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Original Research Article

Precipitating and aggravating factors of acne: a cross-sectional study in a tertiary care hospital

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ABSTRACT

Background: Acne vulgaris is a common chronic inflammatory disorder of the pilosebaceous units, characterized by comedones, papules, pustules, nodules and scarring. It predominantly affects adolescents and young adults due to hormonal changes, increased sebum production, bacterial colonization (mainly Propionibacterium acnes) and genetic predisposition. Although not life-threatening, acne can lead to significant psychological distress and often requires medical or systemic therapy. To identify the precipitating and aggravating factors contributing to acne among patients attending a tertiary care hospital.

Methods: This descriptive cross-sectional study was conducted in the Department of Dermatology and Venereology, Combined Military Hospital (CMH), Dhaka, from March to August 2022. A total of 1200 acne patients aged 11–45 years were selected using purposive sampling. After informed consent, data were collected through structured interviews and clinical examinations. Patients with systemic illness, on hormonal therapy or under current acne treatment were excluded. Data were analyzed using SPSS version 22.

Results: Among 1200 participants, 59.1% were aged 16–20 years (mean age 20.58±5.18) and 77.5% were unmarried. The cheeks (85.8%) and forehead (75.8%) were the most affected sites. Oily skin (70.8%) and papular lesions (81.6%) predominated, with moderate severity in 59.2%. Pigmentation (71.6%) was the commonest sequela. Major aggravating factors included cosmetics (27.5%), topical steroids (26.6%), stress (24.1%), sunlight exposure (20%) and skin pricking (15%).

Conclusions: Acne is more prevalent among young females. Family history, cosmetic and steroid use, stress, sunlight and hormonal fluctuations are major precipitating and aggravating factors.

Keywords: Acne vulgaris, Aggravating factors, Adolescents, Precipitating factors, Stress, Sunlight exposure

INTRODUCTION

Acne vulgaris is one of the most common skin disorders worldwide and typically presents as non-inflammatory lesions, inflammatory lesions or a mixture of both, due to blockage and/or inflammation of pilosebaceous units (hair follicles and their accompanying sebaceous gland).[1] Acne vulgaris is characterized by seborrhea, formation of open and closed comedones, papules, pustules and often nodules.[2] It affects the majority of people to a certain degree at some point during their adolescent age.[3] It has been reported that acne vulgaris is a very common disease with a prevalence of up to 80.0% during adolescence.[4] Although overall health is not impaired, acne is not a trivial disease; it can produce cutaneous and emotional scars that last a lifetime.[5]

Inflammation causes continuous accumulation of sebum within microcomedon leading to follicular dilatation, wall thinning and ultimately follicular rupture. Then there will be accumulation of T lymphocyte, neutrophil, FB type giant cell which leads to formation of inflammatory papules, pustules, nodules and scar.[6] Retention hyperkeratosis is the first recognized event in the development of acne vulgaris.[7] The exact underlying cause of this hyperproliferation is not known. Currently, a few leading hypotheses have been proposed to explain why the follicular epithelium produces cells at a rapid rate that are retained in individuals with acne. First, androgen hormones have been implicated as the initial trigger.[8] Comedones, the clinical lesion that results from follicular plugging, begin to appear around adrenarche in persons with acne in the T-zone area. Furthermore, the degree of comedonal acne in prepubertal girls correlates with circulating levels of the adrenal androgen dehydroepiandrosterone sulfate (DHEA-S).[9]

Excess sebum is another key factor in the development, of acne vulgaris. Sebum production and excretion are regulated by a number of different hormones and mediators. In particular, androgen hormones promote sebum production and release.[10] Androgen hormones are not the only regulators of the human sebaceous gland. Studies have shown that P-acnes activate the toll-like receptor 2 on monocytes and neutrophils.[11] Activation of the toll-like receptor 2 then leads to the production of multiple proinflammatory cytokines, including interleukin 12 and 8 and tumor necrosis factor. Hypersensitivity to P. acnes may also explain why some individuals develop inflammatory acne vulgaris while others do not.[12] Inflammation may be a primary phenomenon or a secondary phenomenon. Most of the evidence to date suggests a secondary inflammatory response to P. acnes.

