

## Investigation of the effect of stress and other factors on acne in medical students

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### Abstract

**Objective:** The purpose of this research is to determine the effect of stress and other factors affecting acne among medical students.

**Methods:** Between January 2023 and May 2023, 105 medical students were examined and the presence of acne was determined. The severity of acne was determined using the "Global Evaluation Acne Scale" (GEAS), the factors related to acne were questioned, and the "Perceived Stress Scale" (PSS) consisting of 14 items was filled by the medical students.

**Results:** Acne prevalence was found to be 74.28%. There was a statistically significant relationship between acne and lower height, and female gender ( $p < 0.05$ ); high temperature-humidity, sweating, make-up, topical corticosteroid, milk, alcohol, sweet, chocolate, bakery product, age, weight, stress were not found to be correlated ( $p > 0.05$ ). Although not statistically significant, the stress scores were higher as acne severity increased.

**Conclusion:** Stress reduction seems to be important in medical student to reduce acne prevalence. Short height was found to be associated with acne in our study group, and this could be investigated in future studies.

**Keywords:** Acne; Stress; Height; Medical student

### 1. Introduction

Acne is a very common skin disease, and genetic and environmental factors are known in its formation. Psychological stress activates the hypothalamic pituitary adrenal axis and causes biological consequences in the body(1). Skin can form acne in response to stress situations due to the CRH receptors on it(2). In our study, we aim to explore stress and other factors that could alter the risk of acne development and severity in medical students. Information about the factors that aggravate acne could help to avoid them and alleviate acne.

### 2. Material and Methods

Izmir Katip Celebi University 3<sup>rd</sup>-year medical faculty students were included in the study. To assess acne severity, the Global Evaluation Acne Scale (GEAS), based on the degree of comedones, papules, pustules, and nodules on the face,

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developed by Dreno et al.(3), was used. The dermatologist (A.A.) taught the acne lesions to the examiners (J.E., K.U.A., K.Y., K.Ç.) of the study. Examiners assessed the severity of the lesions.

Perceived Stress Scale (PSS) which is a 5-point Likert-type scale that participants evaluate each of 14 items ranging from “Never {0}” to “Very often {4}”, which was developed by Cohen et al.(4), was used to assess stress severity.

Height, weight, body mass index, family history, living area temperature-humidity, sweating, use of make-up and cosmetic products, and use of topical corticosteroids were inquired. Consumptions of milk, sweets, chocolate, bakery products, alcohol, and smoking in terms of glass, bar, or packet were questioned.

This study was conducted under the Helsinki criteria after approval by the Izmir Katip Çelebi University Ethics Committee (approval number: 429, date 20.10.2022). Informed consent was obtained from all participants.

### 3. Results

105 students participated in the study. 55 (52.38%) were female, 50 (47.61%) were male. 78 (74.28%) students had acne.

Acne presence and severity were as follows: for females, no lesion in 8 (14.5%), almost no lesion in 25 (45.5%), mild 17 (30.9%), moderate 4 (7.3%), severe 1 (1.8%); for males, no lesion in 19 (38%), almost no lesion in 21 (42%), mild 7 (14%), and moderate 3 (6%).

In the data we obtained, acne presence in females was found to be significantly higher than in males ( $p < 0.05$ ). A statistically significant difference was due to double match comparisons of the clear and almost clear group {0-1}, and the clear and mild group {0-2}. Categorical variables and their comparison with acne severity are shown in Table 1.

**Table 1** Comparison of Categorical Variables with Acne Severity

	Acne severity					X <sup>2*</sup>	p
	Clear(no lesions) {0}	Almost clear(almost no lesions) {1}	Mild {2}	Moderate {3}	Severe {4}		
<b>Sex</b>							
women	8 (29.6)	25 (54.3)	17 (70.8)	4 (57.1)	1 (100)	9.923	<b>0.030</b>
men	19 (70.4)	21 (45.7)	7 (29.2)	3 (42.9)	- (-)		
<b>High temperature-humidity</b>							
no	8 (29.6)	13 (28.3)	6 (25)	- (-)	- (-)	3.148	0.602
yes	19 (70.4)	33 (71.7)	18 (75)	7 (100)	1 (100)		
<b>Sweating</b>							
no	6 (22.2)	7 (15.2)	4 (16.7)	1 (14.3)	- (-)	0.861	0.919
yes	21 (77.8)	39 (84.8)	20 (83.3)	6 (85.7)	1 (100)		
<b>Make-up</b>							
no	15 (55.6)	19 (41.3)	10 (41.7)	2 (28.6)	- (-)	3.115	0.579
yes	12 (44.4)	27 (58.7)	14 (58.3)	5 (71.4)	1 (100)		
<b>Topical corticosteroid</b>							
no	27 (100)	46 (100)	23 (95.8)	7 (100)	1 (100)	3.407	0.300
Yes	- (-)	- (-)	1 (4.2)	- (-)	- (-)		

