

A CLINICO-EPIDEMIOLOGICAL STUDY OF ADULT ACNE WITH SPECIAL REFERENCE TO ITS ETIOLOGICAL FACTORS AND COMPLICATIONS: AN OBSERVATIONAL STUDY IN EASTERN PART OF INDIA.

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Abstract

Background

Acne is affecting an increasing number of adults and so no longer be considered as a disease of adolescence. Limited data are available on the clinical characteristics, etiological factors, and complications of adult acne in the Indian population.

Aims

To study the prevalence, clinical pattern, contributing etiological and aggravating factors, and complications of adult acne.

Methods

Patients older than 25 years presenting with acne were included in this prospective study. A detailed history and clinical examination with stress on aggravating and etiological factors were carried out. Hormonal studies were done in females with signs of hyperandrogenism. Complications like scarring and psychological stress were assessed by using a qualitative scarring grading system and PHQ-4 respectively.

Results

A total of 200 patients were included in the study (mean age 31.88 ± 1.325 years), comprising 80% females and 20% males. The prevalence of adult acne among the study population was 0.63%. Persistent acne was observed in 64% and late onset in 36%. The majority of the patients had inflammatory papules and it was of grade II in severity (56.5%). The predominant site of involvement was the cheek (70.56%) in the majority, followed by the mandible (12.29%). The most common etiological factor was topical steroid use seen in 43% of patients. Hyperandrogenism was observed in 19.38% but hyperandrogenemia in only 3.75% of females. Scarring was recorded in 82% and psychological stress in 53% of patients.

Conclusion

Adult acne is more common in females, with both external and internal factors playing significant roles. It is primarily facial and inflammatory, often leading to scarring and psychological comorbidities, significantly impairing quality of life. Early and adequate treatment is crucial.

Recommendations

Early and adequate treatment of adult acne is crucial to prevent significant scarring and psychological comorbidities. Further large-scale studies are recommended to validate these findings and optimize management strategies.

Keywords: adult acne, hyperandrogenism, females, external factors, scarring

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Introduction:

Acne vulgaris is one of the most frequently encountered skin diseases in dermatology occurs primarily at puberty with 85% of lifetime prevalence.[1,2,3] Acne has typically been regarded as an adolescent condition; however, in the past two decades, findings from research and clinical practice have revealed that the prevalence of acne in adult patients is increasing.[1, 3] The classic definition of adult acne is the existence of acne after the age of 25.[1, 4] Adult acne comes

in two flavors: late-onset and chronic acne. When teenage acne continues over the age of 25, it's referred to as persistent adult acne, and when acne appears for the first time after that age, it's referred to as late-onset adult acne.[1, 4] Both types are more common in women, as compared to adolescent acne which is common in boys. Despite the higher prevalence of adult acne, there is limited research investigating acne in adult patients. The objectives of this study were to find out the prevalence, clinical pattern, contributing etiological and aggravating factors, and complications of adult acne in the Indian population.

Materials and methods

Study design

A prospective observational study

Study setting

The study was conducted at the Department of Skin and Venereal Diseases, S.C.B. Medical College and Hospital, Cuttack, from August 2014 to July 2015.

Participants

The study included 200 individuals.

Inclusion criteria

Patients over 25 presented with acne in the outpatient department were included in the study.

Exclusion criteria

The study excluded patients with acne secondary to medication use other than topical steroids, with known endocrine disorders unrelated to hyperandrogenism, or with other significant dermatological conditions that could interfere with acne diagnosis and assessment.

Bias

There was a chance that bias would arise when the study first started, but it was avoided by giving all participants identical information and hiding the group allocation from the nurses who collected the data.

