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Correlation between body mass index with striae in female adolescent



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ABSTRACT

Background: Striae has been reported as a skin problem often experienced by a woman and becomes an aesthetic problem. This skin problem can occur at any age, including adolescents, even though it is more common in younger women. Some conditions increase the risk of striae, such as weight, pregnancy, puberty, and hormonal drugs. Women with higher body mass index (BMI) tend to have more striae. With a limited study on striae, it is quite interesting to evaluate the high incidence of striae in the population.

Patients and Methods: This was a cross-sectional study using a total sampling method. The study was conducted after approval from the Ethics Committee Faculty of Medicine, Universitas Sumatera Utara. Samples are 155 female students aged 18-25 years old from the Medical Faculty of Universitas Sumatera Utara.

All samples were physically examined to diagnose the striae, and the BMI was calculated. All the collected data were analyzed statistically with ETA statistical tests to see the relationship between BMI and striae. P-value <0.05 considered statistically significant.

Results: The dominant age of the subject is 19 years old (62.5%), followed by 20 years old (30.3%), 21 years old (3.8%), and 18 and 23 years old (0.6%). Out of 155 subjects, there are 117 have striae (75.5%). None of the striae subjects is underweight, normal weight was 113, 3 obese and one overweight. The 38 subjects without striae are in normal BMI. An analysis using ETA proved that BMI is not significantly associated with striae ($p > 0.05$).

Conclusion: There is no significant relationship between BMI and striae.

Keywords: striae, adolescent, body mass index

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INTRODUCTION

Striae have been reported as a skin problem often experienced by a woman and become an aesthetic problem.^{1,2} Striae in a woman can cause psychological disorders and affect her quality of life.^{3,4} This skin problem can occur at any age, including adolescents. Striae prevalence reaches 80% of the entire population.⁵ In adolescents, striae's sex prevalence is dominated by female adolescents at 60%, while male adolescents only account for 40%.⁶

Until now, the exact cause of striae is not yet known.⁷ Some conditions increase the risk of developing striae, such as pregnancy, puberty, weight, and the use of hormonal drugs.^{6,8,9} Women with higher body mass index (BMI) have more striae. Striae is more common in younger women.¹⁰ With a limited study on striae, it is quite interesting to study the high incidence of striae. This study aimed to evaluate the relationship between BMI with striae and determine the prevalence of striae.

METHODS

This study was conducted after approval from the

Ethics Committee of the Faculty of Medicine, Universitas Sumatera Utara, North Sumatra, Indonesia, with registry number 171/TGL/KEPK FK USU-RSUP HAM/2019. The study was conducted from April 2019 to September 2019 at the Faculty of Medicine, Universitas Sumatera Utara. This is a cross-sectional study using a total sampling method.

The population was all female students of the Faculty of Medicine, Universitas Sumatera Utara, aged 18-25. From the total population of 156 subjects, one person was unwilling to participate in the study. The subjects were willing to fulfill the informed consent form before included in the study. Therefore, the total number of samples was 155 subjects.

The physical examination data were used to confirm the diagnosis. BMI and site of striae were examined. We perform BMI calculations by weight in kilograms divided by the square of height in meters. We checked the subjects' weight with the GEA weight scales, and LANFY mounted wall stadiometer used for height measurements. The BMI calculation results with a value of 18.5 are included in the underweight category, 18.5 to 24.9

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are normal, 25.0 to 29.9 are overweight, and 30.0 and above are obese. We examined striae with direct inspection, and the lesions were photographed. The collected data were analyzed statistically with ETA statistical tests to see the relationship between BMI and striae. P-value <0.05 considered statistically significant.

RESULTS

From 155 subjects, the median age was 19 years with the dominant age of 19 years old (62.5%) followed by 20 years old (30.3%), 21 years old (3.8%), and 18 and 23 years old (0.6%). The results showed that 117 (75.5%) subjects had striae, while 38 (24.5%) subjects did not experience any striae (Table 1).

None of the striae subjects was underweight, with the highest number with a normal BMI at 113 subjects, followed by obesity of 3 subjects and overweight of 1 subject. There were 38 subjects without striae with a normal BMI (Table 2).

Thus, the relationship between BMI and striae incidence was not statistically significant ($p>0.05$).

