the risk factors, an important relationship has been found between moderate and severe acne with a family history of acne. In recent studies, a predominance of maternal inheritance was demonstrated; in cases of moderate to severe acne, it was found that 19.9% have a family history. {5, 6}

The severity of acne is determined based on its extent, which depends on the number of areas involved and the percentage of condition {7}. The intensity of acne is graded by the presence of comedones, pustules, nodules, cysts, and scars. In addition, the degree of functional impairment is considered when considering the emotional commitment of each person, the disturbance of the quality of life, anxiety, and depression. {8}

Approximately 79.1% of patients have mild disease, and 14% moderate to severe. The incidence of severe scars caused by acne occurs from 1% to 12% of patients, in which a mixture of the different types of scars can be found, which are: hypertrophic and atrophic. {9}

The impact on the quality of life is highly significant; acne has a relevant impact on emotions and social interaction {10}. 2.5% of adolescents with severe acne have depressive symptomatology, where it is necessary to carry out an early identification of the disease and an interdisciplinary work to reduce the socio-economic impact of this disease in the future. {11}

Methodology

A cross-sectional study was conducted based on a questionnaire. All 70 pediatric patients with acne vulgaris who visited the dermatology department at hospitals in Karbala, Iraq, were included in the study during a 12-month follow-up period, which ranged from May 2024 to May 2025. Based on the questionnaire administered to the children a questionnaire was administered to all pediatric patients with acne vulgaris after obtaining written informed consent, which their parents were asked to complete the questionnaire, which included information about the quality of life of children with acne vulgaris. Demographic and clinical parameters were collected for pediatric patients, including age, sex, and duration of acne (in months), family history of acne, personal history of acne, parental occupation, and parental marital status. Children with acne vulgaris underwent a complete diagnostic workup, which was based on symptoms, their prevalence, the location of the acne vulgaris, the type and severity of the lesions, and the etiological factors for these lesions of acne vulgaris in children.

Based on the diagnosis of acne vulgaris in children, the clinical presentation of acne vulgaris was evaluated and classified using the Comprehensive Acne Classification System (CACS), which measures the severity of acne vulgaris in children based on the location of lesions on three sites: the face, back, and chest. This system is classified into four grades: Grade I is mild, ranging from 1 to 18; Grade II is moderate, ranging from 19 to 30; Grade III is severe, ranging from 31 to 38; and Grade IV is very severe, with scores greater than 39. The severity of symptoms in children was also evaluated using the global acne grading index. All pediatric patients underwent treatment for acne vulgaris with varying degrees of severity, including tretinoin and adapalene,

benzoyl peroxide (BPO) and salicylic acid, clindamycin and erythromycin, and oral isotretinoin (Roaccutane).

In addition, this current study evaluated the quality of life of children with acne vulgaris and its impact on their health, including the impact of acne on daily life, psychological aspects, and social aspects. This was based on the Cardiff Acne Disability Index (CADI). This questionnaire asked children about all psychological, physical, stress, anxiety, and social aspects, and assessed the clinical severity of acne vulgaris in children. Each question was scored on a scale of 0 to 3, with higher scores representing greater disability for the child patient. Another scale, the Pediatric Quality of Life Scale (PedsQL), was also administered. This scale also assesses children's quality of life from psychological, physical, and social aspects, and ranges from 0 to 100, with higher scores representing the extent to which treatment improved patients' quality of life. All children also completed the Dermatology Life Quality Index (DLQI), a questionnaire designed to assess the effects of dermatological conditions on the psychological, physical, and social aspects of pediatric patients. All recorded results and questionnaires designed for pediatric patients were evaluated and analyzed by SPSS, 24.0.

Results

Table 1: Baseline and demographic features in the patients.