Procedure

After obtaining a fully informed and written consent, a detailed history and examination for each patient was recorded on a printed proforma, including aggravating factors, and medical and family history. Menstrual history and the influence of pregnancy on acne were obtained in female patients. Clinical assessment of each patient included types of acne lesions, distribution, severity, and grading of acne. Photographs were taken for each patient after consent. Acne was graded using a simple system proposed by Indian authors. [5]

Grade I (mild): Comedones, occasional papules

Grade II (moderate): Comedones, many papules few pustules

Grade III (severe): Predominantly pustules, nodules and abscesses

Grade IV (cystic): Mainly cysts or abscesses, widespread scarring

Other signs of hyperandrogenism [6] like hirsutism, androgenetic alopecia, menstrual irregularity, acanthosis nigricans, cushingoid facies, and obesity were also noted. To find out underlying hormonal imbalance, investigations like serum testosterone (total and free), serum dehydroepiandrosterone (DHEAS), luteinizing hormone (LH), follicular stimulating hormone (FSH), prolactin (PRL), fasting glucose / fasting insulin ratio (G/I), thyroid stimulating hormone (TSH), T3, T4 level and ultrasonography of abdomen and pelvis were done when indicated.

Acne scars were graded into macular, mild, moderate, and severe according to the qualitative scarring grading system.[7] Types of acne scars were also recorded. Psychological stress was assessed by the 4-item Patient Health Questionnaire (PHQ-4).[8] The PHQ-4 is a self-administered questionnaire assessing core depression and anxiety symptoms in the past two weeks. Each PHQ-4 item is responded to on a 4-point scale from 0 (not at all) to 3 (nearly every day) and the total score is interpreted as normal (scores of 0-2), mild (3-5), moderate (6-8), and severe (9-12) depression or anxiety. The PHQ-4 has been validated in the general population.[9]

Statistical analysis

The data was entered in Microsoft Excel 2007 and analyzed using SPSS (version 21) software. The categorical values were expressed in terms of proportions and percentages. The chi-square test was used to see the statistical significance between the two proportions. $P < 0.05$ was considered as statistically significant.

Ethical considerations

The study was approved by the institutional ethics committee and conducted according to the ethical standard.

Result

The study included 200 patients, 160 female (80%) and 40 (20%) males. Prevalence of adult acne was found to be 0.63% (200 out of 31,434 adult patients attending the OPD

during the study period). Mean age of patients was 31.88 ±1.325 years with a range of 26-55 years. The proportion of population of different age group is detailed in **Table 1**.

Tables:

Table 1: Age and sex distribution of study sample

Age group (years)	Male Number (%) [*]	Female Number (%) [*]	Total Number (%)
26-30	19 (18.63)	83 (81.37)	102 (51)
31-35	15 (21.43)	55 (78.57)	70 (35)
36-40	5 (21.74)	18 (78.26)	23 (11.5)
41-45	-	3 (100)	3 (1.5)
46-50	-	-	-
51-55	1 (50)	1 (50)	2 (1)
Total	40 (20)	160 (80)	200 (100)

^{*}Row percentage

Table 2: Gender wise distribution of demographic and clinical profile of adult acne

	Male Number (%) [*]	Female Number (%) [*]	Total Number (%)	P-value [†]
Resident				
Rural	17 (21.52)	62 (78.48)	79 (39.5)	-
Urban	23 (19)	98 (81)	121 (60.5)	-
Occupation				
Student	12 (22.64)	41 (77.36)	53 (26.5)	-
Housewife	-	61 (100)	61 (30.5)	-
Service and business class	28 (32.56)	58 (67.44)	86 (43)	-
Types of acne				
Persistent	34 (26.56)	94 (73.44)	128 (64)	
Late-onset	6 (8.33)	66 (91.66)	72 (36)	0.0019 [s]
Grade of acne				
Grade I	6 (60)	4 (40)	10 (5)	0.0045 [s]
Grade II	27 (23.89)	86 (76.11)	113 (56.5)	0.1166
Grade III	5 (10.64)	42 (89.36)	47 (23.5)	0.0665
Grade IV	2 (6.66)	28 (93.33)	30 (15)	0.0476 [s]
Predominant site				
Cheek	13 (9.85)	119 (90.15)	132 (70.56)	0.0004 [s]
Forehead	9 (56.25)	7 (43.75)	16 (8.56)	0.0001 [s]
Mandible	3 (13.04)	20 (86.96)	23 (12.29)	0.7972
Chin	2 (20)	8 (80)	10 (5.34)	0.8558
Nose	5 (83.33)	1 (16.66)	6 (3.2)	0.0001 [s]
Trunk	8 (61.54)	5 (38.46)	13 (6.5)	0.0004 [s]

^{*}Row percentage; [†]Pearson Chi-square test.

