



# Analysis of Biological Factors that Influence the Acceleration of Menarche in Female Students Aged 13-14 Years

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**Abstract:** Various biological factors influence the acceleration of the age of menarche in female students aged 13-14 years. These factors include exposure to pornographic media, excess body weight, consumption of fast food, nutritional status, history of maternal age at menarche, sexual knowledge, height, and family economic status. Early exposure to sexual content and a high-fat diet can accelerate sexual maturity through changes in hormone production, while nutritional status and history of maternal age at menarche are also associated with accelerated menarche. This research involved 85 class VII female students who were selected purposively to analyze the influence of these factors on the age of menarche. Data was collected through questionnaires and physical measurements, then analyzed using the Chi-square test. The results show that exposure to pornographic media, excess body weight, consumption of fast food, nutritional status, and history of the mother's age at menarche have a significant influence on accelerating the age of menarche ( $p$ -value  $< 0.05$ ). On the other hand, height, sexual knowledge and family economic status did not have a significant effect ( $p$ -value  $> 0.05$ ). It is recommended that parents and schools limit teenagers' access to pornographic media and encourage healthy lifestyles to prevent acceleration of the age menarche.

**Keywords:** Age of menarche; Biological factors; Consumption of ready-to-eat food; Excessive body weight; Exposure to pornographic media

## Introduction

Menarche is the first menstruation or blood that comes out of a woman's vagina when she is healthy, not caused by giving birth to a child or due to injury, usually occurs in girls aged 12-13 years. Under normal circumstances menarche begins with a maturation period which can take 2 years. Menarche is a sign of the beginning of puberty in women. During this period, a woman needs parental attention, because starting from the first menstruation period means there is a possibility of becoming pregnant if she has contact with the opposite sex (Gayles et al., 2023; Koech et al., 2022; Nguyen et al., 2019; Mukhoirotin & Sulayfiyah, 2020; Lestari et al., 2022). According to the World Health

Organization (WHO), teenagers are people aged 10-19 years. In the world, it is estimated that teenagers number 1.2 billion (18%) of the world's population (WHO, 2020).

Before entering adolescence, a person will first experience a period of puberty. It is during this period of puberty that children become adults with accelerated growth and physical development and experience the maturity of their sexual reproductive organs (Dewi & Febrian, 2018). The National Health Survey in 2018 showed that the average age of menarche for most Indonesian women was 12.96 years with a decrease of 0.145 years per decade. Based on Dwiwana & Astuti (2023), the age at which menarche occurs on average is

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12.4 years old with a prevalence of 2.6%, at 10-11 years old it is 30.3%, and at 13 years old it is 30%.

Early menarche, namely the first menstruation that occurs before the age of 12, can cause various health impacts. Physically, it can increase the risk of breast cancer, osteoporosis, reproductive health problems and growth disorders. Apart from that, early menarche also has an impact on mental health such as depression, anxiety and eating disorders (Fadhilah & Katmini, 2021). The causal factors vary, ranging from genetics, obesity, to exposure to chemicals. To prevent and manage its effects, it is important to maintain a healthy diet, exercise regularly, manage stress, and get support from the surrounding environment (Fadhilah & Katmini, 2021). Menarche is the onset of the first menstruation in women which marks sexual maturity. There has been a decrease in the age of menarche in various countries, including Indonesia. An earlier age at menarche can have negative impacts, such as the risk of cardiovascular disease, breast cancer and psychological problems. Therefore, it is important to examine the factors that influence the acceleration of the age of menarche so that preventive measures can be taken (Febrianti, 2017; Yustanta & Qudusa, 2020).

Factors that influence the acceleration of the age of menarche in female students aged 13-14 years. The scope of the research will focus on junior high school (SMP) students aged 13-14 years, with the factors to be studied including biological, nutritional, environmental and socio-economic factors. It is hoped that this research can provide scientific information about the factors that influence the acceleration of the age of menarche, as well as being taken into consideration in developing policies and interventions to prevent negative impacts that may arise (Hartatik et al., 2022). Thus, it is hoped that this research can provide a comprehensive understanding of the factors that influence the acceleration of the age of menarche in adolescent girls, so that it can be used as a basis for developing appropriate interventions to prevent negative impacts that may arise.