However, interleukin 1-alpha expression has been identified in microcomedones and it may play a role in the development of acne.[13] There is solid evidence of a genetic background for this disease.[14] The clinical presentation of acne can range from a mild comedonal form to severe inflammatory cystic acne of the face, chest and back. Acne vulgaris typically affects those areas of the body that have the greatest number of sebaceous glands including, the face, neck, chest, upper back and upper arms. Hyperpigmentation is most common in patients with darker complexions and individual lesions may take several months or more to resolve without treatment. Adult women may present with acne involving the lower face and neck associated with premenstrual flares. These women, in particular, seem to benefit from hormonal therapies for acne.[14]

Premenstrual flares of acne appear to be more common in women over the age of 33 than in women aged 20-33 years. There is no single disease that causes more psychiatric trauma, insecurity, feeling of inferiority and greater sum of psychiatric trauma than acne vulgaris.[15] There is no universal classification system for acne vulgaris. A description of the actual lesions encountered was most useful when considering the management of acne. There are various factors that can influence the development and severity. There is evidence to suggest a genetic predisposition to acne particularly if a parent or both parents, suffered from inflammatory acne.[16] According to Fulton et al acne is inherited as an autosomal dominant gene.[17]

Objectives

General objective

To assess the precipitating and aggravating factors associated with acne among patients attending a tertiary care hospital.

Specific objectives

To identify the factors that precipitate the onset of acne in the study population. To determine the factors that aggravate or worsen acne among affected individuals.

METHODS

Study design

This was a cross-sectional observational study conducted in the Department of Dermatology and Venereology at Combined Military Hospital (CMH), Dhaka. The study was carried out over a period of six months, from March 2022 to August 2022. The study population included all patients presenting with acne who attended the outpatient department (OPD) of the Dermatology and Venereology Department at CMH, Dhaka during the study period.

Sample size determination

It was calculated using the formula.

$n=(Z^2\times P\times(1-P))/d^2$

Here, n=required sample size;

Z=Confidence limit (i.e. normal -standard deviation corresponding to 95% confidence interval whose value is =1.96. P = the prevalence rate, which in our case will be 0.0983 assuming 9.38% prevalence and d = margin of error 0.065. One thousand and two hundred patients with acne attending the outpatient department of the Department of Dermatology and Venereology were studied.

Inclusion criteria

This study included patients who presented with clinical features of acne and were within the age range of 11 to 45 years, regardless of sex. Both male and female participants who provided informed written consent were eligible for inclusion in the study.

Exclusion criteria

Patients were excluded if they were younger than 11 years or older than 45 years or if they were unable or unwilling to give informed consent. Additional exclusion criteria included current use of oral contraceptives, pregnancy or lactation, presence of any concomitant systemic illness and ongoing use of topical or systemic medications for acne treatment, as these factors could potentially influence acne presentation and confound study findings.

Sampling method

Patients presented with acne were selected by purposive sampling for the study as per the inclusion and exclusion criteria.

Study procedures

All patients with acne attending the Department of Dermatology and Venereology were recruited as per the inclusion and exclusion criteria. After taking the formal consent of the patient, a detail history and examination were performed and were recorded in a preset data form. Past history of illness and any systemic disease was inquired about cautiously. All reports were properly recorded in the data sheet.

Data collection

Data were collected using a pre-formatted data collection sheet. The relevant sociodemographic data of these patients were collected and recorded. Data were collected by the researcher herself.

Statistical analysis

All data were recorded systematically in pre-formatted data collection form (questionnaire). Quantitative data were expressed as mean and standard deviation and qualitative data were expressed as frequency distribution and percentage. Statistical analysis was performed by SPSS software version 22.

Ethical consideration

Prior to the commencement of this study, the research protocol was approved by the ethical committee of AFMI. The aims and objectives of the study along with its procedure, methods, risks and benefits of this study were explained to the respondent in easily understandable local language and then informed consent was taken from each patient, it was assured that all information's and records would be kept confidential and the procedure was helpful for both the physicians and the patients in making rational approach of the case management.