The demographic and clinical profiles were summarized in **Table 2**. Out of 200, 128 patients (64%) had persistent acne. Gender wise, late onset acne was predominantly found in females [**P < 0.05**]. Face was involved in 93.5% (187/200) of patients while only truncal involvement without face was observed in 6.5% (13/200) patients. On the face, predominant site of involvement was cheek in majority

(70.56%). Gender wise, cheek involvement was more common in females [**P < 0.05**] whereas forehead, nose and trunk involvement in males [**P < 0.05**]. Majority (56.5%) of patients had grade II acne. Grade I acne was significantly more common in males [**P < 0.05**], whereas grade IV in females [**P < 0.05**]. Majority of patients with late onset acne had predominantly inflammatory papulo-pustular lesions.

Male patients who were smoker had predominantly comedonal lesion [Figure 1].



Comedonal acne in a 32-year-old male with smoking as an aggravating factor

Figure 1: Family history of acne with at least one first degree relative involved was present in 45.5% (91/200) patients and it was found to be more common in patients with persistent type of acne than late onset type [$P < 0.05$].

Table 3: Clinical and laboratory evidence of hyperandrogenism in female adult acne

	Number of patients (Total=160) (%)
Clinical features of HA	31 (19.38)
Androgenetic alopecia	7 (4.4)
Hirsutism	9 (5.6)
Menstrual irregularity	8 (5)
Obesity	20 (12.5)
Acanthosis nigricans	15 (9.4)
Abnormal laboratory findings	12 (7.5)
Raised free testosterone	6 (3.75)
Raised LH	2 (1.25)
Decreased FSH	2 (1.25)
USG findings of PCOS	6 (3.75)
Fasting G/I ratio <4.5	4 (2.5)
Raised TSH and low T ₃ , T ₄	1 (0.625)
Raised prolactin	1 (0.625)

Note: the results are not mutually exclusive; percentage may not equal to 100 percent; HA: Hyperandrogenism; LH: Luteinizing hormone; FSH: Follicular stimulating hormone; PCOS: Polycystic ovary syndrome; G/I: Glucose/insulin ratio; TSH: Thyroid stimulating hormone.

31 out of 160 females (19.38%) showed at least one clinical feature of hyperandrogenism. Abnormal laboratory findings were observed in 12 (7.5%) patients, details of which are summarized in Table 3. Premenstrual flare was observed in 41.25% of females.

Figure 2 depicts the contributing etiological and aggravating factors. 43% of patients (86/200) had onset of their acne after use of topical steroid. Underlying diseases was found in 12 females including PCOS in six, insulin

resistance in four and hyperprolactinemia and hypothyroid in one patient each. Diet, cosmetics and smoking were aggravating factors in 7 (3.5%), 30 (15%) and 5 (2.5%) patients respectively. Seasonal aggravation in acne was noted, summer being the most common (29.6%), followed by winter (7.5%) and rainy (1.2%) season. Sunlight was responsible for aggravation in 27 (13.5%) and stress in 32 (16%) patients. 15 patients had onset of their acne after taking some systemic drugs (corticosteroid in 8 patients, potassium iodide and antithyroid drug in 2 patients each,

phenytoin, lithium and antitubercular therapy in 1 patient each).

Figure 2: Out of 103 female patients, who had a history of pregnancy in the past, worsening of acne during pregnancy was noted by 17.48% of patients, improvement in 12.62% while majority (69.90%) of patients had no changes.



Table 4: Gender wise distribution of complications of adult acne

	Male Number (%) *	Female Number (%) *	Total Number (%)	P-value [†]
Scarring[‡]				
Macular	11 (14.86)	63 (85.14)	74 (45.12)	0.4957
Mild	10 (18.87)	43 (81.13)	53 (32.32)	0.6730
Moderate	4 (14.29)	24 (85.71)	28 (17.07)	0.6671
Severe	3 (33.33)	6 (66.67)	9 (5.49)	0.1823
Psychological stress (PHQ-4 Score)[§]				
Normal (Score 0-2)	13 (24.07)	41 (75.92)	54 (77)	0.1368
Mild (Score 3-5)	11 (39.28)	17 (60.71)	28 (14)	0.5621
Moderate (Score 6-8)	6 (35.29)	11 (64.71)	17 (8.5%)	0.3353
Severe (Score 9-12)	-	7 (100)	7 (3.5%)	0.0311 [s]

