

ASSOCIATION BETWEEN ACNE VULGARIS AND BODY MASS INDEX- A CROSS SECTIONAL STUDY IN TERTIARY HOSPITAL OF WESTERN NEPAL

Pratistha Shrestha,¹ Sabhyata Gurung,¹ Meera Shrestha,¹ Rajeev Yadav¹

ABSTRACT

INTRODUCTION

Acne vulgaris is a chronic inflammatory disease of pilosebaceous duct mainly affecting adolescents. There is conflicting data regarding association between acne and body mass index (BMI). The main objective was to find the association between different grades of acne and BMI.

MATERIAL AND METHODS

We conducted a cross-sectional observational study involving 251 patients with acne vulgaris. Severity of acne vulgaris was assessed using simple grading system and WHO reference was used for classification of body mass index (BMI). Data was analyzed using SPSS, version 20. *p* value of less than 0.05 was considered statically significant.

RESULTS

The study included 149 females (59.4%) and 102 males (40.6%). Acne vulgaris is recorded in 47.8% in age group 12-20 years, followed by 44.6% in age group 21-30 years and 7.6% in age group 31-40 years. Grade 2 acne vulgaris was the most common (47%), followed by grade 3 (24.7%), grade 1 (16.7%), and grade 4 (11.6%). About 49.4% of acne vulgaris patient had normal BMI, 19.5% had obesity. There was no significant association between different grades of acne vulgaris and BMI ($p=0.07$).

CONCLUSION

There was no significant association between severity of acne and BMI.

KEYWORDS

Acne vulgaris, BMI, Obesity, Overweight.

1. Department of Dermatology, Universal College of Medical Sciences, Bhairahawa, Nepal

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For correspondence

Dr. Pratistha Shrestha
Department of Dermatology
Universal College of Medical Sciences
Bhairahawa, Nepal
Email: drpratisthashrestha@gmail.com

INTRODUCTION

Acne is one of the common skin diseases which has predominance of 9.4%.¹ It is also the eighth most prevalent disease all over the world.² It is a chronic inflammatory disorder of pilosebaceous unit, mostly affecting adolescents.³ It is a multifactorial disorder, its etiopathogenesis include follicular hyperkeratinization, increase bacterial colonization (commonly *Propionibacterium acne*), and increase sebum production.^{3,4} There are also different contributory factor which aggravate the acne like endocrine factor (androgen),⁵ genetic predisposition, environmental factors, stress and food habits.⁶ It predominately affect face but it can also affect back and other parts of body.⁷

Obesity is increasing globally and its prevalence is 47% in children and 28% in adults.⁸ It is estimated that 20% of the world's population will be affected by obesity and 38% will be overweight by 2030 if current trends persists.⁹ Obesity is also associated with different dermatological manifestation and acne vulgaris is one of them.

Body mass index (BMI) is one of the most accurate ways to measure and determine obesity. Several authors have highlighted the association between acne vulgaris and BMI.¹⁰ High body mass index are said to be more likely to have increased insulin-like growth factor-1, which is implicated as one of the acne vulgaris etiopathogenesis.¹¹ Obesity decreases the plasma level of sex hormone-binding globulin (SHBG), which increases the free testosterone level and adipokine-driven inflammatory cytokines that result to acne.^{12,13}

There is also association between BMI and polycystic ovary syndrome (PCOS) which presents with hyperandrogenism, acne, hirsutism and menstrual irregularities.¹⁴ Fat tissue is also the site of androgen production.¹⁵ There is also role of obesity and peripheral hyperandrogenism and acne vulgaris.

There is paucity of literature on association between acne vulgaris and BMI in Nepal. So this study could be useful to know the relationship between acne vulgaris severity and BMI.

MATERIAL AND METHODS

We conducted a prospective, cross-sectional observational study to demonstrate association between acne vulgaris and BMI. The study was conducted in the Department of Dermatology, UCMS. Ethical clearance (no.UCMS/IRC/099/22) was taken from institutional ethical committee.

The required sample size was calculated using a single proportion formula i.e. $n = Z^2 P(1-P)/d^2$. $p = 20\%$ prevalence from previous study,¹² confidence interval = 95% and margin of error (d) = 5% was taken. Hence, the required sample size was 250.

All the new patients with acne vulgaris irrespective of severity was included in the study. Patient who were already diagnosed with acne vulgaris and under medication were excluded from the study. Patient taking other systemic medication and who did not give consent were excluded

from the study.

All the patients were included after taking the informed consent. Detail history of each patient was taken on different sociodemographic data like age, gender, BMI, duration of disease, premenstrual flare up, family history of acne, dietary habits, and personal history.

Each patient's BMI (kg/m²) was calculated based on weight and height. The World Health Organization reference range for BMI was used i.e., underweight: <18.5; normal: 18.5–22.99; overweight: 23–24.99; obese: >25 kg/m².¹⁶

Severity of acne vulgaris was assessed using simple grading system.¹⁷ It includes 4 grades, i.e., Grade 1 (mild): predominantly comedones, occasional papules; Grade 2 (moderate): predominantly papules, few comedones and pustules; Grade 3 (severe): predominantly pustules, few nodules and papules; Grade 4 (cystic): predominantly cysts, abscess and widespread scarring.

