

CORRELATION OF BODY MASS INDEX WITH MENARCHE AGE IN ELEMENTARY SCHOOL STUDENTS IN KRIAN

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ABSTRACT

Introduction: Early menarche is increasing throughout the world, including in Indonesia. The average age of early menarche in Indonesia is less than 10 years based on the results of Riset Kesehatan Dasar or Basic Health Research 2013. Early menarche can cause stress, cardiovascular disease, and the risk of breast cancer. Early menarche can be influenced by various factors, one of which is nutritional status which can be assessed by body mass index.

Objective: To determine the relationship between Body Mass Index and Menarche Age in elementary school "X" in Krian.

Method: This study used a cross-sectional research design, conducted on a population of elementary school children in grades IV-VI aged 9-12 years at primary school "X" in Krian with the inclusion criteria being School Health Unit (Unit Kesehatan Sekolah or UKS) data and the exclusion criteria being having chronic diseases. Data analysis was carried out using the Spearman Correlation test.

Results: 49 samples were obtained consisting of 7 people in class IV, 14 people in class V, and 28 people in class VI. From the sample, 8 children had a low BMI (16.3%), 30 children had a normal BMI (61.3%), and 11 children had a high BMI (22.5%). Meanwhile, for early menarche 6 people (12.2%), normal menarche 43 people (87.8%), and no late menarche (0%) obtained a p-value = 0.616 ($p > 0.05$). The percentage of early menarche in obese BMIs is higher than in other BMIs with a percentage of 6.1%.

Conclusion: There is no significant correlation between body mass index and age at menarche due to the small number of samples.

Keywords: Body Mass Index, Age of Menarche, Nutritional Status, Elementary School

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INTRODUCTION

Early menarche is increasing throughout the world, including Indonesia. The results of the 2013 Basic Health Research analysis show that women in Indonesia experience menarche at a younger age. Indonesia is in 15th position for early menarche with results of 14.5% experiencing early menarche in the last 10 years. The average age of early menarche in Indonesia is less than 10 years.¹ Early menarche is often found in overweight to obese teenagers and often occurs in urban areas rather than rural areas because of different food frequencies and lifestyle patterns. Early menarche can cause stress, cardiovascular disease, and breast cancer risk.^{2,3,4}

Early menarche can be caused by various factors, one of which is nutritional status. Body mass index (BMI) is one of the assessments to determine nutritional status by carrying out anthropometric measurements.⁵ The relationship between BMI and fat levels influences the age of menarche. Leptin will stimulate increased GnRH secretion, thereby triggering puberty by binding to receptors on GnRH neurons. Leptin levels increase significantly, causing a faster increase in the secretion of GnRH. 6 Based Research conducted by Tiara (2020) in Cirebon on junior high school students, shows that there is a relationship between overweight body mass index and early age

at menarche. There were 18 (11.3%) female students who experienced early menarche.⁷ In contrast to research conducted by Friska (2018) in Surabaya, there was no relationship between body mass index and early age of menarche with the result that 57 people (72.15%) experienced normal menarche.⁹

This difference in the results of previous research is what made researchers want to examine the relationship between body mass index and age at menarche at the "X" elementary school in Krian. Krian is one of the sub-districts in Sidoarjo. In the Krian area, there are fast food outlets that are easy to find on the side of the road which can be a risk factor for obesity.

METHOD

This research uses a cross-sectional research design. The sample in the study was elementary school children in grades IV-VI aged 9-12 years in the 2021-2022 school year. The inclusion criteria for the study were all female students who had weight and height in the UKS data and the exclusion criteria were female students who had chronic diseases. The data used are primary and secondary. Age at menarche was obtained through interviews, while weight and height were obtained through UKS data. Data analysis was carried out using the Spearman Correlation test.

RESULT

Table 1. Data Distribution based on Age

Age	Frequency (n)	Percentage (%)
9 y/o	2	4.1%
10 y/o	6	12.2%
11 y/o	34	69.4%
12 y/o	7	14.3%
Total	49	100%

Table 1 shows that the highest age of respondents was 11 years old, 34 people (69.4%)

Table 2. Data Distribution based on BMI

BMI	Frequency (n)	Percentage (%)
Low nutritional value	8	4.1%
Good nutritional value	30	12.2%
Excess nutritional value	5	69.4%
Obesity	6	14.3%
Total	49	100%

Table 2 shows that the majority of respondents had a good nutritional body mass index of 30 people (61.3%) compared to other body mass indexes.

Table 3. Data Distribution based on Menarche

Menarche Age	Frequency (n)	Percentage (%)
Early (≤ 9 y/o)	6	12.2%
Normal (10-13 y/o)	43	87.8%
Delayed (> 14 y/o)	0	0%
Total	49	100%

Table 3 shows that the majority of respondents experienced normal menarche age, 43 people (87.8%) with other body mass indexes.