*Row percentage; [†]Pearson Chi-square test; $P < 0.05$ is statistically significant

[‡]According to qualitative scarring grading system^[7]

[§]According to Patient Health Questionnaire (PHQ-4)^[8]

Complications of acne studied included facial scarring and psychological stress, described in **Table 4**. Scarring was observed in 82% (164/200) and psychological stress in 53% (106/200) of patients. PHQ-4 Score indicates the majority of patients had mild-to-moderate symptoms of depression and/or anxiety and severe symptoms were more common in females [$P < 0.05$]. Most common type of scar was persistent pigmented macules (45.12%), followed by icepick scar (27.44%). Hypertrophic scar was more common in males as compared to females [$P < 0.05$].

Discussion

Since acne is now more common among adults, it can no longer be regarded as a teenage condition. Adult acne is more common in women.[4] similarly, in the study, women

were predominantly affected (80%) as compared to men (20%). Hormonal factors, increased use of cosmetics, the stress of modern life, sleep deprivation, and exposure to hot and humid conditions during cooking may play a role in the increased prevalence of adult acne in females. [1,10]

Adult acne may develop late in life, starting in maturity, or it may persist from adolescence. Our study revealed persistent acne in the majority (64%) and female predominance in late-onset acne, which is consistent with previous studies. [1,4]

It has been suggested that familial factors are important in determining individual susceptibility to adult persistent acne.[11] In the study, positive family history was noted in 45.5% of patients and it was more common in patients with persistent type of acne. Previous studies demonstrate positive family history in 38%-67% of patients. [1,4,12,13]

Regarding clinical presentation, adult acne usually presents gradually and is mild-to-moderate in severity in contrast to adolescent acne which may develop rapidly and present as severe disease. [14,15] In our study, the majority of patients presented with inflammatory papules and were of moderate severity (grade II in 56.5%). This is consistent with the results of some studies. [1,4,12] In this study, smokers had predominantly comedonal acne. [16]

Adult acne is predominantly facial and a similar result was observed in this study. It has been suggested that facial acne is typically present in the U-zone (cheeks, peri-oral, and lower chin area) in adults, compared to the T-zone (forehead, nose, upper chin area) in adolescents.[17] In the study, the cheek was the predominant site to be involved in the majority followed by the mandible and this is in concordance with the studies of[1] and [3]but in contrast, recently a large-scale international study on adult acne reported that majority of adult had acne involves multiple areas of the face, similar to that observed in adolescents.[18]

Since adult acne is more common in women, the underlying hormonal imbalance was always given importance. However, some authors suggested that the end organ hypersensitivity and not the androgen levels may be the central factor in the development of adult acne in women. [13,14,19]. In the current study, 19.38% of females had at least one clinical feature of hyperandrogenism and amongst them, only 3.75% of patients had hyperandrogenemia (raised serum testosterone level). In comparison, a study reported hyperandrogenism in 25.6% and hyperandrogenemia in 3.04% of females.[1]

The premenstrual flare of acne may be related to the altered response of cutaneous androgen receptors to the physiological hormonal changes of the menstrual cycle. In this study, it was observed in 41.25% of females, whereas some studies reported premenstrual flare in 11.7%, 84.8%, and 56 % respectively. [1, 4, 20]

Steroids have been implicated in the causation of acne by inducing hypercornification of the upper portion of the pilosebaceous unit.[1] The majority (43%) of the patients reported the onset of acne after the use of topical steroids, which emphasizes that external factors also play a significant role in adult acne. This may be due to the rampant prescription of topical steroids by some physicians and quacks as well as misuse by many patients for cosmetic purposes due to unawareness. In contrast to this study, a study reported a less significant role of external factors in adult acne. [4]

The proposed mechanism behind acne in underlying endocrine disorders is increased production of adrenal and ovarian androgen.[6] In this study, acne due to underlying disease (polycystic ovary syndrome [6], insulin resistance [4], hypothyroidism [1], and hyperprolactinemia [1]) was observed in 6% (12/200) of patients. However polycystic ovaries have been reported in 52-82% of patients with adult acne.[21] A study reported hyperprolactinemia in 45% of their female acne patients [22]and another study found a significant association of hypothyroidism with adult female acne. [23]