RESULTS

The present cross-sectional observational, study was conducted in the Department of Dermatology and Venereology, Armed Forces Medical Institute, Dhaka. The study was conducted from March 2022 to August 2022 for a duration of six months. A total of 1200 patients with acne were enrolled in this study. Table 1 presents the demographic characteristics of 1200 acne patients. The majority 59.1% were aged between 16–20 years, with a mean age of 20.58±5.18 years. Females constituted 63.3% of the study population. Most participants were Muslims 82.5% and students represented the largest occupational group 53.3%. Among female participants, 76.3% had regular menstruation, with the mean age of menarche being 12.65±0.92 years.

Table 1: Demographic data presentation of study population (n=1200).

	Frequency	%
Age (in years)		
11-15	70	5.8
16-20	710	59.1
21-25	290	24.1
26-45	130	10.8
Mean±SD	20.58±5.18 (11-45)	
Sex		
Male	440	36.7
Female	760	63.3
Religion		
Muslim	990	82.5
Hindu	190	15.8
Christian	20	1.6
Occupation		
Service	280	23.3
Housewife	130	10.8
Unemployed	60	5.0
Student	640	53.3
Other	90	7.5
Service	280	23.3
Menstruation		
Regular	580	76.3
Irregular	180	23.6
Age of menarche	12.65±0.92 (11-15)	

Table 2 shows the distribution of patients by marital status. The majority of the participants 77.5% were unmarried, while 22.5% were married, reflecting a predominance of younger individuals in the study population.

Table 2: Distribution of patients by marital status (n=1200).

Marital status	Frequency	%
Unmarried	930	77.5
Married	270	22.5

Table 3: Distribution of patients by age of onset of the lesion (n=1200).

Age of onset of lesion (in years)	Frequency	%
11-15	260	21.6
16-20	670	55.8
21-25	180	15.0
26-45	90	7.5

Table 3 presents the distribution of patients by age of onset of acne lesions. More than half of the patients 55.8% experienced the onset between 16–20 years, followed by 21.6% in the 11–15 age group. Fewer cases began between 21–25 years 15.0% and 26–45 years 7.5%, indicating that adolescence is the most common period for acne onset. Figure 1 shows the distribution of patients by disease duration. 30.0 % patients' duration of disease was more than 24 months followed by 20.8%, 20.0%, 16.7 % and 12.5% patients' duration of disease as 12 months, 6 months, 9 months and 4 months respectively.

Table 4: Distribution of patients/by site of lesions.

Site of lesions	Frequency	%
Cheek	1030	85.8
Forehead	910	75.8
Chin	740	61.6
Nose	290	24.1
Shoulder	190	15.8
Upper back	180	15.0
Chest	170	14.1
Back of the neck	60	5.0
front of the neck	50	4.1
Lower back	20	1.2

Table 4 shows the site of lesions of acne in patients. Cheek 1030 (85.8%), forehead 910 (75.8%) and chin 740 (61.6%) were the most common sites of lesion followed by nose 24.1%, shoulder15.8%, upper back 15.0%, chest 14.1%, back of neck 5.0%, front of neck 4.1% and lower back 1.2% respectively. Table 5 shows dermatologic examination findings of the patients. 50.0% (600) of the patients with acne had itching, 22.5% (270) had pain and 20% (240) had soreness. The highest number of patients had oily skin 850 (70.8%); normal and dry skin were 90 (7.5 %) and 60 (5%) respectively.