<b>Fatty milk</b>							
no	4 (14.8)	5 (10.9)	3 (12.5)	1 (14.3)	- (-)	0.409	0.974
yes	23 (85.2)	41 (89.1)	21 (87.5)	6 (85.7)	1 (100)		
<b>Skimmed milk</b>							
no	8 (29.6)	14 (30.4)	6 (25)	2 (28.6)	1 (100)	2.645	0.696
yes	19 (70.4)	32 (69.6)	18 (75)	5 (71.4)	- (-)		
<b>Alcohol</b>							
no	9 (33.3)	23 (50)	11 (45.8)	3 (42.9)	1 (100)	3.192	0.553
yes	18 (66.7)	23 (50)	13 (54.2)	4 (57.1)	- (-)		
<b>Smoking</b>							
no	19 (70.4)	32 (69.6)	15 (62.5)	7 (100)	1 (100)	4.104	0.387
yes	8 (29.6)	14 (30.4)	9 (37.5)	- (-)	- (-)		
<b>Sweet</b>							
no	2 (7.4)	- (-)	- (-)	1 (14.3)	- (-)	7.397	0.074
yes	25 (92.6)	46 (100)	24 (100)	6 (85.7)	1 (100)		
<b>Chocolate</b>							
no	- (-)	- (-)	- (-)	1 (14.3)	- (-)	14.135	0.076
yes	27 (100)	46 (100)	24 (100)	6 (85.7)	1 (100)		
<b>Bakery product</b>							
no	2 (7.4)	- (-)	- (-)	- (-)	- (-)	5.890	0.266
yes	25 (92.6)	46 (100)	24 (100)	7 (100)	1 (100)		

\* Fisher's Exact test; Column percentages are used

The mean height of those without lesions was 177.25 cm; those with almost no lesions was 171.47 cm; those with mild lesions were 168.41 cm, and those with moderate lesions were 171.42 cm. There was a statistically significant relationship between acne presence and lower height ( $p < 0.05$ ). A statistically significant difference was due to double match comparisons of the clear and almost clear group {0-1}, and the clear and mild group {0-2}.

In terms of perceived stress scores, the mean scores in the categories of clear, almost clear, mild, and moderate were 25.92, 28.06, 29.25, and 31.42, respectively. There was no statistically significant correlation between acne severity and perceived stress scale ( $p > 0.05$ ). Although not statistically significant with these results ( $p = 0.079$ ), the PSS was found to be higher as acne severity increases. Numeric variables and their comparison with acne severity are shown in Table 2.

**Table 2** Comparison of Numeric Variables with Acne Severity

	Acne severity					Test statistics	
	Clear (no lesions) {0}	Almost clear (almost no lesions) {1}	Mild {2}	Moderate {3}	Severe {4}	$H^*$	$p$
<b>Age</b>						3.199	0.525
<i>Mean.±standart deviation</i>	21.44±1.69	21.06±0.7	21.54±1.69	20.85±0.69	20±		

<i>M (IQR)**</i>	21 (2)	21 (2)	21 (1.75)	21 (1)	20 (-)		
<b>Height</b>						14.123	<b>0.007</b>
<i>Mean.±standart deviation</i>	177.25±8.26	171.47±8.44	168.41±7.42	171.42±8.16	170±		
<i>M (IQR)</i>	180 (14)	170 (13.5)	167.5 (10.5)	172 (13)	170 (-)		
<b>Weight</b>						2.746	0.601
<i>Mean.±standart deviation</i>	73.51±15.54	69.21±17.98	69.66±18.28	67.57±9.64	70±		
<i>M (IQR)</i>	78 (25)	64.5 (21.5)	65 (17.75)	70 (18)	70 (-)		
<b>BMI(Body mass index)</b>						1.062	0.900
<i>Mean.±standart deviation</i>	23.16±3.42	23.33±4.67	24.56±6.51	22.94±2.36	24.22±		
<i>M (IQR)</i>	23.57 (5.76)	22.45 (4.74)	22.89 (5)	22.94 (4.55)	24.22 (-)		
<b>Perceived Stress Scale (PSS)</b>						8.359	0.079
<i>Mean.±standart deviation</i>	25.92±7.36	28.06±5.63	29.25±4.54	31.42±6.92	28±		
<i>M (IQR)</i>	27 (8)	27 (6)	28 (3)	33 (13)	28 (-)		

