

The Age Divide in Acne: A Comparative Study of Adolescent and Adult Acne

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Abstract:

Background: Acne is a prevalent dermatological condition affecting both adolescents and adults, with distinct characteristics across these age groups. Understanding the differences in acne presentation, severity, and associated factors in these populations is crucial for effective treatment and management.

Objective: To do a comparative analysis of acne vulgaris affecting Indian adolescent versus adult patients at a tertiary care centre.

Methods: A comparative cross-sectional study conducted over 18 months at Venkateshwara Institute of Medical Sciences included 200 patients: 100 adolescents (11-25 years) and 100 adults (26-40 years). Participants were evaluated using structured questionnaires, with socioeconomic status assessed by the Kuppuswamy Scale. Clinical examinations covered anthropometry, acne grading per AAD classification, and hyperandrogenism assessment using the hirsutism grading scale.

Results: The study revealed significant differences between adolescents and adults with acne. Adolescents (mean age 20.03 years) were predominantly male (68%) and most affected in the 21-25 age range, whereas adults (mean age 29.77 years) were mainly female (72%) and primarily affected in the 26-30 age range. In adolescents, acne was more common on the cheeks (81%) and forehead (66%), while in adults, it primarily affected the cheeks (71%) and chin (51%). Adults used systemic steroids more frequently (13%) and cosmetics more often (62%) compared to adolescents (33%). A sedentary lifestyle was more common in adults (66%), with a higher percentage of overweight or obese individuals. Adolescents consumed more high-glycemic foods like chocolate (76%) and sugars (72%). Smoking as an aggravating factor was more prevalent among adults (16%) than adolescents (6%). Adults also reported higher rates of poor quality of sleep (48%), anxiety (22%), and depression (27%). Adults experienced more scarring (57%) compared to adolescents (39%), while similar rates of post-inflammatory hyperpigmentation (67%) were observed.

Conclusions: The findings highlight the need for tailored acne management strategies for adolescents and adults, considering their unique clinical and sociodemographic characteristics. Further research, especially in India, is crucial for improving treatment outcomes.

Keywords: Acne, Age Distribution, Demographic Features.

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Introduction

Acne vulgaris is a prevalent skin condition caused by inflammation of pilosebaceous unit, influenced by excess oil, bacterial overgrowth (particularly *Cutibacterium acnes*), hormonal imbalances, and genetics. [1,2] While traditionally, thought to be associated with adolescence, acne can also affect adults of all ages. "Adolescent acne" refers to those under 25, whereas "adult acne" starts at or after 25 years, with

subtypes including persistent, late-onset, and relapsing acne. [3,4] Acne usually starts in adolescence, peaking between ages 14 and 19, and can be more chronic in females. [5]

Neonatal acne affects up to 20% of newborns and resolves within weeks. [6] Childhood acne increases the risk of persistent acne later in life. Rare types of

acne include drug-induced, occupational, and other specific forms. [7] Acne lesions are categorized as inflammatory (e.g., papules, pustules) or non-inflammatory (e.g., comedones), with complications like hyperpigmentation and scarring. [8] Key pathogenetic factors include increased androgens, elevated sebum production, bacterial colonization by *Cutibacterium acnes*, and an immune response to this bacterium. [8] Acne severity ranges from Grade 1 (comedones) to Grade 4 (cysts and extensive scarring). [9] Exacerbating factors include comedogenic products, stress, medications, and high glycemic diets, with insulin levels and androgen secretion playing significant roles. [10-12]

Acne-related syndromes provide insights into systemic conditions influencing acne, such as congenital adrenal hyperplasia (CAH), seborrhea-acne-hirsutism-androgenetic alopecia (SAHA), polycystic ovary syndrome (PCO), and metabolic syndrome. Elevated FGFR2 signaling in Apert syndrome and inflammatory pathways in SAPHO and PAPA syndromes also play a role. Persistent immune activation by *Cutibacterium acnes* strains contributes to inflammatory adult acne, with hormonal dysfunction, especially excess androgens, being a major factor in adult acne. [4, 13-16]

Psychosocial impacts of acne include body image issues, social withdrawal, and potential depression, necessitating regular mental health evaluations. Treatment typically involves topical therapies, systemic antibiotics, retinoids, and corticosteroids for severe cases. Hormonal therapy may be effective for women with refractory acne and elevated androgen levels but is not the first-line treatment. [17-19]

Due to a lack of data on adolescent versus adult acne in the Indian population, this study was planned aimed to do a comparative analysis of acne vulgaris affecting Indian adolescent versus adult patients at a tertiary care centre.

