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ACNE VULGARIS AMONG MEDICAL STUDENTS IN MOSUL CITY, PREVALENCE, PATTERNS AND CONTRIBUTING FACTORS

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ABSTRACT

Background: A chronic inflammatory skin condition known as acne vulgaris; it affects around 9.4% of people globally. Around 85% of male and female adolescents suffer from this disorder, which may continue into adulthood after puberty. *Propionibacterium acnes*, increased sebum production by androgens, inflammation, and blockage of the sebaceous follicles are some of the theories through explain acne. **Aim of the study:** To estimate the prevalence of acne vulgaris among medical students at the University of Mosul and to assess its patterns and contributing factors. **Methods:** A cross-sectional study; was adopted to achieve the objectives of the study. Data was collected from the participants retrospectively using convenient sampling technique to assess the prevalence of acne vulgaris among College of Medicine students at the University of Mosul. the questionnaire was composed of five sections, section one was to cover socio-demographic parameters, section two was for skin details, section three was for acne risk factors, section four of acne distribution, and section five was for acne treatment and complications. **Results:** The study included 755 subjects, with acne prevalence being (76.82%), mean (±SD) age is 21.6 (±2.2) years, with 301 (40%) being males, and 454 (60%) being females. Subjects with acne were more likely to be female, have an oily or mixed skin type, have used soap for face wash, with positive family history of acne, have psychological upset, acne can worse with menses,(53.9 %) have acne for more than one year, scar was reported among (47%) of the college of medicine students with the face was the predominant site of acne scar. **Conclusions:** Acne vulgaris can have multiple causes, and is sometimes unpredictable. It affects females mainly. Having oily skin is highly amenable to acne and develops scars. Using improper soap and skin cleanser may aggravate acne. Hereditary factors play a significant role in acne and acne scar appearance. Pustular and nodular variant types of acne are more likely to end in scar. Early treatment of acne vulgaris can improve the overall prognosis and prevent scar formation.

KEYWORDS: Acne vulgaris, contributing factors, Iraq, Mosul, Prevalence, patterns.

INTRODUCTION

A chronic inflammatory skin condition known as acne vulgaris; it affects around 9.4% of people globally. Around 85% of male and female adolescents suffer from this disorder, which may continue into adulthood after puberty.[1] *Propionibacterium acnes*, increased sebum production by androgens, inflammation, and blockage of the sebaceous follicles are some of the theories through explain acne.[2]

It's still unclear what exactly causes acne and what risk factors contribute to its development.[3] The severity of acne varies based on the kind and size of lesions, the degree of involvement, the existence of inflammation, and how long scars last.[4] In moderate-to-severe cases, oral and topical drugs such as antibiotics, topical retinoids, and oral contraceptives are administered. Generally, it is treated using over-the-counter topical remedies.[5]

Globally, it was estimated that there were 117.4 million incident cases of acne vulgaris and 231.2 million prevalent cases with an increase of approximately 48% compared with 1990.[6]

Contributing Factors for Acne
1 Genetic factors
2 Diet
3 Endocrine disorders
4 Drug-induced acne
6 Skin care products
7 Bacterial Propionibacterium acnes (P acne).[7]

Acne Epidemiology
Among all skin diseases, acne vulgaris is the eighth most frequent worldwide, with an estimated 9.3% prevalence across all age groups.[8] Acne prevalence varies among countries and age groups; estimations range from 35% to nearly 100% of adolescents experiencing acne at some point in their life.[9]

The prevalence of acne vulgaris varies across different regions in Iraq. One study conducted in Zacho City found that the infection rate among secondary school students was 49.2%, with a higher prevalence in males compared to females.[10]

The prevalence of acne vulgaris in medical students ranged from 34.38 to 97.9%.[11] In Saudi Arabia, the incidence of acne among students of health-related science colleges is 78.5%, with 56.0% using self-medications without a prescription.[12] In Syria, the incidence of acne was 34.7%, and the face was the most common site for acne.[13] In Malaysia, the prevalence of acne was 75.8%. Compared with male students, female students had significantly impaired quality of life, and students with acne had higher rates of frequent insomnia than those without acne.[14]