Variables	Categories	Frequency	Percentage, %
Age [years]			
	Preadolescent (4-10)	28	40 %
	Adolescent (11-16)	42	60 %
Sex			
	Male	33	47.1 %
	Female	37	52.9 %
Duration of Acne (months)			
	< 5	10	14.3 %
	6 - 10	25	35.7 %
	11 - 15	18	25.7 %
	16 - 20	12	17.1 %
	> 20	5	7.1 %
Family History of Acne			
	Positive	48	68.6 %
	Negative	22	31.4 %
Personal History of Acne			
	Positive	70	100 %
	Negative	0	0 %
Parents' Occupation			
	Employed	59	84.3 %
	Unemployed	11	15.7 %
Parents' Marital Status			
	Married	51	72.9 %
	Divorced	15	21.4 %
	Widow	4	5.7 %

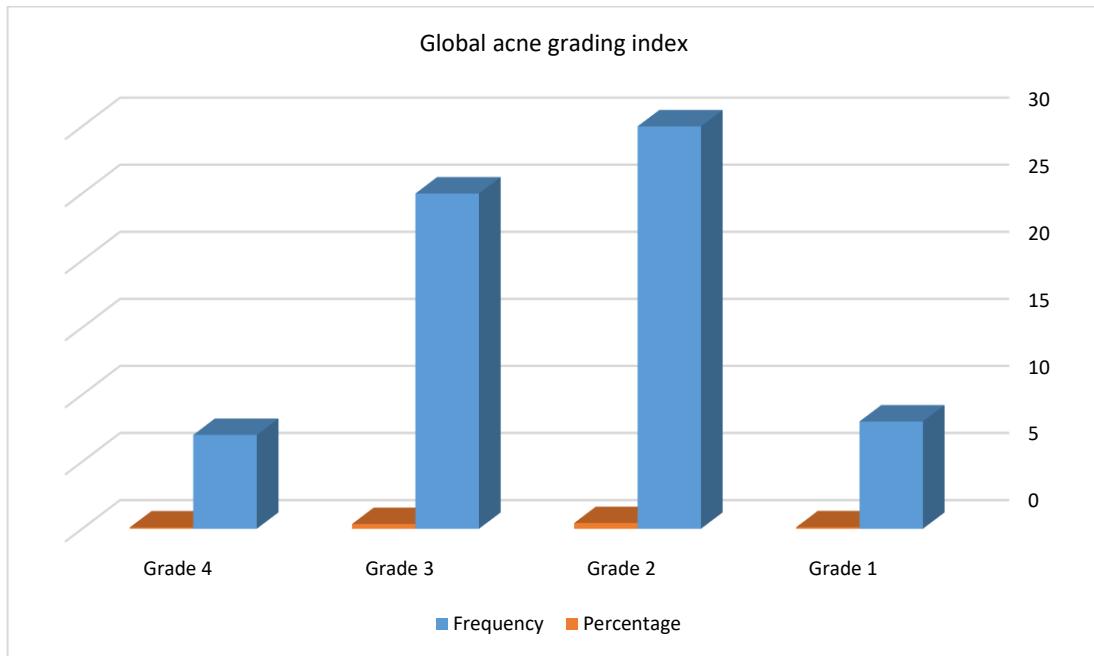


Figure 1: Classification of acne severity by the Global Acne Grading Index.