DISCUSSION

In this study, the value of $p = 0.616$ ($p > 0.05$) was obtained. These results show that there is no relationship between body mass index and age of menarche in "X"

Table 4. Sample analysis based on Body Mass Index and Age of Menarche using the Spearman Correlation Test

Variable	Menarche Age			Total	p-value
	Early (≤ 9 y/o)	Normal (10-13 y/o)	Delayed (> 14 y/o)		
Low nutritional value	2 (4.1%)	6 (12.2%)	0 (0%)	8 (16.3%)	0.616
Good nutritional value	1 (2%)	29 (59.2%)	0 (0%)	30 (61.2%)	
Excess nutritional value and Obesity	3 (6.1%)	8 (16.4%)	0 (0%)	11 (22.5%)	
Total	6 (12.2%)	43 (87.8%)	0 (0%)	49 (100%)	

Table 4 shows that 2 people (4.1%) of respondents with low nutritional BMI experienced early menarche and 6 people (12.2%) experienced normal menarche. In the BMI of good nutrition, 1 person (2%) experienced early menarche and 29 people (59.2%) experienced normal menarche, while in the BMI of overnutrition and obesity, 3 people (6.1%) experienced early menarche and 8 people (16,4) experiencing normal menarche. The results of the analysis using the Spearman correlation statistical test obtained a value of $p = 0.616$ ($p > 0.05$), meaning that there is no relationship between body mass index and age at menarche.

elementary school girls in Krian. However, based on the percentage of BMI data, obesity is greater than underweight and normal BMI. This is proven by the data obtained that 3 out of 6 people who

experience early menarche are female students who have an obese BMI. So the data obtained is in line with the theory which proves that there is a relationship between BMI and early age at menarche, but the research results are not significant because the sample size is small.

This research is similar to research conducted by Annisa (2018) in Sukajadi showing that there is no correlation between BMI overweight and obesity and early menarche age.^{8,9} Based on this research, the weight and height data used was post-menarche, the data results showed that respondents who had a normal BMI were more than those with an obese BMI with an average BMI of 20.10 kg/m². Research by Friska (2018) in Surabaya also stated that there was no relationship between obese BMI and early menarche. In this study, it is known that the sample size used was small, so the results obtained did not vary.⁹

The results of this research are not in line with research by Maya (2021) in the city of Bima. In this study, obesity BMI had a very significant relationship with early menarche.¹⁰ People who have an obese BMI will experience menarche more quickly than people with a normal BMI. Every 1 kg/m² increase in body mass index in girls will affect menarche by 6.5%. An increase in BMI will cause fat accumulation in the body which will correlate with an

increase in leptin. Leptin will inhibit neuropeptide Y which inhibits GnRH secretion. GnRH secretion that is not inhibited will increase rapidly which will stimulate the anterior pituitary gland in the hypothalamus to secrete FSH and LH which function for ovum maturation and the occurrence of menarche. There are other factors studied in the form of food intake. Respondents who often consume fast food experience more early menarche than respondents who rarely consume fast food.

In this study, the results were found to be insignificant because there were confounding variables such as physical activity, food intake, and exposure to mass media with adult content that were not studied and the sample size was small. This is supported by research conducted by Devi (2019) which revealed that physical activity has a significant relationship with the age of menarche. Physical activity is very likely related to a person's body mass index. Light and infrequent physical activity will result in an accumulation of calories increasing body mass index.^{9,11,12}

Food intake is a factor that influences menarche. Research conducted by Neni (2018) in Koto revealed that food intake has a significant relationship between food and age at menarche. Food intake during puberty is related to leptin and estrogen metabolism. Excessive food intake will result in high leptin levels so that

high leptin synthesis will suppress the synthesis of neuropeptides that inhibit GnRH which will result in increased GnRH secretion. GnRH will stimulate the pituitary to release FSH and LH. FSH stimulates follicular maturation and stimulates the production of estrogen by follicular cells so that the ovulation process is faster which causes earlier menarche.^{12,13}

Exposure to adult mass media such as adult videos or adult stories is another factor that can influence the age of menarche. Research conducted by Rita (2022) in Oheo District, Southeast Sulawesi shows that there is a relationship between exposure to mass media and age at menarche. Researchers assume that adult exposure to mass media will stimulate the hypothalamus to release the hormone GnRH, thereby affecting the maturity of hormones and reproductive organs, and causing menarche.¹⁴

CONCLUSION

There is no significant correlation between body mass index and age of menarche in school girls.

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