Some variants of acne vulgaris include[15]
Acne conglobate
Acne fulminans or acne maligna
Acne excoriée

Management
The goals of treatment are to give the patient the best appearance and to minimize scarring and psychological upset.[16] Treatment includes.
1 Skin hygiene
2 Topical therapy
3 Systemic therapy
4 Procedural therapies
5 Complementary therapies

Aim of the study
The present study aims to estimate the prevalence of acne vulgaris among medical students at the University of Mosul and to assess its patterns and contributing factors.

OBJECTIVES
1. To calculate the prevalence of acne among the study population.
2. To evaluate the possible contributing factors.
3. To assess acne severity and site of distribution of lesions among study participants.
4. To describe the socio-demographic characteristics of the study sample.

Methods: Patients &
1 Administrative agreements
The permission to conduct this study was obtained from the Scientific Council of the Arab Board for Health Specializations in Iraq. Moreover; approval was obtained from the Directorate of Health in Ninawa and the College of Medicine, University of Mosul before data collection.

2 Ethical consideration
All participants were interviewed by the investigator herself to explain the objective of the study and to obtain consent before data collection**.**

3 Study Setting
The study was conducted at the College of Medicine / University of Mosul**.**

4 Study design
Across-sectional study; was adopted to achieve the objectives of the present study. Data was collected from all students.

5 The Study Period
Data collection was conducted over 6 month period extending from the 2nd of January to the end of June 2024.

6 Study sample
Seven hundred and fifty-five participants from all grades and both genders of the College of Medicine were enrolled in this study. The students were invited to participate in the study with the help of each stage representative student.

The sample size was estimated according to the following equation of cross-sectional study design as following:
$N=Z^2P(1-P)/d^2$

Where:
N=sample size
Z=Z statistics for a level of confidence of 95% (1.96)
P=estimate of expected prevalence or proportion (in proportion of one if 15%, P=0. 15, 1-p=0.85).
d= estimate absolute error or precision (if 5%, d=0.05).[109]
The calculated sample size for desired precision is 195 then it is multiplied by 2(for design effect)
195*2=390 and the total sample considered 400. The investigator chose the number 755 according to the respondents reached.

7 Source of data and Data collection

Data collection was conducted using a specially designed questionnaire form which is approved by the scientific committee of family medicine in Mosul training center of the Arabic Board of the Health Specialization.

The questionnaire form includes demographic information age, sex, weight, height, academic class, and residence in addition to information regarding acne including; duration, type of lesion, distribution of lesion, and presence of scars.

Moreover; the questionnaire includes information regarding diet, medication use, menstrual cycle for females, family history, chronic disease, smoking, use of sunscreen and cosmetics, wearing a mask, frequency of face washing, and stress. (Appendix 1)

All study Participants were interviewed by the investigator herself; a clinical examination was conducted on all of them to diagnose the presence of acne and to categorize the severity.

8 Pretest (Pilot study)

The pilot study included a survey of 50 students. The aims of this pilot study were:

1. To examine the completeness of the questionnaire and to suggest any modifications required.
2. To test the cooperation of the students and to detect the difficulties that may likely be faced during the study.

The feedback from the pilot study was:

a. The response rate was 84%. (8 cases were refused the interview).

b. Regarding smoking, the investigator faced a problem as the sample population was females and almost all the smoker ladies were embarrassed to answer correctly; anyhow, this question was kept because it was important.

C. regarding the question of drug-induced acne a lot of students forgot the exact name, despite that question being fixed in the study.

9 Statistical analysis

Data has been managed and analyzed by special programs using a computer facility Laptop (Lenovo). Provided in computer facilities (Microsoft Office 2016: word & excel program).

The data was analyzed using SPSS, version 25. The number (percentage) and mean ± standard deviation (SD) were calculated for demographic data. The differences between categorical variables were assessed by the Chi-squared ($\chi 2$) test. A p-value of < 0.05 was considered statistically significant.