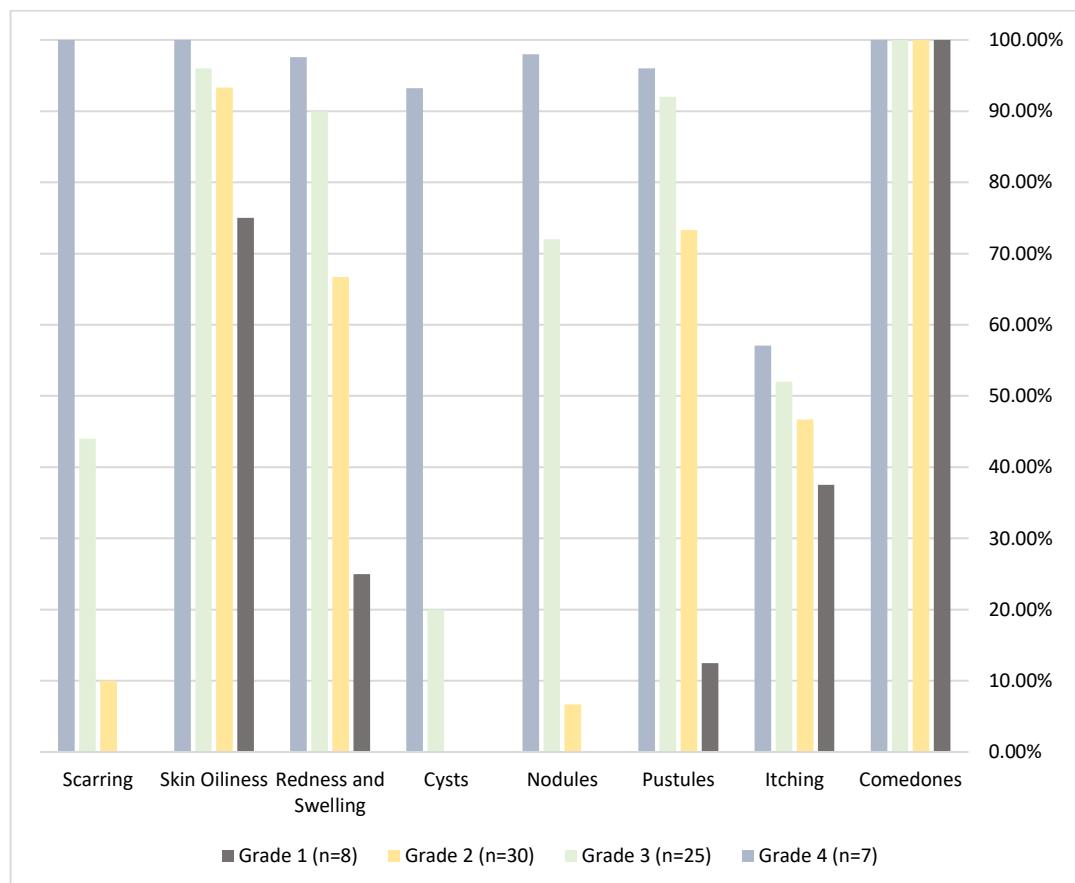


Figure 2: Distribution of acne vulgaris symptoms in the children who participated in this study.

Table 2: Prevalence of the location of acne lesions in children.

Location	Prevalence of patients, [70]	Percentage, %
Face	55	78.6 %
Back	8	11.4 %
Chest	2	2.9 %
All (Face, Back, Chest)	5	7.1 %

Table 3: Identifying lesion types and aggravating factors of acne in children.

Variables	Prevalence of patients, [70]	Percentage, %
Lesion types		
Comedonal	15	21.4%
Inflammatory	16	22.9%
Mixed (Comedonal & Inflammatory)	39	55.7%
Aggravating Factors		
Cosmetic/Oily Products	50	71.4%
Diet (dairy, high-glycemic)	41	58.6%
Stress	38	54.3%
Sweating	35	50.0%
Menstrual cycle in females	24	64.9%
Sun Exposure	18	25.7%
Medications (steroids)	5	7.1%

Table 4:- Determining the common treatments performed into patients.

Treatments	Categories	Frequency	%
Topical Retinoids	Tretinoin & Adapalene	25	35.7%
Topical Antimicrobials & Keratolytics	Benzoyl Peroxide (BPO) & Salicylic Acid	20	28.6%
Topical Antibiotics	Clindamycin & Erythromycin	15	21.4%
Systemic Therapy	Oral Isotretinoin (Roaccutane)	10	14.3%

