

Acne and its Relationship with Body Mass Index (Bmi)

Yasir Aljoudi^{1*}, Mohamed Tarek Elshawaf²

¹ Yasir Aljoudi, Specialist Dermatologist, Primary Health Care Corporation Doha Qatar.

Email: yasirjoudi@gmail.com

² Mohamed Tarek Elshawaf, Consultant Dermatology, Primary Health Care Corporation

Doha Qatar. Email: mtelshawaf@gmail.com

Abstract

Background: Acne vulgaris is a much-known skin ailment that impacts a large percentage of young people, ranging from 79% to 95%. Acne is frequently regarded as a sign of maturation, and it is a primary source of doctor visits, which can result in increased costs. Obesity is a major problem in the Western lifestyle. The World Health Organization (WHO) reported in 2008 that 35% of adults (20 years or older) globally were overweight. Objective: The main purpose of this research is to study the link between body mass index and the severity or the occurrence of acne. Study design: A cross-sectional study Place and Duration: This study was conducted in Primary Health Care Corporation Doha from June 2021 to June 2022 Methodology: A total of 300 people were part of this research. The sampling method used was sequential, with all newly diagnosed acne cases being included. All patients gave their informed consent. Demographic information was gathered, including whether first-degree relatives had a positive or negative family history of acne and height, and weight were measured. By dividing weight by height, the body mass index of each participant was calculated. The weight was measured in kilograms and the height was measured in meters squared. This classification was based on the criteria provided by the World Health Organization Asian Pacific Guideline 2000. All of the participants were divided into 4 categories based on their BMI. Results: The percentage of females was slightly higher than males with a male-to-female ratio of 1:1.4. The age groups of the participants ranged from the age of 10 years to 44 years. The average age of the patients was 20.88 years. The majority of the participants (n=156) had grade 2 acne, representing 52% of the sample size. Only 5% of patients were having grade 4 acne while 23% of patients were having grade 1 acne and 20% of patients were having grade 3 acne. Conclusion: There was no significant link seen between body mass index and acne severity.

Keywords: Acne, body mass index, adults, weight, height

1. Introduction

Acne vulgaris is a much-known skin disorder marked by papules, nodules, comedones, scars, and pustules. Meanwhile, obesity is becoming a bigger issue not only in developed countries but also in low and middle-income countries [1]. 2016 WHO survey found that thirty-nine percent of people were overweight and thirteen percent were obese [2]. Obesity has been linked to peripheral hyperandrogenism, which suggests its role in the development of severe acne. Although there is no clear consensus on the relationship between acne and BMI, the Body Mass Index (BMI) is used to precisely define obesity [3].

Acne vulgaris is a much-known skin ailment that impacts a large percentage of young people, ranging from 79% to 95% [4]. In most developing countries, approximately 40% to 45% of people over the age of 25 have some kind of facial acne, and approximately 12% of women and 3% of men continue to have it throughout middle life [5]. Acne is frequently regarded as a sign of maturation, and it is a primary source of doctor visits, which can result in increased costs. Acne can also have a bad impact on one's psychological well-being and lead to the production of scars.

Obesity is a major problem in the Western lifestyle.

The World Health Organization (WHO) reported in 2008 that 35% of adults (20 years or older) globally were overweight [6]. Previously, it was considered that overweight and obesity were primarily issues in high-income countries, however, this issue is becoming increasingly prominent in low and middle-income countries as well [7]. Obesity has been shown to have a significant impact on SHBG (sex hormone-binding globulin) levels and free testosterone levels. According to research, obese women have higher testosterone levels, lower SHBG levels, and a higher androgen index than slim women [8].