Material and Methods

This comparative cross-sectional observational study was conducted at Venkateshwara Institute of Medical Sciences, Amroha, UP, involving the Departments of Dermatology, Venereology, Leprosy, and Biochemistry over a period of 1.5 years. It aimed to compare acne characteristics between adolescents (ages 11-25) and adults (ages 26-40). A total of 200 patients were recruited, with 100 in each age group, all seeking acne treatment at the institute's outpatient department. Participant provided informed

written consent and the study was approved by the Institutional Ethical Committee.

Inclusion Criteria:

- Patients aged 11-40 years diagnosed with acne.
- All grades of acne, including severe forms.
- Willingness to participate and provide written informed consent.

Exclusion Criteria:

- Unwillingness to participate.
- Age younger than 11 or older than 40 years.

Sample Size Calculation: A total of 200 patients of acne with 2 groups of 100 each (adults with acne and adolescents with acne), fulfilling the study criteria were selected by purposive sampling using the formula

$$n = (za/2)^2 pq/r^2$$

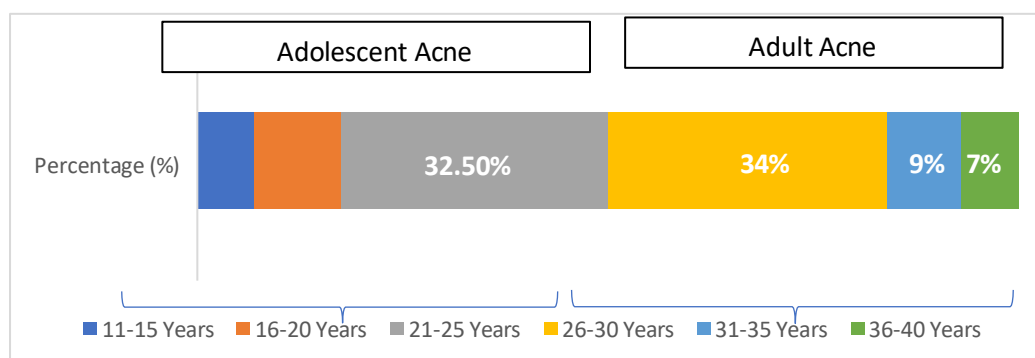
Data collection involved a structured, pretested questionnaire covering medical history, acne details, personal habits, stress, family history, drug use, diet, menstrual history, and systemic diseases. Participants underwent general physical and dermatological examinations, including anthropometric measurements and acne grading using the American Academy of Dermatology (AAD) scale. Socioeconomic status was assessed using the Kuppaswamy Socioeconomic Status Scale, and acne severity was graded according to AAD criteria.

Statistical Analysis

Data analysis was performed using IBM SPSS Statistics version 23 for Windows (SPSS Inc; IBM, Chicago, IL, USA). Descriptive statistics such as mean, percentages, standard deviation and ranges were found out. For univariate comparisons, categorical variables were evaluated using Chi-square or Fisher's exact tests. Continuous variables were analyzed with Mann-Whitney test. P values <0.05 considered statistically significant

Results

The study examined the demographic profile of acne among adolescents and adults, finding that adolescents aged 21-25 had a mean age of 20.03 years, while adults aged 26-30 had a mean age of 29.77 years. The overall mean age across both groups was 24.9 years. Notably, the gender distribution indicated that 68% of adolescents with acne were male, compared to 28% in adults. [Graph 1]



Graph 1: Age distribution among adolescent acne and adult acne

Socio-economic analysis revealed that adolescent acne predominantly affected the upper middle class (43%), while adults experienced acne more evenly across the upper middle and lower middle classes (32% each). No significant socio-economic differences were observed between the groups ($p > 0.05$).

Environmental factors played a role, with 73% of adolescents and 59% of adults reporting acne aggravation in summer, and 92% of adolescents citing pollution as a major trigger. Electronic device usage for more than 2 hours was seen more in the adolescent

group (62%) as compared to adults (44%). In terms of psychiatric factors, poor sleep quality affected 23% of adolescents and 48% of adults, with significant associations found for anxiety, depression and picking behavior. Physical activity levels were low, with 53% of adolescents and 66% of adults leading sedentary lifestyles ($p = 0.002$). According to our study, 6% (6 males and 0 females) of adolescents and 16% (16 males and 0 females) of adult patients reported a history of smoking. The chi-square test value is 8.40 and the P value is 0.08. [Table 1]

Table 1: Distribution of influence of environmental factors, psychiatric factors and life style between adolescents and adults