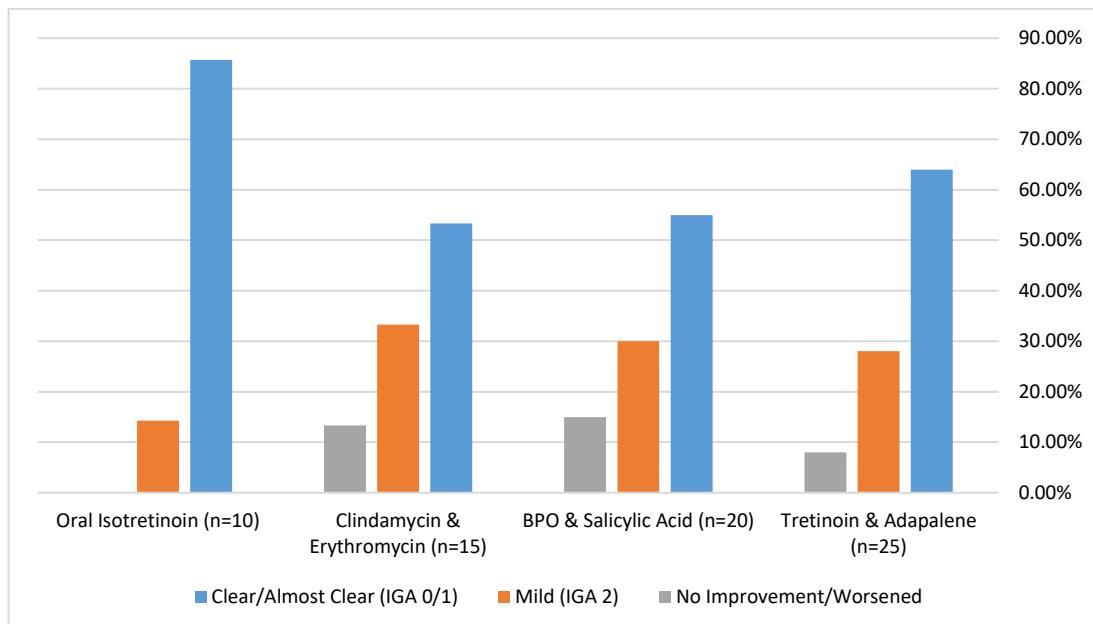


Figure 3: The clinical responses of patients on the treatments.

Table 5: Assessment of health quality of life at baseline and following treatment.

Therapies	Metric	Baseline	After Treatment
Tretinoin & Adapalene	DLQI	7.2 ± 2.1	2.1 ± 1.5
	PedsQL	68.5 ± 8.3	85.2 ± 6.1
BPO & Salicylic Acid			

	DLQI	6.8 ± 1.9	2.4 ± 1.6
	PedsQL	70.1 ± 7.5	86.5 ± 5.8
Clindamycin & Erythromycin			
	DLQI	6.5 ± 2.3	2.6 ± 1.7
	PedsQL	71.3 ± 9.1	87.1 ± 6.5
Oral Isotretinoin			
	DLQI	12.4 ± 3.0	1.8 ± 1.2
	PedsQL	60.2 ± 10.5	89.0 ± 4.9

Table 6:- Enroll clinical outcomes of health-related QoL by Cardiff Acne Disability Index (CADI) questionnaire.

CADI Domains	Baseline, Mean (SD)	Post-Treatment, Mean (SD)
Emotional Impact	3.2 (0.8)	1.5 (0.7)
Social Impact	2.8 (0.9)	1.3 (0.6)
Functional Impact	2.1 (0.7)	0.9 (0.5)

Table 7: Multivariate logistic regression of risk factors

Risk Factors	Odds Ratio (OR)	95% Confidence Interval (CI)	p-value
Adolescent Age (13-19 vs. 9-12)	3.45	1.28 - 9.32	0.015
Positive Family History	4.10	1.45 - 11.60	0.008
Duration of Acne >12 months	2.85	1.10 - 7.38	0.031
High-Stress Self-Report	2.52	0.98 - 6.50	0.055