\*Kruskal Wallis H analysis, \*\* median (interquartile range)

#### 4. Discussion

In the study of Sachdeva et al., a literature review of acne in medical students was done, 11 cross-sectional studies from different countries were detected, and acne prevalence was found to be 57.2% (1866/3261) with a mean age of 21.3 in the medical students; the prevalence was 40% in the general population of the same age group(5). In our study, acne prevalence was found to be 74.28%, which was higher than the aforementioned study. Stress-reducing techniques were recommended for medical students(6).

Although cortisol level was studied in many studies for detecting stress presence, PSS is an effective noninvasive substitute method that could be used on purpose(7). In our study, although stress was not found to be statistically significant, stress scores were found to be higher as acne severity increased. Mediators of stress as CRH and substance P have receptors on sebaceous glands, and when stimulated in response to stress, secrete sebum that is involved in acne pathogenesis(8,9). In the study of Zari et al. with 144 6<sup>th</sup>-grade female medical students, in which PSS and GEAS were used, perceived stress was found higher in those with high acne severity(10).

In Dreno et al.'s study, the body mass index (BMI) was found to be higher in acne patients (24.90) than the controls (23.99) ( $P < 0.001$ )(11). In our study, we did not find a statistically significant relationship between acne and BMI, but there was a statistically significant relationship between the presence of acne and lower height ( $p < 0,05$ ). Stress levels beyond compensatory capacity result in negative health outcomes on bone growth. Both acute and chronic stress and subsequent cortisol increase adversely affect chondrogenesis through altering the growth hormone (GH)-insulin-like growth factor-1 (IGF-1) axis(12). Supraphysiological adrenal androgens in patients with congenital adrenal hyperplasia and premature adrenarche which are ACTH-driven disorders reduce final adult height(13). Endocrinologic effects of stress might lead to both short height and prevalence of acne in our study group.

Regarding sex, in the systematic review of the epidemiology of acne vulgaris, males were found to have acne with slightly increased risk by odds ratio (OR) of 1.07 (95% CI 0.42–2.71) (14). In our study, a statistically significant difference was found between the presence of acne and female gender( $p < 0,05$ ). Our patient number is less, which could be the reason for female predominance.

There was no difference between acne and diet in our study involving 105 students ( $p > 0,05$ ). In Dreno et al.'s international survey with 2826 acne patients and 3853 controls, acne was found to be correlated with dairy product intake, soft drinks, juices or syrups, pastries, chocolate, and sweets ( $P < 0.001$ )(11). In a review, omega-3 fatty acids and low-glycemic index foods were reported to decrease acne(15).

In Suh et al.'s study of 1236 patients with acne, make-up was stated to have an enhancing effect on acne(16). Also smoking and alcohol consumption was found to be associated with acne(16). Our patient population was small, and that could be the reason for not significant relationships.

In Suh et al.'s study, the summer season, which is the most humid and hot in Korea, was reported to exacerbate acne(16). In Izmir, winter is the most humid season, and summer is the hottest season. In our study, we did not investigate the effects of seasons; since 73% of our participants live all year in Izmir, they did not report an effect of environmental change, this could be because peaks of humidity and temperature did not exist together at the same season in Izmir. In the study of Zari et al. with 144 medical students in Saudia Arabia(10), they reported heat and humidity together caused acne exacerbation, which they attributed to easier *Propionibacterium acnes* colonization.

Among the other factors that were stated to be associated with acne were vigorous face cleaning, air pollution, screen and tablet use before sleeping ( $P<0.001$ )(11).

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## 5. Conclusion

Stress reduction seems to be important in medical students to reduce acne prevalence. Short height was found to be associated with acne in our study group, and this could be investigated in future studies.

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## Compliance with ethical standards

### *Disclosure of conflict of interest*

No conflict of interest to be disclosed.

### *Statement of ethical approval*

The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the ethics committee of the Izmir Katip Çelebi University Ethics Committee (approval number: 429, date 20.10.2022).

### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

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