## Method

This research was conducted to determine the influence of exposure to pornographic media, excess body weight, fast food consumption, nutritional status, genetics, age of menarche, sexual knowledge, height, and economic status of parents on the acceleration of the age of menarche. This research was conducted in junior high schools (SMP) during March-July 2024. The independent variable in this study is excess body weight and the dependent variable is age at menarche. The sample size in this study used total sampling got results namely 680 students in grade VII who were taken by non-probability sampling with method side purposive

(Sugiyono, 2019). Assessment of exposure to pornographic media, consumption of ready-to-eat food, nutritional status, genetics, age of menarche, sexual knowledge, economic status of parents using a questionnaire, excessive body weight and nutritional status and height using an observation sheet measuring body weight and height (Karmila & Perbata, 2022). The data analysis used is univariate and bivariate analysis using tests chi-square.

## Result and Discussion

### Results

#### Univariate Data

**Table 1.** Frequency distribution of age of menarche in female students aged 13-14 years in 2024

Age of Menarche	Number (n)	Percentage (%)
Early Menarche	343	50.40
Natural Menarche	217	31.90
Slow Menarche	120	17.60
Total	680	100

**Table 2.** Frequency distribution of exposure to pornographic media, excessive body weight, fast food consumption, nutritional status, genetics, age of menarche, sexual knowledge, height, economic status of parents in female students aged 13-14 years

Respondent Characteristics	Number (n)	Percentage (%)
Exposure to Pornographic Media		
Often	36	5.30
Seldom	223	32.80
Never	421	61.90
Excessive Weight		
Overweight	39	5.70
Light Excess Body Weight	203	29.90
Not experiencing excess weight	438	64.40
Consuming Fast Food		
Often	133	19.60
Seldom	254	37.40
Never	293	43.10
Nutritional status		
Which ones	29	4.30
Normal/ Ideal	218	32.10
Fat	433	63.70
Genetics Age of Menarche		
Mother's Family	36	5.30
Father's Family	223	32.80
There isn't any	421	61.90
Sexual Knowledge		
Not enough	99	14.60
Enough	195	28.70
Good	386	56.80
Height		
Short	99	14.60
Normal	195	28.70

Respondent Characteristics	Number (n)	Percentage (%)
High	386	56.80
Parents' Economic Status		
Not enough	92	13.50
Enough	223	32.80
More	365	53.70

Based on Table 1 above, it shows that of the majority of respondents, the age at early menarche (< 12 years) was 343 respondents (50.4%), the age at normal menarche (12-13 years) was 217 respondents (31.9%) and the age at late menarche was 21.9%. 120 respondents (17.6%).

The results of univariate analysis based on frequency distribution statistical tests showed variations in exposure to pornographic media, weight status, fast food consumption, nutritional status, genetic factors, sexual knowledge, height and economic status in 680 female student respondents aged 13-14 years. The majority of respondents (61.9%) have never been

exposed to pornographic media, while 32.8% are rarely exposed, and 5.3% are frequently exposed. Most of the female students (64.4%) were not overweight, 29.9% were mildly overweight, and 5.7% were severely overweight. In terms of fast food consumption, 43.1% of female students never consume it, 37.4% rarely consume it, and 19.6% often consume it. Nutritional status shows that the majority of female students (63.7%) are obese, 32.1% are normal/ideal, and 4.3% are thin. Genetic factors for menarche show that 61.9% of respondents do not have genetic factors, 32.8% have genetic factors from their father's family, and 5.3% from their mother's family. As many as 56.8% of respondents had good sexual knowledge, 28.7% had enough, and 14.6% had less. The majority of female students (56.8%) have above normal height, 28.7% are normal, and 14.6% are short. Finally, the economic status of parents shows that 53.7% of female students come from families with sufficient income, 32.8% have enough, and 13.5% have less.

