



Association between Different Categories of BMI and Severity of Acne- A Cross Sectional Hospital Based Prospective Study

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Abstract: **Introduction:** Acne vulgaris is a common skin disorder that affects 79% to 95% of the young population. In United States, 40% to 45% of men and women older than 25 years of age have some degrees of facial acne that continues to the middle age in 12% of women and 3% of men. Acne vulgaris (acne) is one of the most common chronic dermatological diseases among adolescents, affecting about 80% of young people between 12 and 18 years of age. Obesity is one of the biggest problems in western life style but nowadays, the problem is increasing even in low and middle-income countries. Body Mass Index (BMI) is used to accurately measure obesity. **Objective:** To find out the association between different categories of BMI and severity of acne. **Materials and Methods:** This was a cross sectional prospective study conducted in the outpatient Department of Dermatology, Shaheed M. Monsur Ali Medical College Hospital, Sirajganj, Bangladesh from January to March 2022. All the newly diagnosed patients with acne were included in the study. Height and weight of the patients was recorded and BMI was calculated. BMI was categorized as underweight, normal weight, overweight and obese. Type of lesions were noted and severity of acne was graded from 1 to 4. Statistical analysis was performed using SPSS version 21 for windows. One-way Analysis of Variance between groups (ANOVA) test was applied. P value of less than 0.05 was considered significant. **Results:** A total of 125 patients with acne were included in the study. Age of the patients ranged from 10 to 50 years with mean age of 20.82 ±5.9 years. Most of the patients were in the age group of 11-20 years. There was slightly a female preponderance with female: male ratio of 1:1.4. According to BMI, 65.5% were normal, 12% were overweight, 20.5% were underweight and 2% of patients were obese. Majority of the patients had Grade 2 acne (52.8%). There was no significant association between the BMI and severity of acne (p=0.129). Maximum number of obese patients had grade 4 acne, maximum number of overweight patients had grade 2 acne and maximum number of underweight patients had grade 1 acne. But there was no significant association between the BMI categories and grades of acne (p=0.129). Similarly, there was no significant association between the age and grades of acne (p=0.61). **Conclusion:** The prevalence of acne with severity more than moderate was much lower in patients who were underweight (BMI less than 18.5). However, this study showed no statistically significant difference in BMI among people with different severities of acne. Population-based studies, as well as age restriction of the participants, can lead to more accurate and reliable results in this regard. There was no significant association between BMI and severity of acne. However, a larger population-based study is indicated to validate our finding.

Keywords: Acne Vulgaris, Nodules, Obesity, Overweight.

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INTRODUCTION

Acne vulgaris is a common skin disorder that affects 79% to 95% of the young population. In United States, 40% to 45% of men and women older than 25 years of age have some degrees of facial acne that continues to the middle age in 12% of women and 3% of men [1]. Acne vulgaris (acne) is one of the most common chronic dermatological diseases among adolescents, affecting about 80% of young people between 12 and 18 years of age [2-4]. Acne vulgaris is a common skin disease and is clinically characterized by the presence of comedones, papules, pustules, nodules and scars. It is one of the biggest problems in western countries but nowadays, the problem is increasing even in low and middle income countries. According to the report of WHO, in 2016, 39% of adults were overweight and 13% were obese [5]. Recent findings also support the influence of lifestyle on the disease, indicating that intake of high glycemic index foods may have a profound effect on the development and severity of acne [6]. These observations could be of great importance as the number of overweight adolescents continues to increase despite increasing knowledge about risks resulting from obesity [7]. A higher body mass index (BMI) is associated with an increased incidence of polycystic ovary syndrome (PCOS) that presents with hyperandrogenism, acne, hirsutism and menstrual irregularities; also, obese women with PCOS have a more severe clinical presentation of hyperandrogenism rather than thin women suffering from this disease [8, 9]. Obesity affects skin physiology through changing the barrier function of the skin, lipid production, sweat glands and lymphatic function, collagen formation, wound healing, subcutaneous fat, and microscopic and macroscopic blood circulation [10]. The impact of obesity on many skin diseases has been established such as acanthosis nigricans, acrochordon, keratosis pilaris, hyperandrogenism, hirsutism, striae cutis distensae, adiposus dolorosa, fat redistribution, lymphedema, plantar hyperkeratosis, cellulitis, skin infections, suppurative hidradenitis, psoriasis, insulin resistance syndrome and many other conditions that may be exacerbated by obesity [11-13]. There are controversial findings regarding association between acne and BMI. Additionally, some studies found a positive association between acne and body mass index (BMI) [11, 12]. Herein we provide further evidence of the link between BMI and acne severity.

