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ORIGINAL ARTICLE

Association between Acne Vulgaris and Body Mass Index among Adolescents

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ABSTRACT

Background: The severity of acne vulgaris (AV), a relatively prevalent chronic inflammatory illness, can range from minor lesions to severe lesions that can cause deformities that significantly impact one's daily life. These days, obesity is also a very frequent health issue brought on by sedentary lifestyles and poor eating habits. Numerous systems are impacted, including the sebaceous glands' function and the skin barrier. This study aims to assess the relationship between body mass index (BMI) and occurrence and severity of acne vulgaris among adolescents.

Methods: This case control study was carried out in dermatology outpatient clinic at Zagazig University Hospitals, Egypt on adolescents with acne and apparently healthy control adolescents. Patients underwent complete history taking, physical and dermatological examination to determine severity of acne. Body mass index was calculated for both groups.

Results: There is a statistically significant difference between the studied groups regarding body mass index, as about 19% of the patients with acne were obese compared to 4.9% of the patients in the control group. There is a statistically significant positive correlation between body mass categories and grade of acne. Being overweight and obese significantly increases risk of severe/very severe acne by 6.67 folds.

Conclusions: Obesity is significantly associated with presence and severity of AV among adolescents. Lifestyle modification and weight reduction should be added in management of AV to improve outcome.

Keywords: Acne Vulgaris; Body Mass Index; Adolescents.

INTRODUCTION

A common chronic inflammatory skin condition affecting the pilosebaceous unit (sebaceous gland and hair follicles) is acne vulgaris (AV). Depending on the kind and quantity of lesions, the degree of skin involvement varies from minor lesions to extremely inflammatory lesions that could result in deformity [1]. It is estimated that 9.4% of people worldwide suffer from acne, making it the eighth most common skin condition. More than 85% of teenagers suffer from acne, which can last into adulthood. It typically affects women and is the reason for two-thirds of dermatologist visits for acne [2].

Of a mentally unstable time of adolescence, acne mostly affects the face, which cannot be concealed, and can leave scars that last for years or perhaps a lifetime [3]. Adolescence is a crucial time when social, physical, and identity development are at their peak. One of the dermatological conditions that impact not only the life of teenagers but also those of their relatives is acne [4]. Since appearance is important and affects how we see ourselves and how others see us, adolescents with AV experience psychological problems like anxiety, depression, emotions, self-identity, low self-esteem, psychic trauma, maladjustment, general insecurity, and feelings of inferiority. Additionally, social phobia is closely associated with acne. Adolescents' quality of life can be significantly impacted by even minor injuries [5].

Millions of people worldwide are impacted by the growing obesity pandemic. Obesity is precisely measured using the Body Mass Index (BMI). The

consequences of obesity on the body's systems are numerous. Obesity has a number of negative consequences on skin health, including affecting sebum production, sebaceous gland function, and the effectiveness of the skin barrier [6].

The production of acne is significantly influenced by sebum. It is an aqueous material that is created to maintain skin hydration. When the sebaceous ducts get inflamed and obstructed, acne develops. It is evident that conditions linked to obesity aggravate acne [7]. Insulin, growth hormone, insulin-like growth factors, and androgens (male hormones) are elevated in fat people. Acne risk factors include all of these [8].

Acne and its medical, social, and psychological repercussions, such as patients' happiness with their body image, self-esteem, and quality of life, are largely identified by the family medicine doctor [9].

In order to prevent the psychological effects of acne and to improve quality of life, particularly for adolescents, the family doctor is also concerned with appropriately referring patients to dermatologists for appropriate treatment [10].

This study aims to assess the relationship between BMI and occurrence and severity of acne vulgaris among outpatient dermatology clinic adolescents.

METHODS

The Declaration of Helsinki was followed in the conduct of this investigation. From January 2023 to January 2024, a case control study was conducted at the dermatology outpatient clinic at Zagazig University Hospitals in Egypt on teenagers with acne who visited the clinic and adolescents who appeared to be in good condition. The study participants ranged in age from 12 to 19. We separated them into two groups: group 1 (acne group) contained 41 individuals with acne vulgaris, and group 2 (control group) contained 41 individuals who appeared to be in good health.

Assuming that mean BMI in acne patients is 21.86 ± 2.83 kg/m2 and in controls is 20.22 ± 2.43 kg/m2, so the sample size will be 82 (41 in each group), calculated using OpenEpi, at power 80% and CI 95% [11]. The study subjects were aged from 12 to 19 years old. We divided them into two groups: Group 1 (acne group): included 41 cases of acne vulgaris. Group 2 (control group): included 41 apparently healthy persons.