A higher BMI is linked to an increased risk of polycystic ovarian syndrome (PCOS), which is characterized by symptoms such as hyperandrogenism, acne, hirsutism, and monthly irregularities. Furthermore, obese PCOS women showed a more severe clinical presentation of hyperandrogenism than slim PCOS women [9]. Obesity influences skin physiology by affecting the skin's barrier function, lipid production, sweat glands, lymphatic function, collagen production, wound healing, subcutaneous fat, and microscopic and macroscopic blood circulation. Many skin diseases are known to be exacerbated by obesity, including keratosis pilaris, cellulitis, psoriasis, acrochordons, acanthosis nigricans, fat redistribution, striae cutis distensae, lymphedema, skin infections, insulin resistance syndrome, adipositis dolorosa, suppurative hidradenitis, plantar hyperkeratosis,

and several other conditions.

Because androgens are synthesized in adipose tissue, the association between obesity and peripheral hyperandrogenism, as found in PCOS, is well documented. The impact of hyperandrogenism on the sebaceous glands, which results in increased oil production, is a major contributor to the development of acne. Because no research has been undertaken in our locality to investigate the link between BMI and the prevalence of acne or the severity of acne, it would be good to investigate this link [10].

With the rising prevalence of acne, obesity, and overweight, the main purpose of this research is to study the link between BMI and the severity of acne or the occurrence of acne. There is only a rare number of studies that talk about this topic. That is why, we have focused more on this topic and decided to work on it to draw more conclusions.

2. Methodology

This cross-sectional study was carried out at the dermatology department of our Health Center. A total of 300 people were a part of this research. The institutional review board gave its clearance before the trial began. The sampling method used was sequential, with all newly diagnosed acne cases being included. All patients gave their informed consent. Demographic information was gathered, including whether first-degree relatives had a positive or negative family history of acne and height and weight were measured.

Patients who were already getting acne medication or who were taking other systemic medications that could affect acne, as well as those who did not grant consent, were excluded from the trial.

By dividing weight by height, the body mass index of each participant was calculated. The weight was measured in kilograms and the height was measured in meters squared. This classification was based on the criteria provided by the World Health Organization Asian Pacific Guideline 2000. All of the participants were divided into 4 categories based on their BMI. The categories are as follows:

If the BMI is less than 18.5 kg/m², he or she is underweight.

If the BMI is between 18.5 and 23.9 kg/m², he or she is normal weight.

If the BMI is between 24 to 26.9 kg/m², he or she is overweight.

If the BMI is over 27 kg/m², he or she is obese.

The patients' acne lesions were evaluated for comedones, papules, pustules, cysts, abscesses, and scars, and the severity of acne was scored using the Indian classification, which has 4 grades ranging from 1 to 4. Occasional papules and comedones were classified in the first grade (grade 1). Comedones, papules, and a few pustules were classified in the second grade (grade 2). Nodules, predominant pustules, and abscesses were classified in the third grade (grade 3). Lastly, widespread scarring, predominantly cysts, and abscesses were classified in

the fourth grade (grade 4). For statistical analysis, the one-way Analysis of Variance between Groups (ANOVA) tests was performed, and a p-value of less than 0.05 was considered significant.

3. Results

Overall, a total of 300 participants were a part of this research. The percentage of females was slightly higher than males with a male-to-female ratio of 1:1.4. The age groups of the participants ranged from the age of 10 years to 44 years. The average age of the patients was 20.88 years. Table number 1 shows the classification of the participants based on their age group. The maximum number of participants falls under the age group of 11 years to 20 years, representing 62 percent of the total sample size.

If we classify participants based on their BMI, most of them were having normal weight, representing 65.5 percent of the total sample size. Out of the rest, the percentage of participants who were overweight was 12 percent, people who were obese were only 2 percent, and the rest 20.5 percent people were underweight. The majority of the participants (n=156) had grade 2 acne, representing 52% of the sample size. Only 5% of patients were having grade 4 acne while 23% of patients were having grade 1 acne and 20% of patients were having grade 3 acne. Table number 2 shows the comparison of variables with different grades of acne.

When the BMI was compared with the different grades of acne, the results were recorded as shown in Table 3.