Cosmetic-induced acne has been originally discussed as an important cause of acne in females.[24] however, this factor remains controversial. In this study, 15% of patient had onset of their acne after using some form of cosmetics. Similarly, some studies found cosmetics-induced acne in 39.9%, 64.6%, and 62% of their patient respectively, [3,12,25] whereas in other studies the cosmetic factor is not shown as an aggravating factor for acne in adult females. [4,26] This could be explained by the wide variety of products grouped under the term 'cosmetics', some being more involved than others in the development of acne.

It has been suggested that chronic stress might be a possible cause of increased androgen secretion in some women, resulting in the pathogenesis of acne in such patients. [1] This study revealed stress as an aggravating factor for acne only in 7.5% of patients, in contrast to other studies [1,3,4,25] where aggravation of acne due to stress was noted in the majority (25-71%) of patients.

In 15 of the patients, it was evident that the acne was precipitated due to systemic drug use. Almost similar results were reported by some studies. [1,4]

UV radiation (causes inflammation and generates squalene peroxides, which are highly comedogenic), increased humidity, and sweating may play a role in the aggravation of acne.[1] In this study, aggravation of acne due to summer season and sun exposure was noted in 5% and 7.5% of patients respectively. However, a study observed summer aggravation of acne in a majority (80.62%) of patients [27] and a study reported sun exposure and summer aggravation in 32% and 36.7% of patients respectively. [1]

The epidemiological link between high glycemic load and dairy food has been established, the molecular trigger appears to be based on elevations in IGF-1 and insulin, which is stimulated by dairy and high glycemic load food.[28] In our study, diet (chocolates and milk products) as an aggravating factor for acne was found in 3.5% of patients.

Worsening of acne during pregnancy was noted in 17.48% of the patients while improvement was seen in 12.62%, out of 103 females who had a history of pregnancy in the past. This is in contrast to the study which reported improvement in the majority than worsening. [3,4]

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As adult acne is more inflammatory, resistant to treatment, and treatment is often delayed, scarring is more common in adult acne as compared to adolescent acne. The current study revealed scarring in the majority (82%). Studies reported scarring in 77.2% of men and 58.5% of women.[4] Similarly, a study found scarring in 76.4% of patients. [1]

As facial appearance represents an important aspect of one's perception of body image, individuals with facial acne may develop significant psychosocial disability. The disease has a greater negative impact on the quality of life of adult patients than their younger counterparts.[29] The study observed psychological stress due to acne in 53% of patients. Similarly, some studies found psychological stress in 52.8% and 63% of patients respectively. [3, 11]

Generalizability

The study's findings on the prevalence, etiological factors, and complications of adult acne highlight patterns likely relevant to broader populations, emphasizing the need for early and comprehensive treatment. Further large-scale studies are necessary to confirm these results and optimize management across diverse demographics.

Conclusion

Adults with acne are a unique and under-studied patient population, despite their increasing prevalence. The findings from this study highlight the multifaceted etiological factors as well as the impacts of acne in adults. Hyperandrogenism is thought to be the main etiology of acne in women of this age group, however, in most cases, there is no associated endocrine disease. On the other hand, external factors also play an important etiological role in the majority. Thus there is no predominant etiopathogenetic factor in adult acne and is still a matter of debate. Acne in adults is mostly facial and inflammatory, thus leading to scarring and psychological comorbidities in the majority of patients, which impair the quality of life significantly. This emphasizes that adult acne should not be neglected and should be treated early and adequately. As this was a hospital-based study, results may not reflect the status of the disease in a community but it depicts the general trend of the disease. However, more numbers of large-scale studies are required to validate and confirm our findings and to identify the best approaches to management that will meet the needs of these patients.

Limitations

The major limitation of the study is an investigation for underlying hormonal imbalance couldn't be done in all patients and response to treatment was not studied.

Recommendation

Early and adequate treatment of adult acne is crucial to prevent significant scarring and psychological comorbidities. Further large-scale studies are recommended to validate these findings and optimize management strategies.

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Conflict of interest

The authors have no competing interests to declare.

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