*Bivariate Data*

**Table 3.** Influence of exposure to pornographic media, excess body weight, consumption of fast food, nutritional status, genetics, age of menarche, sexual knowledge, height, economic status of parents in female students aged 13-14 years

	Age of Menarche						Total	Asymp. sign (2-sided)
	Early Menarche		Natural Menarche		Late Menarche			
	n	%	n	%	n	%		
Exposure to Pornographic Media								
Often	33	91.7	1	2.8	2	5.6	36	100
Seldom	93	41.7	83	37.7	46	20.6	223	100
Never	217	51.5	132	31.4	72	17.1	421	100
Excessive Weight								
Overweight	30	76.9	5	12.8	4	10.3	39	100
Light Excess Body Weight	88	43.3	72	35.5	43	21.2	203	100
Not experiencing excess weight	225	51.4	140	32.0	73	16.7	438	100
Consuming Fast Food								
Often	78	58.6	20	15.0	35	26.3	133	100
Seldom	110	43.3	102	40.2	42	16.5	254	100
Never	155	52.9	95	32.4	43	14.7	293	100
Nutritional status								
Which ones	29	100	0	0	0	0	29	100
Normal/ Ideal	93	42.7	82	37.6	42	19.7	218	100
Fat	221	51.0	135	31.2	77	17.8	433	100
Genetics Age of Menarche								
Mother's Family	33	91.7	1	2.8	2	5.6	36	100
Father's Family	93	41.7	83	37.7	46	20.6	223	100
There isn't any	217	51.5	132	31.4	72	17.1	421	100
Sexual Knowledge								
Not enough	63	63.6	25	25.3	11	11.1	99	100
Enough	81	41.5	74	37.9	40	20.5	195	100
Good	199	51.6	118	30.6	69	17.9	386	100
Height								
Short	63	63.6	25	25.3	11	11.1	99	100
Normal	81	41.5	74	37.9	40	20.5	195	100

	Age of Menarche						Total	Asymp. sign (2-sided)	
	Early Menarche		Natural Menarche		Late Menarche				
	n	%	n	%	n	%			
High	199	51.6	118	30.6	69	17.9	386	100	
Parents' Economic Status									
Not enough	55	59.8	24	26.1	13	14.1	92	100	
Enough	99	44.4	75	33.6	49	22.0	223	100	0.085
More	189	51.8	118	32.3	58	15.9	365		

The results of bivariate analysis show that several factors have a significant influence on accelerating the age of menarche in female students aged 13-14 years. Exposure to pornographic media, excess weight, consumption of fast food, nutritional status, and genetic factors such as age at menarche all showed a significant influence with a p-value < 0.05, based on the Chi-square test. Specifically, exposure to pornographic media has a p-value of 0.000, excess body weight of 0.000, fast food consumption of 0.003, nutritional status of 0.031, and genetic factors of age at menarche of 0.000, all of which show a strong relationship with accelerated age of menarche. On the other hand, sexual knowledge, height and economic status of parents did not show a significant influence on accelerating the age of menarche, with p-values of 0.080, 0.080, and 0.085 respectively (p-value > 0.05). Thus, it can be concluded that factors such as exposure to pornographic media, excess body weight, consumption of fast food, nutritional status, and genetic factors play an important role in accelerating the age of menarche, while sexual knowledge, height, and family economic status do not have a role. significant influence in this context.

*Discussion*

*The Effect of Exposure to Pornographic Media on the Acceleration of Menarche*

The results of the analysis of exposure to pornographic media with the acceleration of the age of use Chi-square obtained a significance value of 0.000, because p-value < a (p-value < 0.05), then it can be concluded that there is an influence of exposure to pornographic media on the acceleration of the age of menarche. Research in line with Karmila & Perbata (2022), the results obtained from the Chi Square test show a significant relationship between exposure to mass media and the age at which menarche occurs. Apart from that, a PR value of 5.231 and a 95% CI value of 1.764-15.513 were also obtained. Based on the results of the prevalence ratio calculation, the value obtained was 5.231 (PR > 1) (95% CI lower = 1.764; upper = 15.513) which means that exposure to mass media is indeed a risk factor for early menarche. The conclusion from this research is that there is a relationship between Mass Media Exposure and age at menarche (Nili et al., 2020).

Research in line with Nurhayati & Purwandari (2023) Based on the results of the Chi Square statistical test between the relationship between exposure to pornography through mass media and the age of menarche for class V and VI female students, the value of  $\alpha = 0.045$  was obtained so that  $\alpha < 0.05$ . The results of statistical tests prove that there is a relationship between exposure to pornography through mass media and age at menarche (Nursalam, 2020; Rahmananda & Sari, 2020). Visual exposure of a sexual nature can stimulate the central nervous system to release certain hormones, such as luteinizing hormone (LH) and follicle-stimulating hormone (FSH). These hormones play an important role in the menstrual cycle and sexual development. Repeated stimulation can trigger the production of these hormones earlier, thereby accelerating the onset of menarche (Asfahani et al., 2019; Rois et al., 2019).