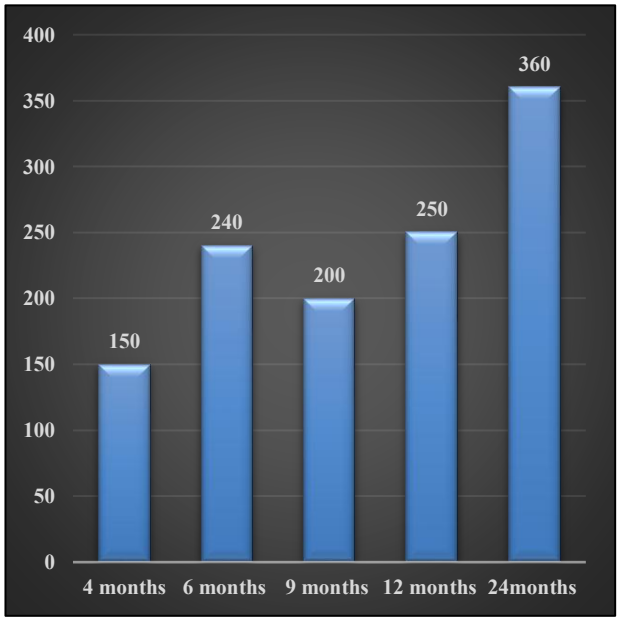

Figure 1: Distribution of patients by duration of disease.

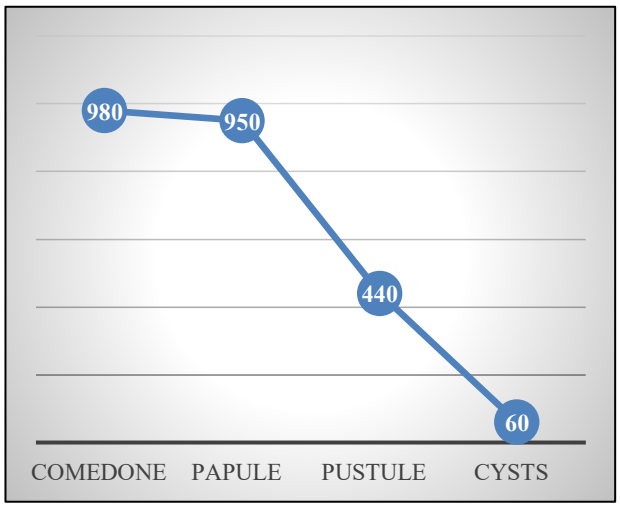

Figure 2: Distribution of patients by signs of lesions.

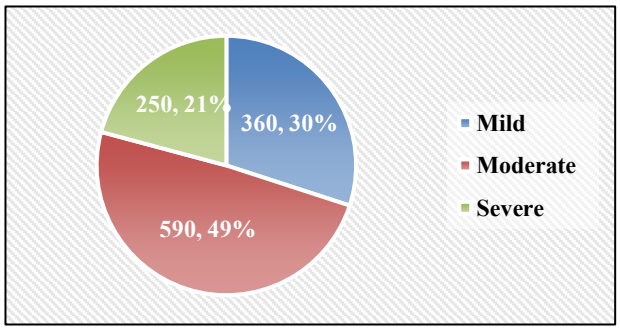

Figure 3: Distribution of patients by severity of lesions.

Table 5: Distribution of patients by dermatologic symptoms (n=1200).

Dermatologic examination	Frequency	%
Itching	600	50.0
Burning	30	2.5
Pain	270	22.5
Soreness	240	20.0
Type of skin		
Normal	90	7.5
Dry	60	5.0
Oily	850	70.8

Table 6: Distribution of patients by type of lesions and physical sequel of lesions (n=1200).

	Frequency	%
Type of lesion		
Inflammatory	550	45.8
Non-inflammatory	650	54.2
Physical sequelae of lesions		
Scar	250	20.8
Pigmentation	860	71.6
Pitting	100	8.3
Cysts	50	4.2

Table 7: Distribution of patients by precipitating and aggravating factors.