Patients were recruited through systematic random technique. Control group participants were selected via systematic random technique of relatives of patients of about same age group.

Approval was obtained from Zagazig University Institution Review Board (IRB number 10440-26-2-2023). Study title and objectives were explained to participants and their guardians, and a written informed consent was taken from their guardians. Confidentiality of data was reassured.

Socio-demographic characteristics of the studied adolescents were collected. This part included: adolescents' age, residence, sex, socioeconomic status, weight, height, BMI and duration of acne [12].

Operational design

The lead investigator conducted interviews with each participant in the current study and performed anthropometric and dermatological examinations.

Body mass index, height, and weight in light clothing are examples of anthropometric indices. Weight was recorded to the closest 0.1 kg. Height was measured barefoot using a verified stadiometer, and results were reported to the closest 0.1 cm.

One researcher collected all of the measurements. A person's weight in kilograms divided by their height in meters squared is their body mass index. Normal weight is 18.5-24.9, overweight is 25-29.9, obesity is 30-34.9, and extremely obese is over 35 per BMI categories [13].

A dermatologist at a dermatology outpatient clinic assessed and graded acne vulgaris (AV) using a straightforward grading method that divides the condition into four grades: Grade 1 includes comedones and sporadic papules; Grade 2 has papules, comedones, and a few pustules; Grade 3 includes a majority of pustules, nodules, and abscesses; and Grade 4 consists primarily of cysts, abscesses, and extensive scarring [14].

Statistical Analysis

The statistical package for the social sciences, or SPSS, version 28 was used to analyse the data. The chi square test was used to compare and characterise categorical variables based on their absolute frequencies. The chi square trend test was used to examine ordinal data between two groups. Assumptions for use in parametric testing were validated using the Shapiro-Wilk test. Depending on the type of data, the means, standard deviations, median, and interquartile range were used to characterise quantitative variables. The independent sample t test (for normally distributed data) was developed to compare quantitative data between two groups. The degree of relationship and correlation between two continuous, non-normally distributed variables was assessed using the Spearman rank correlation coefficient. $P<0.05$ was chosen as the threshold for statistical significance.

RESULTS

Regarding gender, residency, socioeconomic position, or age, there are statistically insignificant differences between the groups under study (Table 1). About 18.6% of acne patients were obese, compared to 4.9% of the control group, indicating a statistically significant difference in body mass index between the groups under study. Obesity and overweight non-significantly increased risk of AV by 3.48 and 2.58 times, respectively. Having abnormal BMI significantly increased risk of AV by 2.78 folds (Table 2). Mild, moderate, and severe acne were reported by 36.6%, 34.1%, and 17.1% of respondents, respectively. The median duration of the disease was two years, with a range of one to seven years (Table 3). Body mass index and acne severity are positively correlated in a statistically significant way. Obesity and excess weight raise the incidence of severe or very severe acne by 6.67 times (Table 4).

Table 1: Comparison between the studied groups regarding demographic data.

	Acne group N=41 (%)	**Control group** N=41 (%)	χ^2	**p**
Gender				
Female	34 (82.9%)	27 (65.9%)	3.137	0.077
Male	7 (17.1%)	14 (34.1%)		
Residence				
Rural	23 (56.1%)	17 (41.5%)	1.757	0.185
Urban	18 (43.9%)	24 (58.5%)		
SES				
Low	9 (22%)	8 (19.5%)		
Middle	26 (63.4%)	29 (70.7%)	0.037	0.847
High	6 (14.6%)	4 (9.8%)		
	Mean ± SD	Mean ± SD	t	p
Age (year)	16.61 ± 2.0	15.93 ± 2.41	1.396	0.167

χ^2Chi square test; t independent sample t test

Table 2: Comparison between the studied groups regarding BMI.

	Acne group N=41 (%)	**Control group** N=41 (%)	χ^2	**P**	**COR (95% CI)**
BMI					
Normal	23 (56.1%)	32 (78%)			1 (reference)
Overweight	13 (31.7%)	7 (17.1%)	4.196	0.041*	2.58(0.89 – 7.49)
Obese/extremely obese	5 (18.6%)	2 (4.9%)			3.48(0.62 – 19.53)
COR (95% CI) of not having normal BMI to produce acne					2.78 (1.06 – 7.29)*

χ^2 Chi square for trend test; *p<0.05 is statistically significant; COR, crude odds ratio; CI, Confidence interval.

Table 3: Distribution of patients according to disease-specific data.