Hormonal development in adolescents is triggered by exposure to mass media that invites curiosity and provokes a desire to experiment in sexual activity. What determines this influence is not the frequency but the mass media issue itself. Young women who receive strong stimuli from outside, for example in the form of soap operas showing children acting as adults, films about sex (blue films), reading books (novels) and magazines depicting sex, temptation and stimulation from men, can directly impact sexual acts (Roswendi & Damayanti, 2023). Sensory stimuli are converted in the cerebral cortex and through the amygdala nucleus are channeled to the hypothalamus, stimulating the formation of gonadotropin releasing hormone (GnRH) which stimulates the anterior pituitary with a portal system so that the pituitary gland which produces FSH (follicle stimulating hormone) and LH (luteinizing hormone) sends signals through gonadotropins (hormones that stimulate the sex glands) to the ovaries to produce the hormone estrogen (Sarwa & Agus, 2020; Savitri et al., 2019).

Based on previous theory and research which explains the influence of exposure to pornographic media on accelerating the age of menarche, researchers assume that exposure to sexual visuals can trigger an increase in the production of sex hormones such as estrogen and luteinizing hormone (LH), which ultimately accelerates the onset of puberty and



menarche (Panangian et al., 2023). Exposure to pornography can trigger desensitization to sexual stimulation, so that teenagers need a stronger stimulus to achieve satisfaction. This can trigger faster hormonal changes.

#### *The Effect of Excessive Weight on the Acceleration of Menarche*

The results of the analysis of excess body weight with the acceleration of the age of menarche use Chi-square obtained a significance value of 0.000, because  $p\text{-value} < \alpha$  ( $p\text{-value} < 0.05$ ), then it can be concluded that excess body weight occurs with the acceleration of the age of menarche. The research is in line with Larasati et al. (2019) explaining that the results of statistical tests obtained a  $p\text{ value} = 0.008$ , meaning ( $p < 0.05$ ) adolescent girls who menstruate earlier tend to be heavier and heavier. higher at the time of first menstruation compared to those who have not menstruated at the same age. Meanwhile, adolescent girls with late menstruation weigh less than menstruating women of the same age and height. In general, those who mature earlier will have a higher BMI, and those who mature later will have a lower BMI at that age. the same one. Excess body weight is the main risk factor for accelerating the age of menarche. Excess fat tissue triggers higher production of the hormone estrogen, accelerates sexual development, and causes menstruation to come earlier. Apart from that, psychological factors such as social pressure and a body image that is not positive can also worsen this condition (Yazia, 2019).

Acceleration of the age of menarche has long-term impacts on health, including an increased risk of chronic disease. Therefore, preventive efforts such as maintaining an ideal body weight, healthy eating patterns and regular physical activity need to be started early (Yazia, 2019). Researchers concluded based on theory and previous research that obesity can speed up the age of menarche through several mechanisms. Fat tissue in obese people produces more estrogen, a key hormone in female sexual development. Higher estrogen levels can trigger ovarian maturation and faster menstrual cycles. Being overweight can cause insulin resistance, which increases insulin levels in the blood. Insulin also plays a role in sexual development, and high levels can accelerate ovarian maturation. Being overweight can increase the production of leptin, a hormone that also influences sexual development. In addition, genetic and environmental factors can also play a role. Certain genes can influence hormone production and metabolism, while exposure to chemicals and an unhealthy lifestyle can influence the timing of menarche. All these factors are interrelated and may accelerate the onset of menarche in obese girls.

Therefore, being overweight can be a risk of accelerating the age of menarche.