MATERIALS AND METHODS

This was a cross sectional prospective study conducted in the outpatient Department of Dermatology, *Shaheed M. Monsur Ali Medical College Hospital*, Sirajganj, Bangladesh from January to

March 2022. Sampling method used was consecutive sampling technique. All the newly diagnosed patients of acne were enrolled in the study. Follow up patients of acne who were already under medication for acne were excluded from our study. They received information on the objectives, importance, and method of this project and were assured of the confidentiality of the information. After obtaining informed consent, patients were enrolled in the study. A questionnaire, which contained two parts, was completed for each patient. The first part was about demographic characteristics including age, sex, weight, height, BMI and severity of acne and the second part included questions about the disease duration, medical history, type of the drugs, history of isotretinoin use, duration of daily exposure to sunlight, milk consumption during the day, amount of chocolate consumption in one week, and smoking history. Similarly, those under other systemic medicines which could influence acne and those who did not give consent were also excluded from the study. Informed consent was obtained from all the patients. Information on demographic data was obtained. Family history of acne in the first-degree relatives, if it was positive or negative was recorded. Height and weight were measured. BMI was calculated by dividing weight in kilograms by height in meters squared, or kg/m² [14]. The World Health Organization Asian Pacific Guideline 2000 was followed for categorization of BMI [15]. The patients were classified into one of the following categories: underweight (BMI < 18.5), normal weight (BMI: 18.5– 23.9), overweight (BMI: 24–26.9) and obese (BMI ≥ 27). Patients were examined for the types of lesions like comedone, papule, pustule, cyst, abscess or scar and the severity of acne was graded using Indian classification, which classifies acne into four grades from 1 to 4 [16]. Grade 1: Comedones, occasional papules. Grade 2: Papules, comedones, few pustules. Grade 3: Predominant pustules, nodules, abscesses. Grade 4: predominantly cysts, abscesses, widespread scarring. Information was obtained from patients through a questionnaire and was recorded in a form. All data were entered into SPSS-21 Windows software and analyzed with statistical tests such as independent T-test, Chi-square, and Analysis of Variance between groups (ANOVA). P values less than 0.05 were considered statistically significant.

RESULTS

A total of 125 patients with acne were included in the study. Age of the patients ranged from 10 to 50 years with mean age of 20.82 ±5.9 years. Most of the patients were in the age group of 11-20 years (Table 1). There was slightly a female

preponderance with female: male ratio of 1:1.4. According to BMI, 65.5% were normal, 12% were overweight, 20.5% were underweight and 2% of patients were obese. Majority of the patients had Grade 2 acne (52.8%). Only 4.8% had grade 4 acne. Acne of Grade 2 and 3 were more prevalent in females whereas grade 3 and 4 acne were more common among males (Table 2). A positive family history of acne was seen in 24(19.6%) patients (Table 2). When comparison of BMI was made with

the grades of acne, mean BMI was within the normal range for all grades of acne. Maximum number of obese patients had grade 4 acne, maximum number of overweight patients had grade 2 acne and maximum number of underweight patients had grade 1 acne. But there was no significant association between the BMI categories and grades of acne ($p=0.129$). Similarly, there was no significant association between the age and grades of acne ($p=0.61$) (Table-3).

Table 1: Distribution of patients according to age group (N=125)

Age Group	Frequency	Percentage
0-10	1	0.8
11-20	76	60.8
21-30	38	30.4
31-40	8	6.4
41-50	2	1.6
Total	125	100

Table 2: Comparison of different variables with grades of Acne (N=125)

Variables	Grades of Acne			
	Grade 1	Grade 2	Grade 3	Grade 4
No of Patients	29 (23.2%)	66 (52.8%)	24 (19.2%)	6(4.8%)
Mean Age±SD (yrs)	19.5±5.2	21.2.5±6.1	21.5±6.3	19.7±3.5
BMI (mean) ±SD (kg/m ²)	21.1±4.0	21.4±3.4	21.1±2.7	21.3±3.5
Family history (+)	5 (17.2%)	13 (19.6%)	5 (20.8%)	1(16.6%)
Male/Female	9/20	24/42	15/9	4/2