	N=41	**%**
Acne grade		
Mild	15	36.6%
Moderate	14	34.1%
Severe	7	17.1%
Very severe	5	12.2%
	Median (IQR)	**Range**
Disease duration (year)	**2(1 – 3.5)**	**1 – 7**

Table 4: Correlation between body mass index and grade of acne.

	Average N=23 (%)	**Overweight** N=13 (%)	**Obese** N=5 (%)	**χ^2**	**p**	**Correlations**
Acne grade						
Mild	11 (47.8%)	3 (23.1%)	1 (20%)			r=0.317
Moderate	9 (39.1%)	3 (23.1%)	2 (40%)	5.621	0.018*	p=0.015*
Severe	2 (8.7%)	5 (38.5%)	0 (0%)			
Very severe	1 (4.3%)	2 (15.4%)	2 (40%)			
COR (95% CI) of Overweight &obese in produce severe and very severe acne			6.67(1.45 – 30.64)*			0.01*

χ^2 Chi square for trend test; r Spearman rank correlation coefficient; *p<0.05 is statistically significant; COR crude odds ratio; CI Confidence interval

DISCUSSION

The pilosebaceous unit, which includes sebaceous glands and hair follicles, is impacted by acne vulgaris, a chronic inflammatory skin condition. Acne can range in intensity from little pimples to large, inflammatory pimples that can cause deformity and scarring. This disorder frequently affects the face, making it quite noticeable and frequently posing physical and mental difficulties for persons who have it [15–19].

Thus, the purpose of this study is to assess the association between adolescents' body mass index and acne vulgaris.

At the Zagazig Dermatology Outpatient Clinic in Egypt, 82 teenagers participated in this case-control study (41 with acne vulgaris and 41 healthy controls). Adolescents with acne vulgaris who were free of other systemic, psychiatric, or dermatological conditions as well as relatives of the patients who appeared healthy served as participants. Acne severity was rated using a four-tier approach (Grades 1-4), and anthropometric indices, such as BMI, height, and weight, were measured by a single investigator.

Age, gender, place of residence, and socioeconomic status did not significantly differ between the two groups.

Regarding body mass index, there was a statistically significant difference between the groups under study.

In Podder et al. study [20] 50 individuals with acne vulgaris (cases) and 50 age and sex-matched controls without acne participated in case-control research. According to their findings, the patients and controls had similar demographic traits, such as age and waist circumference.

In agreement with our research, Bedoyan and Al-Yassen [21] performed a study with the goal of evaluating the relationship between body mass index (BMI) and acne severity as well as the relationship between BMI and the incidence of acne vulgaris. At Basrah city's Al-Fayhaa Teaching Hospital's dermatology outpatient clinic, a case-control research was carried out. 201 individuals with acne vulgaris who were matched for age and gender with 203 controls had their body mass index measured. A greater BMI is observed among cases compared to controls because the results indicated a significant correlation between the BMI value and acne vulgaris in patients under the age of twenty.

Parallel to our work, Cartron et al. [22] examined the relationship between school children's point prevalence and acne patterns and obesity. A pair of board-certified dermatologists examined 3,274 kids from Magong Township, ages 6 to 11. The frequency of acne was 7.3%, and girls were more likely than males to have it. Their findings showed that, without a gender difference, the mean BMI of students without acne was substantially lower than that of participants with acne.

In contrast to our research, Aslam [23] in their case control study reported that case and control groups' Body Mass Indexes did not differ significantly, according to their findings. The distinct intended population research may have something to do with this.

Nevertheless, one study found an inverse relationship between BMI and AV severity and occurrence [24], while another found no connection between BMI and AV severity [25]

The results corroborated earlier research showing a correlation between higher BMI and more severe AV. Both univariate and multivariate analyses show that a higher BMI significantly increases the probability of severe acne by 2.5 times [26].

There were certain restrictions on this investigation. We did not examine the true effect of BMI in the incidence of AV, and the sample size was somewhat small. Additionally, the study was conducted in a hospital rather than in the general community. Causal relationships cannot be established via association. Nonetheless, we employed standardized objective instruments, such as acne grade and BMI measurement. This work may serve as a starting point for future large-scale prospective research to determine the actual contribution of BMI to the pathophysiology of AV.

CONCLUSIONS

According to this study, adolescents' BMI and the existence and severity of acne vulgaris are significantly correlated. The results demonstrate the significance of acne as a dermatological disorder and the necessity of all-encompassing care that takes into account the physical health outcomes of this demographic. One of the cornerstones of AV management should be weight loss and counselling on healthy lifestyle choices in order to enhance results.

Conflict of Interest: None.
Financial Disclosure: None.

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