RESULTS

The present study included a total of 755 participants, acne was diagnosed among 580 students with an overall prevalence of 76.82% as shown in (**Figure 3.1)**.

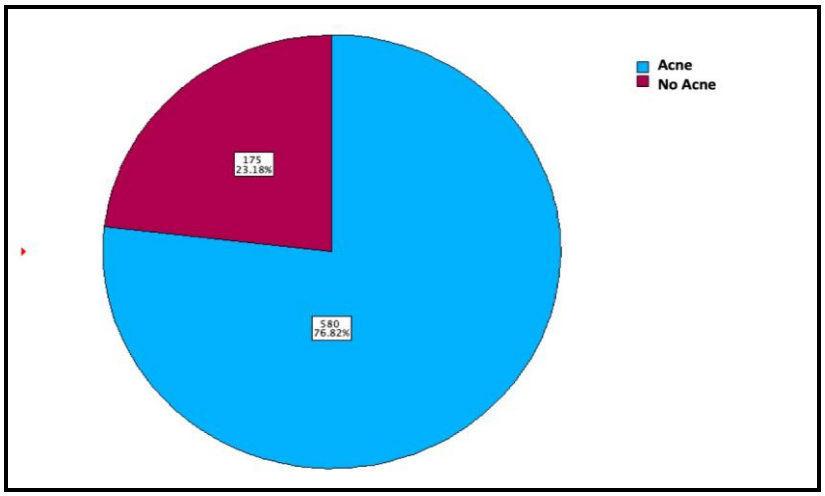

Figure (3.1): overall prevalence of acne vulgaris among the study population.

3.1 Distribution of study sample according to age group

It's evident from Table (3.1) that the prevalence of acne was found to be (79%) among the age group 18-20 years, moreover, acne prevalence is (75%) among students aged 22-24 years.

Table (3.1): Age-specific Prevalence of acne vulgaris among the study population (n=755).

Age group	Acne		No Acne		Total	
	No.	%	No.	%	No.	%
18- less than 20 years	128	79	34	21	162	100
20 less than 22 years	152	78	42	22	194	100
22-less than 24 years	198	75	65	25	263	100
24 years or above	102	75	34	25	136	100

3.2 Distribution of study sample according to sex

Table (3.2) illustrates sex-specific acne prevalence. It's clear that acne vulgaris was more prevalent among females than males (80% and 72% respectively).

Table (3.2): Sex-specific prevalence of acne vulgaris among the study population (n=755).

Sex	Acne		No Acne		Total	
	No.	%	No.	%	No.	%
Male	217	72	84	28	301	100
Female	363	80	91	20	454	100

3.3 Distribution of study sample according to BMI

Table (3.3) shows the distribution of study participants according to BMI, it's evident from this table that the prevalence of acne was (77 %) among underweight compared to (76%) among normal-weight participants. On the other hand acne prevalence was found to be (78%) among students with BMI more than 25.

Table (3.3): Prevalence of acne vulgaris according to body mass index.

BMI Group	Acne		No Acne		Total	
	No.	%	No.	%	No.	%
Below 18.5	56	76.7	17	23.2	73	100
18.5-24.9	399	76.4	123	23.5	522	100
25 and above	125	78.1	35	21.8	160	100

3.4 Distribution of study sample according to residence

As shown in **Table (3.4),** it's clear that acne vulgaris prevalence was observed in (77%) of urban areas compared to (72%) of those who lived in rural areas.

Table (3.4): Prevalence of acne vulgaris according to residence.

Residence	Acne		No Acne		Total	
	No.	%	No.	%	No.	%
Urban	528	77	155	23	683	100
Rural	52	72	20	28	72	100

3.5 comparison of study sample according to skin characteristics, and acne contributing factors:

Table (3.5) shows the distribution of the study population according to skin characteristics, and acne contributing factors. It is evident that dry skin was observed among (18.7%) of acne patients compared to (52.5%) among students with no acne. Oily skin was seen among (42.9%) and (22.2%) of acne and no acne group respectively with significant p=<0.001. Furthermore; mixed skin was seen among (38.2%) of acne participants versus (25.1%) of no acne participants.