	Adolescent Acne (n = 100) Frequency (%)		Adult Acne (n = 100) Frequency (%)		Total number of acne patients (n=200) Present	P Value
	Present	Absent	Present	Absent		
ENVIRONMENTAL FACTOR						
Summer aggravation	73	27	59	41	132 (66%)	0.58
Pollution	92	8	37	63	129 (4.5%)	0.002*
Electronic device usage more than 2 hours	62	38	44	56	106 (53%)	0.01*
PSYCHIATRIC DISORDER						
Poor quality of sleep	23	77	48	52	71 (35.5%)	0.02
Anxiety	13	87	22	78	35 (17.5%)	0.05
Depression	3	97	27	73	30 (15%)	0.001*
Picking behavior	77	23	58	42	135 (67.5%)	0.003*
Lack of physical Activity	53	47	66	34	119 (59.5%)	0.002*
Smoking	6	94	16	84	22 (11%)	0.08

The use of topical steroids was more prevalent among adults (60%) than adolescents (34%), with significant associations noted for females ($p < 0.05$). Furthermore, a higher percentage of adults (39%) reported a history of oral drug intake compared to adolescents (19%), with all drug types showing significant associations ($p < 0.05$). The study found that adults were more likely to use cosmetics (62%) and

sunscreens (24%) compared to adolescents (33% and 17%, respectively), while moisturizer use was similar between groups. Facial massage was an aggregating feature of acne in 18% of adolescents and 90% of adults. Dietary habits indicated that adolescents consumed more high-glycemic foods associated with acne flare-ups, with significant findings for greasy food ($p = 0.05$). [Table 2]

Table 2: Distribution of adolescent acne and adult acne according topical steroid usage, drug history, application of cosmetics/sunscreen/moisturizer/facial massage and diet.

	Adolescent Acne (n = 100) Frequency (%)		Adult Acne (n = 100) Frequency (%)		Total number of acne pa- tients (n=200)	P Value
	Present	Absent	Present	Absent		
TOPICAL STEROID USAGE						
Yes	34 (34%)	66 (66%)	60 (60%)	40 (40%)	94 (47%)	0.20
DRUG HISTORY						
No drug	81	19	61	39	142 (71%)	0.001*
Azathioprine	00	100	2	98	2 (1%)	
Isoniazid	2	98	3	97	5 (2.5%)	
Lithium	2	98	1	99	3 (1.5%)	
Phenytoin	00	100	2	98	2 (1%)	
Steroid	10	90	15	87	23 (11.5%)	
Vitamin B12	5	95	16	84	21 (10.5%)	

APPLICATION OF						
Cosmetics	17	83	24	76	41 (20.5%)	0.03*
Sunscreen	60	40	61	39	121 (60.5%)	0.001*
Moisturizer	18	82	90	10	108 (54%)	0.004*
Facial Massage	33	67	62	48	95 (47.5%)	0.002*
DIET						
Sugar	72	28	58	42	130 (65%)	0.54
Dairy	63	37	45	55	108 (54%)	0.18
Chocolate	76	24	48	52	124 (62%)	0.31
Greasy food	61	39	29	71	90 (45%)	0.05
Spicy food	69	31	50	50	119 (59.5%)	0.46
Gym (whey protein)	38	62	36	64	72 (36%)	0.36

Regarding acne location, adolescents commonly experienced it on the cheeks (81%) and forehead (66%), while adults primarily had it on the cheeks (71%) and chin (51%). Statistically significant differences were found for chin involvement ($p = 0.02$).