Table No. 1: classification of the participants based on their age group

Age group (years)	N	%
0 to 10	2	0.60
11 to 20	186	62.00
21 to 30	90	30.00
31 to 40	16	5.4
41 to 50	6	2.00
Total	300	100.00

Table No. 2: comparison of variables with different grades of acne

Variables	Grade 1	Grade 2	Grade 3	Grade 4
Patients (n)	69	156	60	15
Mean age (years)	19.5	21.3	21.5	19.8
Family history (n)	13	30	14	2
Mean BMI (kg/m ²)	21.1	21.4	21.2	21.3

Table No. 3: BMI comparison with the different grades of acne

Grade of acne	N
Grade 1	
Overweight	8
Normal	34
Obese	4
Underweight	23
Grade 2	
Overweight	30
Normal	96
Obese	8
Underweight	22
Grade 3	
Overweight	5
Normal	47
Underweight	8
Grade 4	
Normal	8
Obese	2
Underweight	5

4. Discussion

Acne vulgaris is a common skin disorder that primarily affects adolescents but can also affect adults. This issue is typically encountered in those whose parents had acne while they were teenagers [11]. According to our findings, acne is more widespread in women. Obesity affects skin physiology in a variety of ways, including androgen synthesis in adipose tissue. Obesity is associated with peripheral hyperandrogenism, which increases sebaceous gland activity, a critical element in the development of acne.

The relationship between BMI and acne has been a source of contention, with some studies supporting the link. Jancin B, for example, researched female teenagers and discovered that overweight and obese people had a higher prevalence of moderate to severe acne [12]. Alan S and colleagues discovered a positive relationship between BMI and acne severity, with those with greater BMI having more severe acne [13]. Smith RN also discovered a strong relationship between acne lesion numbers and BMI in young men [14]. Lu LY discovered that overweight and obese people aged 18-25 had a greater frequency of severe acne [15]. In contrast, an Italian study found that a lower BMI was related to a lower risk of acne, particularly in men [16]. British research on male soldiers revealed that those with acne were heavier, but a Taiwanese study of schoolchildren discovered that those with lower BMI had lower rates of acne [17]. In a study of 18-19-year-old girls, Halvorsen JA discovered that overweight and obesity were related with acne.

However, other research has found no link between acne and BMI or the severity of the condition. A study of just adult women, for example, discovered no link between BMI and acne severity [18]. Another Taiwanese study found that obese women had less acne than non-obese people [19]. In this research, we discovered individuals with varying BMI ranges across all acne classes, including obese individuals in all grades except grade 3. Nonetheless, the relationship between BMI and acne severity was not statistically significant.

The major goal of this study was to see if BMI had an effect on acne severity, and the results showed that there was no significant difference in mean BMI across groups with different levels of acne severity. Our findings are consistent with those of Borgia's research. We were unable to confirm the hypothesis that BMI influences acne severity via peripheral hyperandrogenism. A similar study conducted in Iran found no linkage between cigarette smoking or sun exposure and the severity of acne, but it did reveal that eating sweets, nuts, chocolate, and fatty foods was associated with more severe acne. As a result, persons with acne may benefit by restricting their intake of sweets, such as chocolate, because it has a direct effect on acne severity. However, limiting sun exposure, smoking, or dairy product consumption is not recommended because they do not appear to

worsen acne severity.

A population-based design with large sample sizes has been used in the bulk of international studies on this topic [20]. However, these studies have concentrated on certain age groups, such as teens in the Halvorsen et al study and adults over the age of 17 in the Borgia study. It may be desirable to include fewer age groups, conduct population-based studies, increase the sample size, and use more exact and reliable measurement equipment to produce more accurate results. Because acne is so common and there is so little study on the subject in our nation, it is critical to do similar studies that account for cultural differences in diet and genetic predisposition to acne.

5. Conclusion

Despite the fact that patients of various BMI categories were present in all acne severity classes, our study found no significant link between BMI and acne severity. However, a larger study with a population-based design is required to corroborate our findings.

