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The relationship between age of menarche with striae among female students



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ABSTRACT

Background: Striae are harmless skin disorders, but can cause cosmetic and psychological concerns. The role of estrogen in reducing adhesion between collagen fibers can cause striae in stretch area. Menarche that occurs during puberty play a role in the increment of estrogen levels. Adolescents who had experienced menarche tend to have higher estrogen levels.

Methods: This was a cross-sectional study with total sampling method. 151 female students in Faculty of Medicine, Universitas Sumatera Utara were included and physical examination on the site of striae was done to confirm diagnosis. Age of menarche is classified as early (≤ 11 y.o), normal (12-13 y.o) and late (≥ 14 y.o). Study was conducted after approval from the Ethics Committee Faculty of Medicine, Universitas Sumatera Utara.

Results: Subjects in early menarche group were 84 (55.6%) subjects, normal were 56 (37.1%) subjects and late were 11 (7.3%) subjects. Median (11.0 y.o) and minimum-maximum age of menarche (9-16 y.o). Sites of striae were found mostly in thighs (66.9%), followed by buttocks (11.8%), calves (7.4%), hips (6.6%), chest (3.7%), upper arms (2.2%) and breasts (1.4%). Subjects with early menarche were 84 subjects in which 78 with striae and 6 without striae. Subjects with normal and late menarche was 67 subjects with 35 having striae and 32 without striae. In this study, we found a significant correlation between age of menarche with striae ($p < 0.05$).

Conclusion: Early menarche can induce risk of striae in adolescents

Keywords: striae, adolescents, menarche

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INTRODUCTION

Striae is a harmless skin disorder but can cause cosmetic and psychological problems in sufferers.¹ Striae can cause stress which often leads to a decrease in quality of life.^{2,3} In a study conducted by Yamaguchi et al. found that striae did harm women's quality of life like other chronic skin diseases.⁴ The study reports the prevalence of striae during puberty vary from 11% to 88%.^{5,6} About 70% of adolescent girls have striae.^{7,8} Pathogenesis of striae remains unknown to date. One hypothesis of striae is estrogen resulting from the maturation of the hypothalamic-pituitary-ovarian (HPO) axis during puberty.⁹ Estrogen can reduce adhesion between collagen fibers which results in the formation of striae in the stretch area.¹⁰ In studies conducted by Cordeiro et al. there is a significant increase in the expression of estrogen receptors in parts of the body that experience striae.¹⁰

Menarche that occurs during puberty in adolescent girls occurs at 11-16 years old (y.o).¹¹ Menarche disorders based on the age of occurrence comprise early menarche that occurs before 11 y.o and late menarche that occurs after 14 y.o.¹² In a study conducted by Kirchengast and Hartmann found that adolescents who had experienced menarche had much higher estrogen levels than adolescents

who had not experienced menarche and there were differences in estrogen levels between early, normal, and late menarche.¹³ Researchers were interested in investigating the relationship between the age of menarche with the incidence of striae to see whether the age of menarche is a risk factor for future 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. We conducted this study from April 2019 to September 2019 at the Faculty of Medicine, Universitas Sumatera Utara. This study is a cross-sectional study with a total sampling of subject. The subject population taken in this study were female students of the Faculty of Medicine, Universitas Sumatera Utara aged 18-25 y.o who had menstruated, normal body mass index and hadn't previous obesity history. Subject who forget their menarche, suffer from Cushing's syndrome or Marfan's syndrome, history of oral or topical steroids usage over six months before the first appearance of striae, on-going or having a

history of hormone therapy before the first appearance of striae and on-going or having a history of using hormonal contraception before the first appearance of striae were excluded from this study. Of 156 subjects, 4 subjects are obese or had any history of obesity and 1 subject was not willing to take part in the study so that the total number of subjects was 151 subjects.

On the subjects, anamnesis and physical examination were done to establish the diagnosis of striae. In history taking, the subjects were asked about the occurrence age of menarche and then grouped into early menarche (≤ 11 y.o), normal menarche (12-13 y.o), late menarche (≥ 14 y.o). On physical examination, site and striae lesions were examined. Collected data will be analyzed statistically with chi square statistical analysis to see the relationship between the age of menarche with the incidence of striae.

RESULTS

Subject characteristics in this study include the age of menarche and sites of striae. In this study, it was found that median age of menarche on subjects is

11.0 y.o, minimum age of menarche are 9 y.o and maximum age of menarche is 16 y.o (table 1). The most common sites of striae in this study subjects were thighs (66.9%) (table 2). From 131 subjects with striae, in which some subjects happen to have more than one sites of striae, we locate a total of 136 striae sites from 7 different locations.

After we collect the data, a chi-square test is performed to see the relationship between the age of menarche with striae (Table 3).

This study found a relationship between the age of menarche with the occurrence of striae ($p = 0,000$). Besides, we found that subjects with early menarche had a risk of 11.88 times more likely to experience striae compared to subjects with normal or late menarche (OR = 11.88). The results show that menarche can influence the onset of striae.

