RESEARCH ARTICLE

A cross-sectional study of body mass index and sleep quality as risk factors to severity of acne

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Abstract

Objective: To analyse the association of body mass index and sleep quality with severity of acne.

Methods: The cross-sectional study was conducted at the Dermatology Department of Mayo Hospital, Lahore, Pakistan, from January to March 2019, and comprised acne patients of either gender aged 12-45 years. Data was collected using a pre-designed questionnaire. Acne grades 1, 2, 3 and 4 were determined by a consultant dermatologist. Pittsburgh sleep quality index was used to assess sleep quality, while body mass index was calculated as per the standard procedure. Data was analyzed using SPSS 22.

Results: Of the 98 patients, 27(27.6%) were male and 71(72.4%) were female. The overall mean age of the sample was 22.3±4.9 years. There were 36(36.7%) patients with acne grade 3, followed by 25(25.5%) each with grades 1 and 2, and 12(12.2%) with grade 4. The relationship between body mass index and acne severity was not significant (p=0.07), and the same was the case with sleep quality (p=0.09).

Conclusion: Body mass index and sleep quality were not found to be associated with acne severity.

Keywords: Acne, Body mass index, Sleep, Risk factors. (JPMA 71: 2148; 2021)

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Introduction

Among the top 10 diseases, acne was the 8th most prevalent in 2010.[1] It is among the top three skin diseases. A total of 85% of adolescents in the United States face this issue.[2]

Acne is the chronic inflammation of pilosebaceous glands of the skin. Patients present with comedones, papules and pustules. Sometimes nodules and scarring may be observed. Areas most commonly involved in this condition are face, chest and back.[3]

Obesity is a growing problem in the developed world and is accompanied by a number of dermatological problems, like hyperandrogenism, hirsutism, keratosis pilaris and androgenetic alopecia. Obesity increases the production of sebum in the skin, resulting in severe acne. A few studies have cited body mass index (BMI) as a potential risk factor for the development of acne.[4,5] Other studies have shown no relationship between the two.[6]

It is a well-known fact that circadian rhythms control a number of physiological and behaviour aspects of human body, including hormonal balance, temperature control, blood pressure, sleep cycle etc.[7] Sleep patterns are also linked with severity of acne. Some studies showed increasing hours of sleep increases sebum production which may lead to acne development.[8,9]

In Pakistan, minimal local data is available showing association of acne with BMI and sleep patterns. The current study was planned to fill the gap in literature by analysing the association of BMI and sleep quality with acne severity.

Subjects and Methods

The cross-sectional study was conducted at the Dermatology Department of Mayo Hospital, Lahore, Pakistan, from January to March 2019, after approval from the institutional ethics review committee. The sample was raised using non-probability, convenience sampling technique. Those included were acne patients of either gender aged 12-45 years. Those having any other co-morbid dermatological or systemic illness were excluded. After taking written informed consent from all the subjects, data was collected using a pre-designed questionnaire consisting of four sections. The first section was related to demographic variables. The second section was related to acne grades which were determined by a consultant dermatologist into 1, 2, 3 and 4, according to the severity of the disease. The third section related to BMI, was calculated by dividing weight in kg to square of height in meters. BMI was further categorised into underweight = <18.5kg/m^2, normal weight = 18.5-22.9kg/m^2, overweight = ≥23kg/m^2, obesity = 24-30kg/m^2.[5] The fourth section related to sleep quality as assessed by the Pittsburgh sleep quality index (PSQI). A score of 5 or greater was considered poor sleep quality.[10]

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Data was analysed using SPSS 22. Mean and standard deviation of age, BMI and PSQI were calculated. Frequencies and percentages were calculated for gender, acne grade, BMI categories and sleep patterns. Association of acne with BMI and sleep patterns were calculated using chi square test. P<0.05 was considered statistically significant.

Results

Of the 98 patients, 27(27.6%) were male and 71(72.4%) were female. The overall mean age of the sample 22.3±4.9 years. There were 36(36.7%) patients with acne grade 3, followed by 25(25.5%) each with grades 1 and 2, and 12(12.2%) with grade 4. In terms of BMI, 9(9.18%) patients were underweight, 55(56.12%) had normal weight, 22(22.4%) were overweight and 12(12.24%) were obese.