Table (3.5) comparison of the study population according to skin characteristics, and acne contributing factors.

Variable	Acne		No Acne		P-value
	No.	(%)	No.	(%)	
Skin type - Dry - Oily - Mixed	 109 249 222	 18.7 42.9 38.2	 92 39 44	 52.5 22.2 25.1	**<0.001**
Fair skin	222	38.2	65	46	0.207
Uses mask	43	7.4	6	3.4	0.190
Uses sunscreen	296	51	70	40	0.393
Uses soap for face wash	421	72.5	92	52.5	**0.009**
Has chronic disease	36	6.2	9	5.1	0.921
Medications	13	2.2	1	0.5	0.455
Family history	189	32.5	25	14.2	**0.002**
Smoking	35	6.0	12	6.8	0.281
Eats fast food: - 1 to 2 weekly - > 2 weekly	 391 189	 67.5 32.5	 109 66	 62.3 37.7	 0.532 0.488

*Chi square test has been used

Fair skin was seen in (38.2%) of the acne group and (46%) of no acne participants. Uses of the mask were

reported among (7.4%) of students diagnosed with acne and (3.4%) of non-acne participants. While uses of sunscreen were (51%) of acne and (40%) of no-acne students, uses of soap for face wash were evident among (72.5%) of students diagnosed to have acne and (52.5%) of no-acne participants, with a significant statistical difference (p=0.009).

Only (6.2%) of the acne group had chronic disease most of them had asthma while (5.1%) of no-acne participants had no chronic disease.

On the other hand; positive family history was reported among (32.5%) and (14.2%) of acne and no acne participants respectively.

Smoking was reported among (6%) and (6.8%) of acne and no acne groups respectively. Also eating fast food 1-2 times weekly was reported among (79.4%) of acne and (70.2%) of no acne participants. Whereas; eating more than 2 times weekly fast food was reported among (45.5%) and (37.7%) of acne and no acne participants respectively.

3.6: Health effect of acne among the study population

Table (3.6) shows the health effects of acne among study participants. It's clear that (52.7%) of the participants diagnosed to have acne report psychological stress. (76.9%) of the female participants said that the acne worsens during menses.

Table (3.6): Health effect of acne among the study population.

Variable	M= 217 F=363 n=580			
	Yes	(%)	NO	(%)
Psychological effect (stress)	306	52.7	274	47.3
Acne worsens with menses	279	76.9	84	23.1

3.7: Acne duration among the study population:

Table (3.7) illustrates the distribution of participants diagnosed to have acne according to duration. It's evident that (32.8%) reported a duration of fewer than 6 months while (13.3%) reported that their acne lasted between 6 months and less than one year, (and 53.9%) reported more than one year as shown in the **table (3.7).**

Table (3.7): Acne duration among the study population.

Acne duration (n=580)	No.	(%)
- < 6 months	**190**	32.8
- 6 months to 1 year	**77**	13.3
- > 1 year	**313**	53.9

3.8: Distribution of acne cases according to the site of involvement

Table (3.8) shows that (52.2 %) report lesion involvement in the face, (and 36%) report involvement of the face in addition to another site with acne lesions. (4.3%) of participants had acne in the back, and (3.9%) were reported acne lesions in the shoulder and back. Only (3.1%) were reported shoulders involvement with acne.

Table (3.8): distribution of acne cases according to the site of involvement.

Variable	No. (n=580)	(%)
Face	303	52.2
Face, shoulders, back	108	18.6
Face, back	55	9.4
Face, shoulders	48	8.2
Back	25	4.3
Shoulders, back	23	3.9
Shoulders	18	3.1

3.9: Distribution of acne cases according to the site of facial involvement

Table (3.9): Illustrate the lesion distribution of cases having facial acne. It's clear that (35.4%) of those cases have cheek lesions, (20.0%) report forehead involvement, (12.5%) have chin lesion. The other (32.1%) report different facial area involvements.