#### *The Influence of Fast Food Consumerism on the Acceleration of Menarche*

The results of the analysis of exposure to pornographic media with the acceleration of the age of use Chi-square obtained a significance value of 0.000, because  $p\text{-value} < \alpha$  ( $p\text{-value} < 0.05$ ), then it can be concluded that there is an influence of fast food consumption on the acceleration of the age of menarche. Research is in line Anita & Simanjuntak (2018), there is a relationship between fast food consumption and the incidence of menarche and the frequency of eating fast food in children so that the energy and carbohydrate content contained in food accumulates in the child's body. If this is not balanced with sufficient physical activity, the fat in the child's body cannot be metabolized optimally, causing the child's weight to be higher and increasing the risk of overnutrition in the child, which causes the child to experience early menarche. Ready-to-eat foods generally contain very high calories, especially from saturated fat and added sugar. Excess calories that are not burned will be stored in the body as fat. Excessive consumption of fast food can be one of the causes of weight gain and obesity (Astuti, 2014).

Overweight or obesity in teenage girls can trigger an acceleration of menarche or first menstruation. Excess fat tissue in the body can produce the hormone estrogen in greater amounts. This increase in estrogen levels can trigger earlier sexual development, including menstruation (Enggar et al., 2022). Obesity is also often associated with insulin resistance, which can disrupt the balance of reproductive hormones and accelerate the onset of menarche. Acceleration of menarche due to obesity has long-term consequences, such as an increased risk of chronic diseases such as breast cancer and type 2 diabetes, as well as reproductive health problems. To prevent this, it is important for young women to maintain a healthy body weight by consuming nutritious food and doing regular physical activity (Arifin et al., 2020).

The researcher's assumption is that there is an influence of fast food consumption on accelerating the age of menarche, namely that overweight or obesity in young women can trigger an acceleration of menarche (first menstruation) because excess fat tissue produces the hormone estrogen in greater amounts. Fat tissue contains the enzyme aromatase which converts androgen hormones (such as testosterone) into estrogen. This increase in estrogen levels stimulates the development of reproductive organs and the menstrual cycle, causing menstruation to occur earlier. Early menstruation can increase the risk of breast cancer later in life, disrupt the menstrual cycle, and cause other

reproductive health problems. Therefore, maintaining a healthy body weight is very important for the reproductive health of adolescent girls.

#### *The Influence of Nutritional Status on the Acceleration of Menarche*

Results of genetic analysis of age Results of analysis of excess body weight with accelerated age of menarche using Chi-square obtained a significance value of 0.000, because  $p\text{-value} < \alpha$  ( $p\text{-value} < 0.05$ ), then it can be concluded that there is an influence of nutritional status on the acceleration of the age of menarche. The research is in line with Larasati et al. (2019) explaining that the results of statistical tests obtained a  $p$  value = 0.008, meaning ( $p < 0.05$ ) adolescent girls who menstruate earlier tend to be heavier and heavier. higher at the time of first menstruation compared to those who have not menstruated at the same age. Meanwhile, adolescent girls with late menstruation weigh less than menstruating women of the same age and height. In general, those who mature earlier will have a higher BMI, and those who mature later will have a lower BMI at that age. the same one.

Excess body weight is the main risk factor for accelerating the age of menarche. Excess fat tissue triggers higher production of the hormone estrogen, accelerates sexual development, and causes menstruation to come earlier. Apart from that, psychological factors such as social pressure and a body image that is not positive can also worsen this condition (Yazia, 2019). Acceleration of the age of menarche has long-term impacts on health, including an increased risk of chronic disease. Therefore, preventive efforts such as maintaining an ideal body weight, healthy eating patterns and regular physical activity need to be started early (Yazia, 2019). Researchers concluded based on theory and previous research that obesity can speed up the age of menarche through several mechanisms. Fat tissue in obese people produces more estrogen, a key hormone in female sexual development. Higher estrogen levels can trigger ovarian maturation and faster menstrual cycles (Virgo et al., 2022).

Being overweight can cause insulin resistance, which increases insulin levels in the blood. Insulin also plays a role in sexual development, and high levels can accelerate ovarian maturation. Being overweight can increase the production of leptin, a hormone that also influences sexual development. In addition, genetic and environmental factors can also play a role. Certain genes can influence hormone production and metabolism, while exposure to chemicals and an unhealthy lifestyle can influence the timing of menarche. All these factors are interrelated and may accelerate the onset of menarche in obese girls. Therefore, being overweight can be a risk of accelerating the age of menarche.