DISCUSSION

Although striae is a skin disorder that is very common in the population, few theories are known about this disorder, especially in terms of etiology and pathophysiology.^{14,15} We present various theories regarding the etiology and pathophysiology of striae, one of which is hormonal factors that play a role in the formation of striae.¹⁵ We have mentioned the involvement of hormonal factors in the appearance of striae in many studies, especially in cases of striae related to pregnancy, puberty and corticosteroid use, some studies have found hormonal involvement in the pathogenesis of striae.¹⁵ There is a hypothesis that stimulation of the hypothalamic-pituitary-ovarian (HPO) axis that produces estrogen at puberty causes striae.⁹ The hormone estrogen can reduce adhesion between collagen fibers which results in the formation of striae in the stretching area.¹⁰ In study conducted by Kirchengast and Hartmann, it was found that adolescents who have experienced menarche have much higher estrogen levels than adolescents who have not experienced menarche and there are differences in estrogen levels between the ages of early, normal, and late menarche.¹³

The age category of menarche in this study is in line with study by Titus-Earnst et al in 563 women in Massachusetts and New Hampshire, United States who get the majority experience early menarche age by 45.2% followed by normal menarche age by 31.1% and late menarche age as much as 23.6%.¹⁶ Putri et al conducted a study of menarche age in grade 5 and 6 elementary school students in Surabaya, found most menarche age was in the early menarche age category which was 76.5%, followed by normal menarche age as much as 23.5% and late menarche age by 0%.¹⁷ However, the results differ from study by D'Aloisio et al

Table 1 Distribution of subjects by age of menarche

Age of menarche	n	(%)	Median (min-max)
Early (≤ 11 y.o)	84	55.6	
Normal (12-13 y.o)	56	37.1	11.0 (9-16)
Late (≥ 14 y.o)	11	7.3	
Total	151	100.0	

Table 2 Distribution of site of striae

Site	n	(%)
Thighs	91	66.9
Buttocks	16	11.8
Calves	10	7.4
Hips	9	6.6
Chest	5	3.7
Upper arms	3	2.2
Breasts	2	1.4
Total	136	100.0

Table 3 Relationship between age of menarche with striae

		Striae		Total	P-Value	Odds Ratio
		Yes	No			
Age of Menarche	Early	78	6	84	0.000	11.886
	Normal & late	35	32	67		
Total		113	38	151		

in 33,501 women aged 35-59 y.o in Puerto Rico found early menarche age as much as 20%, normal menarche age as much as 57% and late menarche as much as 23%.¹⁸ Difference in the proportion of ages of menarche, according to the researchers, is caused by a variety of risk factors that trigger menarche at each study location. The median in this study is in accordance with the results of epidemiological studies by Barros et al in Brazil who found the average age of menarche occurring in 40,803 female students in 37 capitals in Brazil having an average age of menarche was 11.71 y.o.¹⁹ Some studies that previously conducted in Indonesia found an average menarche age of 11 y.o.^{20,21}

Striae can occur anywhere on the body. In the study by Atef and Moustafa, thighs is the second-common sites of striae. Atef et al conducted a study of 44 women with striae, found the most common sites are in the abdomen (31.80%) followed by the thighs (27.30%), buttocks (22.70%) and breasts (18.20%).²² Different subject criterias can cause this difference, this study did not include subjects who were or had been pregnant and subjects with obesity while Atef et al included these criterias. Striae which is associated with puberty in adolescent girls, also in line with the occurrence of menarche which explained by the surges of the estrogen hormone. Menarche occurs in the hormonal maturation of HPO,²³ which finally triggers the production of hormones secreted by the hypothalamus and then continues on the ovaries and uterus.²⁴ Activation of this HPO begins with the secretion of gonadotropin-releasing hormone (GnRH) slowly from the hypothalamus which then signals the release of luteinizing hormone (LH) and follicle stimulating hormone (FSH) from the anterior pituitary gland.²⁵ The secretion of LH and FSH is needed to stimulate the ovaries to produce the hormone estrogen. In a study conducted by Kirchengast and Hartmann found that there were significant differences in estrogen levels in early, normal and late menarche.¹³ In our study subjects which early menarche had more striae lesions than subjects with normal and late menarche.

High estrogen levels in adolescents who experience menarche is in line with an increase in the number of estrogen receptors in the striae lesion. Where the results of study from Cordeiro et al who took biopsy samples of skin lesions from patients with striae and compared with skin biopsies of patients without striae found that there was a significant increase in estrogen receptor expression in site of striae, ie a two-fold increase in more estrogen receptor expression in striae lesions compared to normal skin.¹⁰ In a study conducted by Atef and Moustafa in 44 women with striae, 24 subjects had the expression of estrogen- β receptors in their

striae lesions.²² We found an relationship between the age of menarche with the appearance of striae lesions on the subjects. This study is the first study to discern this relationship.

CONCLUSION

In conclusion, we found a relationship between the age of menarche with the appearance of striae, where earlier menarche had a higher risk of the appearance of striae lesions. We hope that the knowledge from this study can help other researchers to understand the etiology and pathophysiology of striae better. We did not directly examine estrogen levels, which is a limitation in our study. Further study can be done by examining estrogen levels in striae lesions.

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CONFLICT OF INTEREST

We declare that there were no conflicts of interest in this study.

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AUTHOR CONTRIBUTION

All of authors are equally contributed to the study from the study framework, data gathering, data analysis, until reporting the result of study.

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