Table 3: Comparison of grades of acne with BMI (N=125)

Grade of Acne		Frequency	Percent
Grade 1	Underweight	9	31.0
	Normal	15	51.7
	Overweight	3	10.3
	Obese	2	6.8
	Total	29	100
Grade 2	Underweight	11	16.6
	Normal	44	66.6
	Overweight	10	15.1
	Obese	1	1.5
	Total	66	100
Grade 3	Underweight	4	16.6
	Normal	18	75.0
	Overweight	2	8.3
	Total	24	100
Grade 4	Underweight	2	33.3
	Normal	3	50.0
	Obese	1	16.6
	Total	6	100

DISCUSSION

The mean BMI in this study was 23.36 and the severity of acne was determined according to classification of Dreno and colleagues (GEA scale) in all patients [17]. As it is clear, in general, the

moderate acne group had the highest frequency. Among women, the mild acne group followed by the moderate acne group had the highest frequency and among men, the moderate group had the highest frequency followed by the almost clear group. This finding means that despite the lower number of men

in the study, they had more severe acne than women. It may show the higher compliance of men to acne than the women, which is logical with regards to the fact that women are more concerned about cosmetic problems. Acne vulgaris is one of the most common skin disorders affecting mostly the adolescent age group that frequently continues into adulthood [18]. Most of our patients also belonged to the similar age group. Acne has been found more commonly in females [12]. Our study has also confirmed the similar finding. In our study age of the patients ranged from 10 to 44 years with mean age of 20.82 ± 5.9 years. Most of the patients were in the age group of 11-20 years (Table 1). There was slightly a female preponderance with female: male ratio of 1:1.4. According to BMI, 65.5% were normal, 12% were overweight, 20.5 % were underweight and 2% of patients were obese. Majority of the patients had Grade 2 acne (52.8%). Only 4.8% had grade 4 acne. However, in a study by Borgia, the mean BMI showed no statistically significant difference in different severity groups of acne [18]. Acne of Grade 2 and 3 were more prevalent in females whereas grade 3 and 4 acne were more common among males (Table 2). There are still controversial reports regarding the association between BMI and acne. There have been several studies which have confirmed the association between acne and BMI. Jancin B conducted a study in female teens and reported that moderate to severe acne was more prevalent among overweight and obese individuals [19]. Alan S and colleague also observed a positive correlation between BMI and severity of acne, the groups with higher BMI had severe grades of acne [20]. Smith RN et al observed a significant association between acne lesion counts and BMI in men aged 18 to 25 years [21]. Later, this finding was also confirmed by Lu LY et al, severe acne was observed in overweight and obese individuals of age 18-25 years [22]. A study conducted on Italian adolescents and young adults reported that the acne risk was reduced with lower BMI, especially in males [23]. A study conducted in British male soldiers revealed that individuals with acne tended to be heavier [24]. In a study conducted in school children in Taiwan, acne was less prevalent in those having lower BMI (< 18.5) [12]. A study by Halvorsen JA also showed that overweight and obesity were associated with acne in girls of age 18 and 19 years [25]. On the other hand there are studies which have refuted the association between acne and its severity. A study conducted exclusively in adult women found no difference in BMI when compared to severity of acne [26]. A study from Taiwan has even highlighted a negative phenomenon, obese women presented with less acne than the non-obese cases [27]. In our study,

there were underweight and overweight individuals in all the grades of acne. Obese individuals were also found in all the grades of acne except in grade 3. But the association between BMI and severity of acne was not significant. It could be possible to achieve more accurate results through including limited age groups, conducting population-based studies, increasing the sample size, and indicating more precise and reliable measurement tools. Given the high prevalence of acne and the lack of such studies in our country, and also considering the effect of cultural differences on diet and genetic susceptibility to acne, it seems necessary to design and conduct these types of studies to further evaluate the association of these factors with acne.

CONCLUSION

The prevalence of acne with severity more than moderate was much lower in patients who were underweight (BMI less than 18.5). However, this study showed no statistically significant difference in BMI among people with different severities of acne. Population-based studies, as well as age restriction of the participants, can lead to more accurate and reliable results in this regard. There was no significant association between BMI and severity of acne. However, a larger population-based study is indicated to validate our finding.

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