Discussion

Our study is presented a clinical analysis on 70 pediatric cases of acne vulgaris. Based on age, adolescents (11-16) has shown the prevalence of acne vulgaris in 60 % of patients, while preadolescents (4-10) got 40%, where males with 47.1 % and females with 52.9 %, as both of two classes included a duration of acne (6 - 10) months with 35.7 %. Also, we noticed that all patients had personal history 100% or family history 68.6 %. According to the global acne grading index, we found that the severity of acne had grade 2 with 42.90% and grade with 35.70%, where comedones were 100 % as the most common symptom prevalence, followed by itching got 57% of total patients, in the almost face location of 78.6 %. In the diagnostic findings, we enrolled mixed (comedonal & inflammatory) as the most common lesion types within 55.7% as well as cosmetic/oily products, stress, and sweating had aggravating factors in 71.4%, 54.3%, and 50.0%.

Furthermore, all children had undergone to treatments including each of Tretinoin & Adapalene (n=25), BPO & Salicylic Acid (n=20), Clindamycin & Erythromycin (n=15), and Oral Isotretinoin (n=10), where Oral Isotretinoin had the most therapy shown to be Clear in the patients, including 85.70% followed by 64.00%. Based on QoL questionnaire, this study assessed health quality of life at patients who participated in this study, we found the oral isotretinoin achieved success of improvement which mention DLQI was 1.8 ± 1.2 and PedsQL was 89.0 ± 4.9 , followed by (Tretinoin & Adapalene) DLQI was 2.1 ± 1.5 and PedsQL was 85.2 ± 6.1 , generally our treatments have 0.9 (0.5) of functional impact, emotional impact was 1.5 (0.7), and social impact was 1.3 (0.6).

Over the past nine years, the medical profession has embraced the use of low-dose & very-low-dose isotretinoin treatment procedures, which minimize side effects while providing favorable results {12}. According to the research, adolescents who had persistent low-activity acne that

took 5 mg of ISO daily had fewer lesions, an improvement in their quality of life, and few adverse effects. While a daily treatment schedule generated better outcomes to people with more serious diseases, the treatment techniques were found to be safe for patients {13}. According to meta-analyses that summaries various regimens (like 10–20 mg/day), adolescents and individuals who are more inclined to experience side effects may benefit most from lower dosages. {14, 15}

According to studies {16, 17, 18, 19, 20, 21, 22}, people with acne had functional and emotional consequences that are on par with those of people who have psoriasis or dermatitis, as well as social, psychological, and emotional issues that are on par with or worse than those of those who have long-term impairing diseases. Therefore, a better knowledge of the variables influencing acne vulgaris may help identify adolescents who require extra care. Our research verified prior findings indicating that those with acne vulgaris have a significantly more severe quality of life. However, the Cardiff Acne Disability Index scores significantly greater in men in our sample, which contrasts with the female preponderance shown in earlier research. According to a study {23, 24, 25}, neither the quality of life nor the clinical severity of acne were impacted by early reporting by 40% of the study group within 6 months or delayed reporting by 31% after 3 years.

The Cardiff Acne Disability Index question on subjective assessment of acne severity received the highest score in our analysis of responses to individual questions. This shows the subjective variations in each patient's mental state. The third question, which asked about the effects of acne on the back or chest when using public restrooms, received the lowest score. Because it was carried out at a referral institution, our study's mean global acne grading system grade was greater than that of the majority of earlier research. It significantly decreased with age, meaning that as people aged, their quality of life was more adversely affected, even as the severity of acne reduced. In addition, people who reported eating a diet had higher scores. {26, 27}

Conclusion

According to our research, acne vulgaris is one of the most common dermatological conditions seen in daily clinical practice, particularly in adolescence, though it can also manifest in childhood and continue into adulthood. Our study also shows that Oral Isotretinoin and Tretinoin & Adapalene as the most effective treatments who manage of acne vulgaris that resulted to improvement of social dysfunction and a rise of patients' self-esteem as well as development of their quality of life.

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