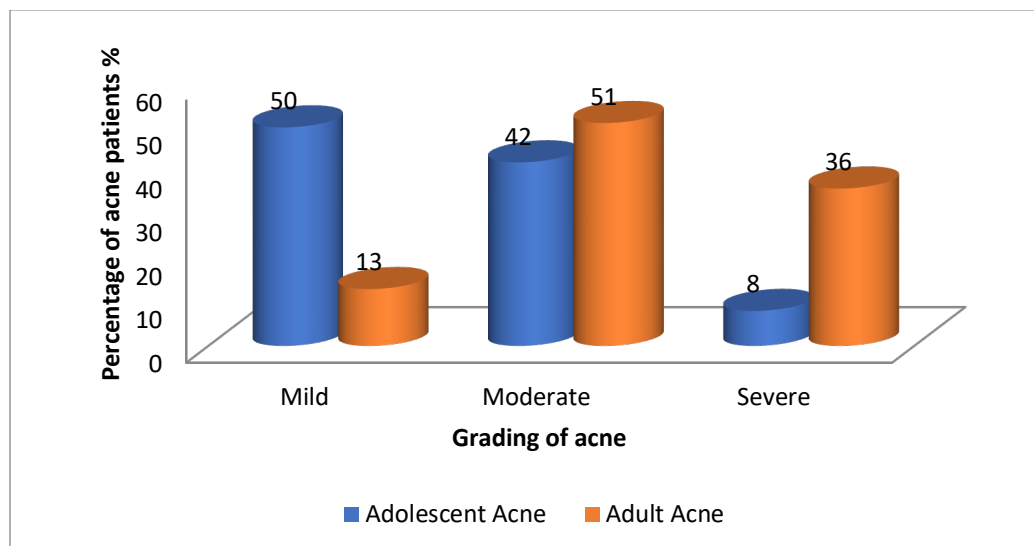
Adolescents exhibited more comedones and papules, while adults had a higher prevalence of pustules and scarring. Finally, scarring, especially pitted and mixed scars, was more prevalent in adults, with significant results ($p < 0.05$). (Table3)

Table 3. Distribution of adolescent acne and adult acne according acne site, acne lesion type and acne scar

	Adolescent Acne (n = 100) Frequency (%)		Adult Acne (n = 100) Frequency (%)		Total number of acne patients (n=200)	P Value
	Present	Absent	Present	Absent		
ACNE SITE						
Cheeks	81	19	71	29	152 (76%)	0.50
Forehead	66	34	44	56	110 (55%)	0.32
Chin	22	78	51	49	73 (36.5%)	0.02*
Chest	20	80	27	73	47 (23.5%)	0.53
Back	27	73	36	64	63 (31.5%)	0.46
ACNE LESION TYPE						
Comedones	96	4	75	25	171 (85.5%)	0.05
Papule	86	14	81	19	167 (83.5%)	0.42
Pustule	59	41	93	7	152 (76%)	0.67
Nodule	35	65	35	65	70 (35%)	0.01*
Scarring	39	61	57	43	96 (48%)	0.02*
PIH	64	36	70	30	134 (67%)	0.03*

ACNE SCAR						
Pitted	36	64	44	56	80 (40%)	0.05*
Rolling	8	92	19	81	27 (13.5%)	0.67
Box car	1	99	3	97	4 (2%)	0.97
Mixed	19	81	24	76	43 (21.5%)	0.04*
Keloid	1	99	2	98	3 (1.5%)	0.32

Our study found that acne grades 1 (50%) and 2 (42%) were more prevalent among adolescents, while grades 2 (51%) and 3 (36%) were more prevalent among adults. These differences were statistically significant (p=0.004). It shows that adults had more severe acne than adolescents. [Graph 2]



Graph 2: Distribution of adolescent acne and adult acne according to grading of acne

Discussion

Acne vulgaris exhibits significant variations in prevalence and characteristics across age groups and genders. A retrospective study by Skroza et al. (2018) found that 41.3% of acne patients were adults and 58.7% were adolescents, with 85% of adult patients being female and a nearly equal distribution among adolescents (53% female, 47% male). [20] Budamakuntla et al. (2020) also reported almost equal gender distribution with 45% male and 55% female, with ages from 10 to 55 years and an average age of 24.64 years. [21] Dhaher et al. (2022) categorized female acne cases, noting that 47% were adolescents, 23.5% had early adult-onset acne, and 29.4% had post-adolescent acne. [22]

Conversely, in our study, 100 adolescents had more male patients (68%) and lesser female patients (32%), while 100 adults had 72% females and 28% males. The mean age was 20.03 years for adolescents and 29.77 years for adults, leading to an overall mean of 24.9 years. The higher prevalence of acne in adolescent males is linked to hormonal changes during puberty that increase sebum production. In contrast, women often experience adult acne flare-ups due to hormonal fluctuations related to menstruation and pregnancy. Adolescent females typically maintain better skincare habits, reducing acne severity.