DISCUSSION

Striae is a skin disorder that is often associated with cosmetic morbidity.¹¹ Striae are linear lesions with purplish-red or white color. It is usually in

the lateral thighs, lower abdomen, buttocks, and breasts. Other sites rarely affected are inguinal, upper arms, shoulders, and legs.¹² Striae occurs at any age, including adolescents.³

Striae is a skin disorder that often appears in adolescents. The incidence of striae in adolescent has been reported at 25% to 35%.¹³ Cho et al. examined striae in 157 Korean adolescents with the result 131 of the adolescents had striae.³ The result was in line with our study, where 117 of 155 adolescents (75.5%) had striae.

It has been reported that striae in adolescents are more dominant in female adolescents at 72% compared to 38% in male adolescents. Striae in adolescents usually occur in people without obesity. This condition is associated with the physical growth of an adolescent.¹² The physical growth includes muscle growth, subcutaneous tissue, and bone extension resulting from the skin's distension.

Our result show there is no significant relationship between BMI and the occurrence of striae. This result in line with Parhusip et al. showed no significant relationship between obesity and the striae disease in young adults.¹⁴

However, studies conducted by Ahsan et al. found linked between weight gain with the occurrence of striae.¹⁵ That result opposite of our research.

There is a hypothesis that striae always begins with stretching without considering whether the stimulus is excessive or not. The adhesion among collagen seems to be more important than the amount of collagen in the stretch response to striae occurrence. Striae occur in skin areas with cross-links of collagen fibers and immature elastic fibers which causes a limited degree of stretching and partial intradermal rupture.¹⁶ Stretch and striae are a continuous process and adaptation to the growing need in adolescence, which changes body mass in early adulthood. Pieraggi et al. showed that striae resulted from the disruption of elastic fibers due to tensile strength. Histologic changes are found in striae such as fragmented collagen, an abundance of essential substances, and globular fibroblasts that lose all fibril secretion signs indicating fibroblast dysfunction due to distension.¹⁶ Some supporting factors have been put forward besides physical growth include genetic, hormonal, and pathological disease processes.¹⁶

The emergence of striae on the skin has been associated with a tendency to decrease families' disease. A retrospective study has found genetic factors such as a history of striae in the family, background, and ethnicity as important predictors for the beginning of striae.¹⁶ In a study conducted by Tung et al., they identified a relationship between striae and gene elastin (ELN), which encodes the

Table 1. Characteristics distribution of the samples

Characteristics	n (155)	(%)
Age (median = 19)		
18	1	0.6
19	97	62.5
20	47	30.3
21	6	3.8
22	3	1.9
23	1	0.6
Body Mass Index (BMI)		
Underweight	0	0
Normal	151	97.4
Overweight	1	0.7
Obesity	3	1.9
Striae		
Yes	117	75.5
No	38	24.5

Table 2. Correlation between body mass index and striae

	Striae		P-Value
	Yes	No	
Body Mass Index	Underweight	-	0.093
	Normal	113	
	Overweight	1	
	Obesity	3	
	Total	117	

elastic protein. Mutations in these genes affect the integrity of the skin caused by a disruption in the formation of elastic fibers.¹⁷

Some pathological factors contribute to the emergence of striae, such as Cushing's syndrome and Marfan's syndrome.¹⁶ Cushing's syndrome occurs due to an increase of cortisol levels disrupting various organs, one of which is on the skin. Cushing's syndrome, the formation of reddish or purplish striae with a width of more than 1 centimeter, is detected.¹⁸ Increased cortisol levels in Cushing's syndrome cause an increase in collagen degradation, resulting in extracellular matrix disruption in the dermis, leading to striae.¹⁹ Marfan's syndrome is a systemic disorder of connective tissue caused by mutations in the fibrillin-1 extracellular protein matrix. In contrast to some other connective tissue disorders, patients with Marfan's syndrome usually have normal skin texture and elasticity.¹⁷

However, our study is not without limitations. The number of subjects is a limitation in this study. Further studies with a larger number of subjects are highly recommended.

CONCLUSION

In conclusion, Our results showed no significant relationship between BMI and incidence of striae in the students of Medical Faculty, Universitas Sumatera Utara. Further investigation with a larger number of subjects and multicenter is significantly required.

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ABBREVIATIONS:

y.o, years old; HPO, hypothalamic-pituitary-ovarian; GnRH, gonadotropin-releasing hormone; LH, luteinizing hormone; FSH, follicle-stimulating hormone.

AUTHOR CONTRIBUTION

All authors have contributed to all processes in this research, including preparation, data gathering and analysis, drafting, and approval for publication of this manuscript.

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CONFLICT OF INTEREST

The authors declare no conflict of interest regarding the publication of this article.

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