Table (3.9): distribution of acne cases according to the site of facial involvement.

Variable	No. (n=514)	(%)
Cheeks	182	35.4
Forehead	103	20.0
Chin	64	12.5
Forehead, cheeks, chin	61	11.9
Forehead, cheeks	44	8.5
Cheeks, chin	42	8.2
Forehead, chin	18	3.5

3.10: Distribution of acne cases according to lesion type

Figure (3.2) shows the distribution of acne cases according to the type of lesion, it's clear that (32.4%) had whitehead comedones, (37.8%) had blackhead comedones, (48.3%) had papules, (25.7%) had pustules and (6.8%) had nodules.

*many cases had more than one type of lesions especially papules and blackhead comedones.

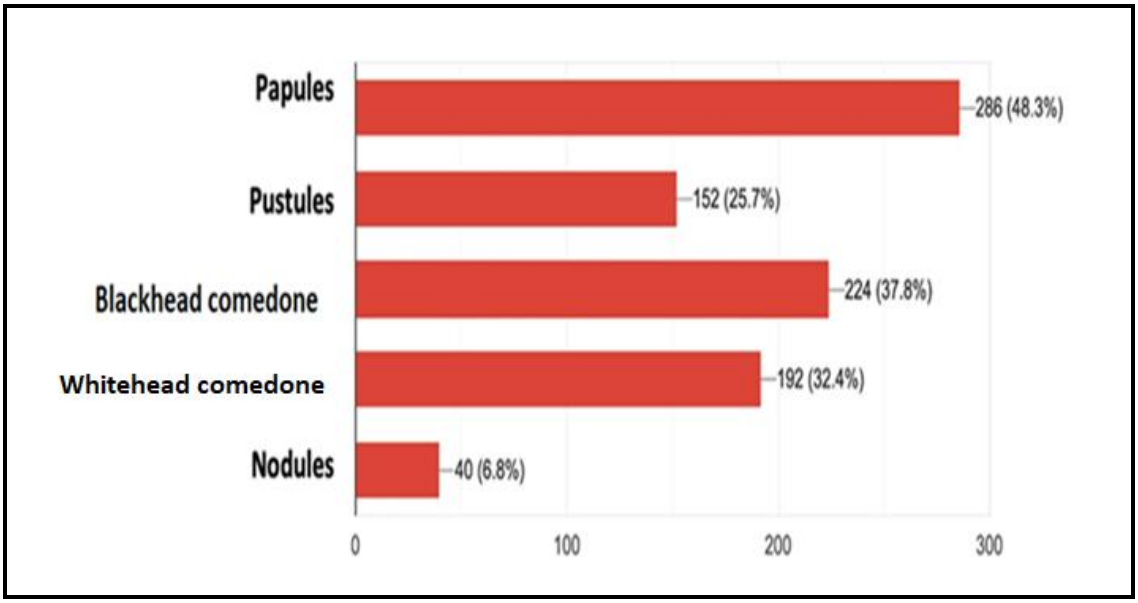

Figure (3.2): distribution of acne cases according to lesion type.

3.11: Details of acne and acne scar treatment

Table (3.10) shows the difference between the study sample according to the use of treatment, it is evident that (44.4%) use local treatment only while (17.9%) use both local and systemic,(2.4%) use Laser and (2.2%) use PRP.

Table (3.10): Details of acne and acne scar treatment among subjects.

Variable	No. (n=580)	(%)
Scar	273	47
Local treatment	258	44.4
Systemic treatment	191	32.9
Local + systemic treatment	104	17.9
Laser	14	2.4
PRP	13	2.2

DISCUSSION

Acne vulgaris is one of the most prevalent skin conditions in the world; it causes a lot of distress to those who have it. Furthermore, social withdrawal and low self-esteem are common symptoms among acne sufferers.[17] People from various ages and cultural backgrounds can get acne vulgaris. Although the clinical manifestation of acne vulgaris can vary greatly, comedones (black and whiteheads), papules (small, raised bumps), pustules (bubbles filled with pus), nodules (big, painful lumps), and in extreme cases, scarring are commonly seen. Additionally, acne can affect the face, neck, chest, and back areas.[18]