In terms of socioeconomic status, 43% of adolescents with acne were from the upper middle class, while 32% of adults came from varying middle-class backgrounds, indicating potential inequalities in healthcare access, diagnosis and cultural attitudes. This finding aligns with Rodriguez Baisi et al., who noted higher socioeconomic status among individuals with acne. [23]

Acne can be aggravated by various medications, including corticosteroids, oral contraceptives, anabolic steroids, anticonvulsants, and certain antidepressants and antipsychotics which are more commonly used by adult population. In our study, medication usage was significant, with 19% of adolescents and 39% of adults reporting drug use. Rajegowda et al. highlighted that 26.7% of participants had a history of drug use. [24]

Diet plays a crucial role in acne development, especially through high consumption of full-fat dairy, which is linked to increased sebum production due to hormones like insulin and IGF-I. Whey protein may also worsen acne, and spicy foods can trigger inflammation. Oily diets rich in saturated and trans fats can clog pores and promote bacterial growth, worsening acne. Our study found that both adolescents and adults consume a high glycemic diet, with adolescents particularly consuming high

amounts of dairy (63%), chocolate (76%), and greasy foods (69%). This aligns with findings from Kutlu et al. [25] and Penso et al. [26], who linked high glycemic diets to increased acne severity.

Smoking is associated with the onset and aggravation of acne through inflammation, oxidative stress, and altered keratinization. In our study, 6.25% of adolescent males and 16.67% of adult males reported smoking, while no females reported smoking, possibly due to cultural stigma. Skroza et al. (2018) found that 24.8% of acne patients smoked, with a higher prevalence of severe acne among smokers, particularly in adults ($p < 0.001$). [27]

Stress and sleep quality were significant contributors to acne severity. Emotional stress triggers hormonal changes that worsen inflammation, while inadequate sleep disrupts hormonal balance.

Our study found that 13% of adolescents and 48% of adults experienced acne aggravation due to anxiety and depression, consistent with findings from Khunger et al. [19] and Goulden et al. [28]

Our study found that adolescents (62%) use electronic devices for over two hours daily significantly more than adults (44%). This increased usage can lead to "cell phone acne" due to the emission of blue light, which generates reactive oxygen species (ROS) and prolonged exposure to heat and friction.

Cosmetic use significantly differed, with 33% of adolescents and 62% of adults reporting usage ($p = 0.002$). Similarly, Khunger et al. (2012) [19] found that 22% of adults experienced worsened acne due to cosmetics, while Suh DH et al. (2021) reported that 38.1% of patients with previous treatment failures indicated cosmetics exacerbated their condition. [29] In our study, sunscreens ($p = 0.03$) and moisturizers ($p = 0.001$) were significantly associated with acne in adults, while facial massage aggravated acne in 90% of adults and 18% of adolescents ($p = 0.004$). Khanna N et al. (2002) similarly noted post-massage acne, particularly deep-seated nodules. [30]

In our study, 92% of adolescents and 37% of adults reported acne worsening due to pollution and dust ($p = 0.001$), with adolescents being more susceptible due to active sebaceous glands. Acne prevalence was higher in summer for adolescents (73%) than adults (59%), likely due to increased UV exposure, humidity, and sweating. Similar findings were noted by Sharma G et al [31] and Adityan B, ⁹ with summer aggravating acne.

In our study, adolescents predominantly had non-inflammatory lesions like comedones (96%), while adults showed more inflammatory lesions, including pustules (93%) and scarring (57%). Khunger et al. (2012) [19] and Capitanio et al. (2010) ³² similarly found that hormonal fluctuations in adults,

particularly in females, contribute to more inflammatory acne compared to adolescents. Additionally, hormonal changes in adult females related to menstruation, pregnancy, and menopause can further aggravate acne inflammation.

In our study, adolescent acne predominantly affected the cheeks (81%) and forehead (66%), while adult acne was more common on the cheeks (71%) and chin (51%) ($p = 0.02$). Supporting studies, including Sharma G et al. (2016) [31] and Dhaher et al. (2022), [22] confirm these patterns, linking adult chin and lower face acne to hormonal factors increasing sebum production.

Summary

Our comparative study between adolescent and adult acne revealed distinct variations in prevalence, lesion types, and aggravating factors. Adolescent males had a higher acne prevalence, with predominantly non-inflammatory lesions, while adult females experienced more inflammatory acne, linked to hormonal fluctuations. Factors like diet, cosmetic use, pollution, and stress played significant roles in both age groups, but hormonal influences were more pronounced in adults.

Conclusion

This comparative study highlights the distinct characteristics of adolescent versus adult acne, with adolescent acne being more comedonal and primarily affecting the cheeks and forehead, while adult acne is more inflammatory and focused on the chin and lower face. Hormonal factors, including menstruation, pregnancy, and menopause, are key contributors to adult female acne, whereas adolescent acne is largely driven by pubertal hormonal changes. External factors like diet, pollution, and cosmetic use aggravate acne in both groups, with notable differences in response to stress, medication, and lifestyle habits like smoking and obesity. These findings emphasize the importance of age-specific acne management approaches that account for hormonal, environmental, and lifestyle influences in both adolescents and adults.

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