Original Article

Frequency and Association of Acne Vulgaris and BMI: A Case Control Study

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ABSTRACT

Objective: To determine the association between increased BMI and Acne vulgaris in young female.
Study Design: case control study
Place and Duration of Study: This study was conducted at the THQ Taxila from October 2022 to March 2023.
Materials and Methods: A total of 270 females out of which 135 unmarried females with acne aged 10 to 30 years old were enrolled as cases and 135 matching controls through non probability convenience sampling. Married females with acne, receiving systemic retinoid in the previous 6 months, oral antibiotics, hormone treatment in the previous two weeks were not included. GAG score was used to assess the grade of acne and BMI of the participants was calculated. Data was entered and analyzed using SPSS-28. Height and weight were expressed in mean and standard deviation. For relationship between BMI and GAG scores among cases, pearson correlation coefficient was used.
Results: The relationship between BMI and GAG scores among cases, pearson correlation coefficient (r= .25) was weakly positive and statistically significant weak positive association was observed between BMI and GAG scores. (p=.004).
Conclusion: The present study found no significant difference in BMI between acne cases and controls. However, a weak positive correlation was observed between BMI and GAG scores among acne cases.

Key Words: Acne vulgaris, BMI, GAG score.

Citation of article: Mirza U, Naheed A, Naveed T, Ahmed A, Zehra T, Nisar N. Frequency and Association of Acne Vulgaris and BMI: A Case Control Study. Med Forum 2023;34(5):111-114.

INTRODUCTION

Acne is the most eye-catching skin disease seen in Dermatology, affecting areas with high density of hormonally sensitive sebaceous glands like face and upper chest. It usually affects age group between 15–40 years [(1)]. It is uncommon that any individual touches maturity without having had it in one of its types. Around 95% of the adolescent population is affected [(2)]. There is perhaps no skin disease of grander rank to the teenage than acne. It is a disease of substantial psychological and economic standing, as the blemishing scars of a severe case are by no means entirely wiped out [(3)].

Pathogenesis of acne vulgaris is the interplay of multiple elements. Both exogenous and endogenous causes like hormones, family history,medication,stress, diet and cosmetics can trigger the development of acne. Although exact pathogenesis leading to inflammation of pilosebaceous is yet to be established [(4)]. Apart from other factors, androgen production and insulin-like growth factor-1 (IGF-1) have a central role in acne development. Obesity has a profound influence on the levels of androgen and IGF-1 [(5)]. Polycystic ovarian syndrome manifests with signs of hyperandrogenism (hirsutism, acne, menstrual irregularity) and increased BMI [(6).]

Obesity not only affect the internal organs of body but modify normal physiological functions of skin like wound healing (collagen formation), subcutaneous fat, cutaneous blood circulation and lymphatic function, changes in sweat glands, lipid production and above all altering the barrier function of the skin [(7)] .The association of obesity with various skin dermatosis like acanthosis nigricans, striae cutis distensae, keratosis pilaris, hyperandrogenism, hirsutism, fat redistribution, plantar hyperkeratosis, skin infections, psoriasis, suppurative hidradenitis, insulin resistance syndrome have already been established [(7-9)] . There is a substantial relationship among the emergent prevalence of obesity and chronic skin diseases. Role of obesity in PCOS is undeniable through increase in the production of androgen in fat tissue which subsequently leads to increased sebum production, an important factor in acne development [(6).]

It has been established that obesity and overweight (Body Mass Index, BMI ≥ 25 kg/m2) were clearly

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Received: April, 2023
Accepted: April, 2023
Printed: May, 2023

linked with increased sebum production, which increases the risk of acne [7,10]. Whereas, a study in China and Taiwan showed that BMI and number of acne lesions (in moderate to severe post-adolescent acne) were inversely related among Taiwanese females between 25 and 45 years of age.

The aim of this study was to determine if there is an association between increased BMI and acne vulgaris in young female.

MATERIALS AND METHODS

The protocol was reviewed and approved by the Ethical Committee of hospital. This case-control study was done in Dermatology department of THQ Hospital Taxila from October 2022 to March 2023..

Sample size was calculated was 252. [12].

$$\text{Sample size} = \frac{r+1}{r} \frac{SD^2(Z\beta+Z\alpha/2)^2}{d^2}$$

After obtaining written informed consent from the participants. A total of 270 females out of which 135 unmarried females with acne aged 10 to 30 years old were enrolled as cases through non probability convenience sampling. Married females with acne receiving systemic retinoid in the previous 6 months, oral antibiotics, hormone treatment in the previous two weeks were not included. 135 females without acne accompanying friends of patients (except family members) were recruited from the same setting during the same period with age matched, served as controls. History and clinical examination was done by Dermatologist. Socio-demographic profile like age, relevant history such as age of onset, affected sites, severity of acne lesions, height and weight, menstrual history and family history of severe acne were noted.

BMI of these participants was calculated (cut off values as Underweight=<18.5, Normal weight=18.5–24.9, Overweight=25–29.9, Obesity= 30 or greater).

Acne severity was evaluated by Global Acne Grading System (GAGS 0 = None,1-18 = Mild, 19-30 =Moderate, 31-38 = Severe, > 39 = Very severe)

The data was entered and analyzed using SPSS-28. t-test was used for comparing height, weight and BMI among cases and controls. To correlate the sub groups of acne and obesity among cases and controls, Pearson correlation was performed, p-value, when <0.05 was considered statistically significant.