Microsoft Excel sheet was used to tabulate the data. Data analysis was done in SPSS software (version 20). T-test was used to compare mean; Chi-square goodness of fit test was used to compare proportions. p value less than 0.05 was considered significant.

RESULTS

We included 251 patients with acne vulgaris where it was more common in females (59.4%) than males (40.6%).

Acne vulgaris is recorded in 47.8% in age group 12-20 years, followed by 44.6% in age group 21-30 years and 7.6% in age group 31-40 years. Grade 2 acne vulgaris was the most common (47%), followed by grade 3 (24.7%), grade 1 (16.7%), and grade 4 (11.6%). Among acne vulgaris patients, family history was present only in 27.9% of the patient and other 72.1% did not have family history of acne vulgaris. 49.4% of acne vulgaris patient had normal BMI, 19.5% had obesity and were underweight, and only 11.6% were overweight (Table 1).

According to BMI, both male and female had normal BMI in maximum number of patient, 19.5% female and 19.6% male had obesity (p value 0.992). Obesity was seen in 18.3% of age 12-20 and 17.9% of age 21-30 (Table 2). There was no significant association between age and BMI ($p=0.476$).

There was also no significant relation between severity of acne and BMI. ($p=0.07$). Grade 2 acne vulgaris was most common and most of them have normal BMI (53.4%). Obesity was found in 16.1%, overweight was found in 8.5% and 22% were underweight in Grade 2 acne vulgaris (Table 2).

Table 1. Distribution of patients according to different variables

Variables		Frequency	Percent
Gender	Female	149	59.4
	Male	102	40.6
Age (years)	12-20	120	47.8
	21-30	112	44.6
	31-40	19	7.6
Family history	Normal	181	72.1
	Yes	70	27.9
Dietary	No	183	72.9
	Yes	68	27.1
Grade	1	42	16.7
	2	118	47.0
	3	62	24.7
	4	29	11.6
BMI	Normal	124	49.4
	Obesity	49	19.5
	Over weight	29	11.6
	Under weight	49	19.5

Table 1. Distribution of patients according to different variables

		BMI				p value
		Normal	Obesity	Overweight	Underweight	
Gender	Female	73(49)	29(19.5)	18(12.1)	29(19.5)	0.992
	Male	51(50)	20(19.6)	11(10.8)	20(19.6)	
Age (years)	12-20	56(46.7)	22(18.3)	14(11.7)	28(23.3)	0.476
	21-30	60(53.6)	20(17.9)	13(11.6)	19(17)	
	31-40	8(12.4)	7(36.8)	2(10.5)	2(10.5)	
Grade	1	15(35.7)	10(23.8)	4(9.5)	13(31)	0.07
	2	63(53.4)	19(16.1)	10(8.5)	26(22)	
	3	31(50)	15(24.2)	8(12.9)	8(12.9)	
	4	15(51.7)	5(17.2)	7(24.1)	2(6.9)	

DISCUSSION

Acne vulgaris is the disorder of pilosebaceous unit which is one of the common chronic skin disease.

The most common age group was 12-20 years (47.8%). Similarly, study done Gayen R et al showed that 75% of patient were in age group 15-25 years.¹² This was supported by the study done by Iftikhar et al also.¹⁸ This age group justify that acne is more common in adolescent because of increase in sebaceous activity under influence of androgen in adolescent.¹²

Most of our patients presented with grade 2 acne vulgaris (47%). Maximum number of patient with mild acne was seen in other studies as well.^{12,18}

The main objective of this study was to evaluate the relationship between different grades of acne vulgaris with BMI which demonstrated that there is no significant relation between them ($p=0.07$).

There is controversy demonstrating the relation between acne vulgaris and BMI. Keratinocytes proliferation, sebaceous lipogenesis and androgen synthesis are involved in development of acne vulgaris where insulin like growth factor-1 (IGF-1) plays a major role. It is found that there is

increase in IGF-1 in patient with high BMI.¹² A high BMI is associated with hyperandrogenism which increases the production and secretion of sebum that results in formation of acne.¹³

The study conducted in school going children in Taiwan showed that mean BMI in children with acne was higher than that of normal children.¹³ In the community based study in Saudi Arabia, the prevalence of acne who had BMI>30 was 38% which was statically significant.¹⁹ Similarly, there were several study supporting the association between acne vulgaris and BMI.²⁰

Meta analysis conducted by Mehta A et al showed null association between obesity and acne risk.²¹ There was also no positive correlation between obesity and severity of acne in study conducted by Podder et al.⁴ The study conducted by Anaba LE et al showed that Adolescents with high BMI are more likely to have facial acne but Acne severity was not associated with high BMI.¹¹

CONCLUSION

Although obesity and overweight was seen in patients with acne vulgaris, they lack any significant association. Thus, we should examine all dermatological patients with acne vulgaris to rule out high BMI, irrespective of disease severity to treat any underlining associated diseases in time. Further studies with larger sample size and important variables are needed to validate the association between higher BMI and acne vulgaris.

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