Table-1: Association between body mass index (BMI) and acne grades.

Grades of Acne	BMI				P value
	Under weight	Normal weight	Over weight	Obese	
One	1	19	2	4	.07
Two	3	15	6	3	
Three	4	17	10	2	
Four	1	4	4	3	

Table-2: Association between sleep quality and acne grades.

Grades of Acne	Sleep Quality		P value
	Good sleeper	Poor sleeper	
One	8	17	.09
Two	10	15	
Three	6	30	
Four	1	11	

The relationship between body mass index and acne severity was not significant (p=0.09) (Table-1).

Of the 98 subjects, 25(25.55%) were good sleepers and 73 (74.49%) poor sleepers. The relationship between sleep quality and acne severity was not significant (p=0.09) (Table-2).

Discussion

The current study found no significant association of acne with BMI and sleep patterns. There were 27 male and 71 female patients. Among the women, grades 1 and 2 were more prevalent compared to men among whom grades 3 and 4 were more prevalent. This shows more severity of acne in men than women. This may also imply that women are more concerned about cosmetic problems, as has been shown in earlier studies.[11]

Worldwide, the burden of obesity has been doubled.[12] Obesity is linked to a number of metabolic disorders, like diabetes, metabolic syndrome and polycystic ovary syndrome (PCOS).[13,14] Obesity creates an environment of hyperandrogenism inside the body which might lead to exacerbation of acne. A study suggested increased BMI leads to hyperandrogenism and increased severity of acne.[15] For the same reason the new treatment guidelines for acne include some contraceptive pills which inhibit androgen activity.[16] However, a study showed that acne has no association with overproduction of androgens.[17] A number of studies investigated relationship of obesity and acne, with most of them showing increased BMI >25kg/m^2 as a significant risk factor for acne.[18]

One study showed strong relationship between increased BMI and increased expression of insulin like growth factor leading to the severity of acne, showing the importance of dietary intervention for treating acne.[19] A study showed that children with increased BMI have inflammatory acne, while those with comedonal acne have lower BMI.[6] A study proposed that decreasing body-weight will decrease lipolysis on fascial skin by inflammatory bacteria, improving the treatment protocols of acne.[20] However, another suggested that there was no relationship between BMI and post-adolescent acne.[6]

The current results are consistent with literature,[6] but our study also included adolescence and post-adolescence. The current study showed that there was no relationship between increased BMI and severity of acne. However, a small sample size is a limitation of the current study.

New researches threw light on the significance of cutaneous rhythms and their manifestation on skin temperature control, sebum activity and proliferation of stem keratinocytes.[7,21] Disruption of this oscillating system damages these normal mechanisms and may lead to pathological manifestations. A study in 2013 showed increased prevalence of psoriasis in people who work in night shifts, and proved the exacerbation of the disease due to misalignment of circadian cycle and behavioural practice.[22] Increased hours of sleep and disturbed sleep is associated with increased skin problems.[23] We

investigated the relationship of sleeping habits to the severity of acne. We used PSQI to differentiate between good and poor sleepers.[10] Many studies indicated increased sebum production and its association with acne.[24] Variation in sleeping patterns change testosterone level and sebum production; increased hours of sleep was associated with increased levels of testosterone and increased sebum production in women.[8,9]

The current study showed that most of the acne patients had poor sleeping habits (74.2%). This may give an insight into the sleeping patterns of society at large. However, the study did not find statistically significant relationship between acne severity and poor sleeping patterns, implying the fact that sleep does not affect acne.

However, other than the small sample size, the absence of a control group is also a limitation of the current study. Other influencing factors, like smoking, dietary habits and stress, could be the confounding variables which were also not taken into account. More accurate methods for measurement of acne severity and sleeping habits should be developed while keeping other variables constant in both control and experiment groups to reproduce more significant results.

Conclusion

BMI and sleep quality were not found to be associated with acne severity.

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