Funding source

None

Conflict of interest

None

References

- Cordain L, Lindeberg S, Hurtado M, et al. Acne vulgaris a disease of western civilization. *Arch Dermatol* 2002; 138: 1584-90.
- World Health Organization. Obesity and overweight fact sheet. Available from: <http://www.who.int/mediacentre/factsheets/fs311/en/> [Accessed 1st September 2017].
- Diane MT, John SS. Disease of the sebaceous glands. In: Irwin MF, Arthur ZE, Klaus W, et al, eds. *Dermatology in general medicine* 2003; 6th ed. New York: McGraw-Hill: 672-84.
- Cypress BK. Health care of adolescents by office-based physicians. Washington: US Government Printing Office. NIH publication No. 99. 1984.
- Tutakne MA, Chari KVR. Acne, rosacea and perioral dermatitis. In: Valia RG, Valia AR. (eds.) *IADVL Textbook and atlas of dermatology*, 2nd ed. Mumbai: Bhalani publishing House; 2003. p.689- 710.
- Bernasconi D, Del Monte P, Meozzi M, et al. The impact of obesity on hormonal parameters in hirsute and nonhirsute women. *Metabolism* 1996; 45: 72-5
- Huppert J, Chiodi M, Hillard PJ. Clinical and metabolic findings in adolescent females with hyperandrogenism. *J Pediatr Adolesc Gynecol* 2004; 17: 103-8
- Hahler B. An overview of dermatological conditions commonly associated with the obese patient. *Ostomy Wound Manage* 2006; 52: 34-6
- Borgia F, Cannavo S, Guarneri F, et al. Correlation between endocrinological parameters and acne severity in adult women. *Acta Derm Venereol* 2004; 84: 201-4.

- Tsai MC, Chen W, Cheng YW, et al. Higher body mass index is a significant risk factor for acne formation in schoolchildren. *Eur J Dermatol* 2006; 16: 251-3.
- Dréno B, Poli F, Pawin H, et al. Development and evaluation of Global Acne Severity Scale (GEA Scale) suitable for France and Europe. *J Eur Acad Dermatol Venereol* 2011; 25:43-8.
- Jancin B. Acne risk linked to obesity in female teens. *Fam Pract News*. 2012; 42: 43. [https://doi.org/10.1016/S0300-7073\(12\)70108-1](https://doi.org/10.1016/S0300-7073(12)70108-1)
- Alan S, Cenesizoglu E. Effects of hyperandrogenism and high body mass index on acne severity in women. *Saudi Med J*. 2014; 35(8):886-9.
- Smith RN, Mann NJ, Braue A, Makelainen H, Varigos GA. A low-glycemic-load diet improves symptoms in acne vulgaris patients: a randomized controlled trial. *Am J Clin Nutr*. 2007; 86:107-15. <https://doi.org/10.1093/ajcn/86.1.107>
- Lu LY, Lai HY, Pan ZY, Wu ZX, Chen WC, Ju Q. Obese/overweight and the risk of acne vulgaris in Chinese adolescents and young adults. *Hong Kong J Dermatol Venereol*. 2017; 25:5-12.
- Bourne S, Jacobs A. Observations on acne, seborrhoea, and obesity. *Br Med J*. 1956; 1(4978):1268-70. <https://doi.org/10.1136/bmj.1.4978.1268>
- Pasquali R, Casimirri F. The impact of obesity on hyperandrogenism and polycystic ovary syndrome in premenopausal women. *Clin Endocrinol (Oxf)* 1993; 39: 1-16.
- Borgia F, Cannavò S, Guarneri F, Cannavò SP, Vaccaro M, Guarneri B. Correlation between endocrinological parameters and acne severity in adult women. *Acta Derm Venereol*. 2004; 84(3):201-4. <https://doi.org/10.1080/00015550410023248>
- Yang JH, Weng SL, Lee CY, Chou SY, Hsu CS, Hsu MI. A comparative study of cutaneous manifestations of hyperandrogenism in obese and non-obese Taiwanese women. *Arch Gynecol Obstet*. 2010; 282:327-33. <https://doi.org/10.1007/s00404-010-1485-2>
- Ghods SZ, Orawa H, Zouboulis CC. Prevalence, severity, and severity risk factors of acne in high school pupils: a community-based study. *J Invest Dermatol* 2009; 129:2136-41.