RESULTS

In our study, total 135 patients with acne that were age matched with 135 controls. The mean age of cases with acne was 21.26+3.9 years. The age of patients ranged from 12 to 29 years. The mean GAG score of acne patients was 18.87+9.2, with a range from 4 to 44. The age of participants in control group ranged from 13 to 35 years with a mean of 21.01+4.03 years. The participants in control group were without acne and GAG score of all participants was zero.

Table No. 1: Height, weight and BMI of Cases and Controls

Group	Variable	N	Minimum	Maximum	Mean	St. Deviation	P value
Cases with Acne	Height in meters	135	1.25	1.77	1.61	.077	-
	Weight in Kg	135	37	79	55.56	8.81	-
	BMI	135	14.86	31.63	21.43	3.42	.61
Control	Height in meters	135	1.25	1.74	1.58	.077	-
	Weight in Kg	135	35	96	52.35	8.72	-
	BMI	135	13.84	44.80	21.04	4.20	.61

Statistically insignificant difference was observed between the mean BMI scores of cases and control group (p>.05)

Regarding categorization of BMI in study and control group, 60.7% (n=82) had normal BMI in study group, whereas 65.9% (n=89%) had BMI in normal range among controls. Relatively fewer participants from study and control group were overweight (15.6% and 7.4%) and obese (1.5% and 2.2%) respectively.

Regarding the relationship between BMI and GAG scores among cases, pearson correlation coefficient (r= .25) was weakly positive and statistically significant weak positive association was observed between BMI and GAG scores. (p=.004).

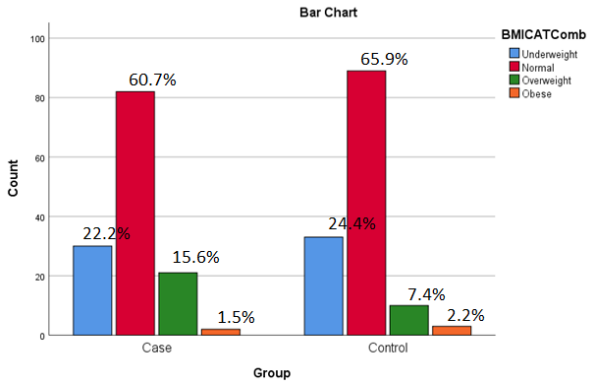

Figure No. 1: BMI categories of Cases and Controls

DISCUSSION

In our study 135 females with acne were enrolled with mean age of 21.26+3.9 years and the mean age of participants in control group was 21.01+4.03 years which is comparable to the studies done by Abulnaja KO[12] and Lajevardi V et al[13].

There is mixed evidence regarding the association between acne and BMI. A study conducted in Taiwanese women with post-adolescent acne found that higher BMI was negatively associated with acne lesion counts[10]. However, a study conducted in adolescent students in Nigeria found that a high BMI was significantly associated with the prevalence of facial acne vulgaris[14]. These studies focused specifically on women with post-adolescent acne, so the findings may not be generalizable to other populations or individuals with different types of acne. Another study conducted in Saudi Arabia did not find a significant association between BMI and acne vulgaris in young adults [15].

However, the present study did find a weak positive correlation between BMI and GAG scores among acne cases. This finding suggests that BMI may play a role in the severity of acne vulgaris similar findings were seen in study done by Lech K and Reich A[16]. This correlation cannot be attributed to chance alone; underlying pathophysiological phenomenon may explain this. Though acne vulgaris is attributed to *P. acnes*; other host factors determine chronicity. GAGs (glycosaminoglycans) are involved in the regulation of sebum production, inflammation, and keratinization, and they may play a role in the pathogenesis of acne vulgaris [17]. The positive correlation between BMI and GAG scores observed in the present study may be due to the influence of insulin resistance and hyperinsulinemia, which are common in overweight and obese individuals and have been shown to increase sebum production and promote acne vulgaris [9]. IGF-1 presence has been found in acne vulgaris lesions; high IGF-1 levels have been associated with increased acne severity[18]. The same study also established correlation between strong intensity of IGF-1 and high BMI values. Our less significant association may also correlate to a study in the West African Journal of Medicine; The prevalence of acne was 81.7% among adolescents with a BMI >25Kg/m2, 61.1% in those with a BMI of 18.5-24.99 kg/m2 and 42.0% among adolescents with a BMI of <18.5 Kg/m2, P<0.001 but BMI was not significantly associated with severity of acne (p=0.830).[3]

In conclusion, the present study found no significant difference in BMI between acne cases and controls. However, a weak positive correlation was observed between BMI and GAG scores among acne cases. Though this study adds to the pool of AV research with being a case-control further validating a weak positive relationship between BMI and acne severity. Further studies are needed to confirm this finding and to elucidate the underlying mechanisms linking BMI and acne vulgaris.

CONCLUSION

The present study found no significant difference in BMI between acne cases and controls. However, a weak positive correlation was observed between BMI and GAG scores among acne cases.

Author's Contribution:

Concept & Design of Study:	Urooj Mirza
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Conflict of Interest: The study has no conflict of interest to declare by any author.

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