The prevalence of acne vulgaris in medical students ranged from 34.3% to 97.9%.[18] In Saudi Arabia, the incidence of acne among students of health-related science colleges is 78.5%, with 56.0% using self-medications without a prescription.[19] In Syria, the incidence of acne was 34.7%, and the face was the most common site for acne.[20] In Malaysia, the prevalence of acne was 75.8%.[21]

Acne is a condition that varies in severity and distribution over time rather than an acute illness. For several months, and perhaps years, acne therapy is required.[22]

The present study found a relatively high prevalence of acne among medical students (76.82%) similar results were observed in another study conducted in Sulaymaniyah \ Iraq by Al-Emaam, et. al in 2020.[23] Moreover, comparable results were found in another study prevalence of acne in Saudi Arabia[24], on the other hand study conducted in Egypt observed a much lower prevalence of acne among students (34.6%).[25] This difference might be due to differences in the sociocultural characteristics of the study population. The mean age of the studied sample was 21.6 (±2.2) years, 40% of the total respondents were males, and 60% were females. This study showed that the prevalence of acne among the age group (18 to less than 20) had acne in (79%), similar results were observed in in a South Brazilian city in 2017 which illustrated a prevalence of 80%.[26] Moreover, a study conducted by *Anais Brasileiros* in 2016[27] shows a higher prevalence of about (90%) this difference might be due to differences in the use of cosmetic materials among the study participants.

Of the total number of cases of acne this study found females predominance with 62.5%, while 37.4% of the total cases were males, with a 1.7:1 ratio this means there is a statistically significant difference. A similar result was found in a study conducted in portegues in 2014 with a female predominance of 64%.[28] Moreover, a study conducted in Malaysia in 2014 showed no sex difference with male to female ratio of 1:.1.[29] A study conducted in Jeddah, Saudi Arabia in 2017 showed a

very high prevalence in female medical students 98%.[30] This might be due to cultural differences and females use cosmetics more than males.

On the other hand; this study found that there was no significant difference in weight, height, or BMI parameters. Medical students have been accepted to the medical college at an average age of 18 and most of them have the same physical activity levels. Sari Taha et. al.'s study had near-finding results.[31]

Most of the students were from inside Mosul city (Urban residence) with no statistical difference between cases with acne and those without acne regarding residence. Kameran Hassan Ismail et.al. Explain the same findings.[32]

This study showed that students with acne were more likely to have oily or mixed skin type, which is statistically significant, with no significant difference between the two groups with regards to having fair skin, using masks, or sunscreen. A similar result was conducted by Duaa Dabash et. al. in 2024 in Palestine showed that skin type was strongly associated with the severity of acne and found also that acne was not related to the use of cosmetics and the majority had oily skin.[115] Alvian Arifin Saiboo et. al. explored that 91.2% of mild acne cases have oily skin.[33]

Patients with acne vulgaris should be encouraged to stay away from oil-based soap and comedogenic sunscreens whenever feasible since these products have the potential to worsen their condition. Acne treatments can be paired with dermo-cosmetics that have whitening properties to hasten the resolution of post-inflammatory hyperpigmentation as well as acne.[34] However, this study found that subjects with acne were more likely to have used soap for face wash. The result is statistically significant. This finding may relate to adopting improper skincare, rough cleansing, and using strong, comedogenic cleansers and makeup which can irritate the skin.