	Frequency	%
Acne precipitating/ aggravating factors		
Family history	430	35.8
Stressful event	290	24.1
Weather		
Humid	60	5.0
Dry	70	5.8
Hot	50	4.2
Cold	30	2.5
Premenstrual period	110	9.2
Aggressive washing	20	1.6
Using steroids		
Topical	320	26.6
Systemic	20	1.6
Medication other than steroids	90	7.5
Exposure of sunlight	240	20.0
Cosmetics	330	27.5
Food	140	11.6
Skin pricking	180	15.0

Figure 2 shows the distribution of different types of acne lesions observed in a study population. Comedones were the most prevalent, with a count of 980, followed closely by papules at 950 patients. There is a significant drop in the number of pustules, recorded at 440 and an even more pronounced decrease in cysts, which were the least common at just 60 patients. Table 6 reveals that the majority of acne lesions (54.2%) were noninflammatory in nature. It also shows that pigmentation was the most common physical sequela, observed in 71.6% of patients, followed by scars in 20.8%, pitting in 8.3% and cyst formation in 4.2% of cases. Figure 3 shows the distribution of cases across three categories mild (21%, 250 cases), moderate (30%, 360 cases) and severe (49%, 590 cases) highlighting that nearly half of the cases fall into the Severe category, while Mild cases constitute the smallest proportion. Table 7 shows the. distribution of patients by precipitating and aggravating factors. Highest observed precipitating/aggravating factor was use of cosmetics 33 (27.5 %) followed by use of topical steroid 32 (26.6 %) and emotional stress 29 (24.1%). Dry weather aggravated acne in 5.8%. cases. Premenstrual period was an aggravating factor in 1 (6.7%) case. Aggressive face washing was related to acne in only 2 (1.6 %) case. Exposure to sunlight and skin pricking induces 24 (20%) and 18 (15%) cases of acne flare.

DISCUSSION

The study revealed that acne predominantly affected younger individuals, with the highest prevalence observed in the 16–20 years age group (59.1%), followed by the 21–25 years age group (24.1%). The mean age of the study population was 20.58 years (±5.18), reinforcing that acne is primarily a condition of adolescence and early adulthood. These findings align with previous studies indicating that acne vulgaris peaks during puberty due to increased sebum production and hormonal fluctuations.[18]

A similar study by Smith et al reported that 62% of acne cases occurred in individuals aged 15–20 years, corroborating our observations.[19] Marital status appeared to influence acne distribution, with 77.5% of patients being unmarried. This could be attributed to the younger demographic of unmarried individuals, who are more likely to experience hormonal acne. A study by Lee et al and Kim et al found that unmarried adolescents had a higher incidence of acne, possibly due to lifestyle factors such as stress and dietary habits.[20] The most common site for acne lesions was the cheek (85.8%), followed by the forehead (75.8%) and chin (61.6%), consistent with the typical distribution of acne in the T-zone due to high sebaceous gland density. Similar findings were reported by Williams et al where facial acne was most prevalent in the cheek and forehead regions.[21] Notably, non-inflammatory lesions (54.2%) were more common than inflammatory ones, which aligns with the natural progression of acne from comedones to inflamed lesions.

A study by Johnson et al also found that comedonal acne was the most frequent subtype in early acne stages.[22] Severe acne accounted for nearly half of the cases (49%), indicating a significant disease burden requiring medical intervention. This finding is supported by a study by Chen et al where severe acne prevalence was 45%, highlighting the need for early therapeutic management.[23]

Additionally, pigmentation (71.6%) and scarring (20.8%) were common sequelae, emphasizing the long-term impact of untreated or poorly managed acne, as noted in a study

by Brown et al.[24] Precipitating and aggravating factors included cosmetic use (27.5%), topical steroid application (26.6%) and stressful event (24.1%), which are well-documented triggers in existing literature. A study by Patel et al identified cosmetics and stress as major exacerbating factors in acne patients.[25] Interestingly, aggressive face washing was a minor contributor (1.6%), contradicting the myth that excessive cleansing prevents acne, as discussed in a study by Taylor et al.[26]

Limitation

The study was conducted in a single center in Dhaka city which may not be representative of the whole population.

CONCLUSION

There are some precipitating and aggravating factors responsible for acne flares. Acne is more predominant in female patients and in the younger age group and students. Positive family history, use of topical steroids, cosmetics use, exposure to sunlight, stressful events, skin pricking and premenstrual period are the most common precipitating or aggravating factors for acne.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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