The data also showed that subjects with acne significantly have a family history of acne. A study conducted in Romania in 2016 had a similar result to this study.[35] On the other hand, a study conducted by Heng, A. H. S., & Chew, F. T. 2020 showed that there was no relation between family history and development of acne[36], this difference might be due to consanguineous marriage in our country. However, there was no significant difference history of medication use, or eating fast food. Sari Taha et. al. and Hazha M Mohammed et. al. again have the same result.[31, 22] Duaa Dabash et. al. found in their mentioned study above that dairy products, sweets, chocolate, and oily food were strongly associated with acne.[19] Interestingly, this study found that individuals with acne were less likely to smoke... Bartłomiej Żmuda et. al. expressed that the relationship between smoking and acne is unclear.[37]

Regarding past medical history; no significant difference was found between the groups, Lucas Garcia Biagi et. al. found that there was no statistical difference among the studied cases and controls in terms of chronic disease.[38]

This study found that 53 % of the students correlate acne appearance with psychological upsets. Farah Modlej Alloboon et. al. showed comparable findings.[39] Stamu-O' Brien, C., et. al. found similar results in a study conducted in 2021.[40] Mustafa Karaağaç et. al. mentioned that; although no relationship was found between acne severity and depression, anxiety, or eating disorders, these conditions can increase the risk of eating disorders among acne patients. Therefore, it is critical to take the necessary precautions for the treatment of depression and anxiety disorders in this patient population.[41]

This study found that 48 % of females reported acne before their menses. Kabir Sardana et. al. showed that persistent acne patients had marked clinical hormonal abnormalities, necessitating an endocrinological evaluation and they benefit from antiandrogen therapy.[42]

Thirty-two percent of the students had acne for less than 6 months. While only 13.3 % had acne for more than 6 months to less than one year and the majority (53. 9%) had acne for more than one year, several articles claimed that acne vulgaris is a chronic disease with relapse-remission clinical presentation.[43-44]

The current study found that Acne was distributed mostly on the face alone in 51%. While; Face, shoulders, and back combined in 18%. Face and back 9%. Face and shoulders 8%. Back alone 4%. Shoulders and back 4% and finally shoulders alone 3%. comparable results were found in a study conducted at Bohemia University, in 2020 by Gražina Šniepienė1et. al.[45] This might be due to oily skin being higher in the face than in another body part may alter the pH of the skin.

Furthermore; facial acne involvement included: Cheeks in 32%, forehead 18%, chin 11%. Forehead, cheeks, and chin in 11%. Forehead and cheeks in 8%. Cheeks and chin in 7%. Forehead and chin in 4%. Hang Zhang et. al. had a similar result to this study.[46] Gillian Heinecke et. al. as well as comparable findings as well.[47]

The study found that (48.3%) of acne group of students had papules, (25.7%) had pustular lesions. blackhead comedones were found in (37.8%), whitehead comedones in (32.4%) and Nodules were found in (6.8%). Comparable results were found in a study conducted in India in 2017shows that more than 90% of lesions are papules.[48] A different result in a study conducted in a city in southern Brazil in 2013 shows that the most common lesion is blackhead comedones[49] this difference might be due to delay in seeking medical help among medical students.

Concerning acne treatment, we found that 57% of the students report receiving acne treatment, with 48% going to the doctor for treatment, 44.4% receiving local treatment, 32.9 % receiving systemic treatment, 17.9% receiving local + systemic treatment, for scar treatment, 2.4% received laser and 2.2% received PRP. Alshimaa Mohsen Mohammed Lotfy et.al. as well recently published a study with close results.[50]

CONCLUSIONS

From this study, we conclude that.

1- Acne vulgaris can be caused by multiple causes.
2- Acne vulgaris affects females in a higher proportion compared to males.
3- Oily skin individuals are highly amenable to be affected by acne and develop scar complications.
4- Using improper soap and skin cleanser may aggravate acne.
5- The face is the predominant site for acne .
6- Psychological upset may increase acne severity.
7- Acne vulgaris appearance is thought to be related to menses.
8- Most acne vulgaris patients suffer from the illness for more than one year.
9- Hereditary factors play a significant role in acne and acne scar appearance.
10- Smoking seems to be not effective factor in acne vulgaris appearances.

Recommendations

We recommend

1- Iraq's Ministry of Health Promotion programs; should continuously aware the families about the risk factors triggering acne vulgaris and its preventive measures.

2- Controlling acne contributing factors, is very important and has a crucial role in decreasing the overall disease burden and improving prognosis.

3- Early treatment of acne vulgaris can improve the overall prognosis and prevent scar formation.

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