#### *Genetic Influence of Menarche Age on the Acceleration of Menarche Age*

The results of the analysis of the history of the mother's age of menarche with the acceleration of the age of menarche using Chi-square obtained a significance value of 0.000 because  $p\text{-value} < \alpha$  ( $p\text{-value} < 0.05$ ), then it can be concluded that there is an influence of maternal history on the age of menarche with the acceleration of the age of menarche. The majority of respondents' maternal age at menarche occurred when the mother was  $\leq 12$  years old (fast), namely 51.4 and 48.6% experienced late menarche or  $> 12$  years. The chi square test between genetics and menarche status of female students showed that the  $p$  value was 0.005 ( $\leq \alpha 0.05$ ). Based on these data, it can be concluded that there is a difference in the proportion of menarche events between respondents with early maternal menarche status and respondents with late maternal menarche status (there is a significant relationship between maternal menarche age and respondent menarche status).

The research is in line with Sujarweni (2020). Genetics greatly influences the age of menarche because genetics is considered to influence the age of maturity of a woman and the age of a mother's menarche can influence the speed of body growth, thus affecting the timing of her teenage daughter's menstruation. The mother's menarche age is related to the child's menarche age, not only due to genetic influences but also related to the family environment. Egg cells contain small organelles called mitochondria. Mitochondria have their own DNA, which is passed exclusively from mother to child. This means that children receive all their mitochondria from the mother. Women have two X chromosomes, while men only have one. Girls receive one X chromosome from the mother and one from the father. However, one of the X chromosomes in females is usually randomly deactivated. This means that girls tend to express more genes from their mothers than from their fathers (Wijayati, 2021). Based on this theory, the researcher concluded the strong correlation between the age of menarche of mothers and their daughters suggests that genetic and environmental factors that influence the age of first menstruation in a mother will likely also influence her daughters. Genes inherited from parents can contribute to similar ages at menarche.

#### *The Influence of Sexual Knowledge on the Acceleration of the Age of Menarche*

The results of the analysis of sexual knowledge with the acceleration of the age of menarche use Chi-square obtained a significance value amounted to 0.080, because  $p\text{-value} > \alpha$  ( $p\text{-value} > 0.05$ ), then it can be concluded that there is no sexual knowledge of the acceleration of the age of menarche. Sexual knowledge

is a comprehensive understanding of everything related to human sexuality. It includes biological, psychological, social, and cultural aspects. Good sexual knowledge will help someone understand their body, make responsible decisions regarding sexuality, and build healthy relationships (Afrilia et al., 2019). Menarche occurs due to hormonal changes in a woman's body. The hypothalamus and pituitary glands release hormones that stimulate the ovaries to produce estrogen and progesterone. These hormones cause physical changes and development of the reproductive organs, and trigger menstruation (Fadhilah & Katmini, 2021).

Menarche, or first menstruation, is an important milestone in a woman's life, marking the start of her reproductive abilities. This is a natural process that is influenced by many factors, including genetics, nutrition, health, and the environment. Menarche occurs at different ages for each woman, and this is normal, there is no one standard that must be followed (Fadhilah & Katmini, 2021). Based on this theory, researchers are of the opinion that there is no influence of sexual knowledge on the acceleration of menarche because the first menstruation is influenced by internal factors in the body such as genetics, hormones and nutrition. Although sexual knowledge is important for reproductive health, there is no scientific evidence to show that the more knowledge a person has about sex, the sooner their first menstruation will come. Sexual knowledge is important, but it will not speed up or slow down the arrival of your first period. The primary focus should be on providing comprehensive sex education and ensuring the health and well-being of adolescents.

#### *The Influence of Height on the Acceleration of Menarche*

The results of the analysis of height with the acceleration of the age of menarche use Chi-square obtained a significance value amounted to 0.080, because  $p\text{-value} > \alpha$  ( $p\text{-value} > 0.05$ ), then it can be concluded that there is no influence of height on the acceleration of the age of menarche. The research is in line with Luvianti & Qomariyah (2017), with the data being analyzed using the Chi Square method. From the research results, it was found that the average age at menarche was  $12.24 \pm 1.16$  years and the average height was  $157.76 \pm 5.44$  cm. In statistical tests using the Chi Square method, it was found that  $P = 0.426$  ( $p > 0.05$ ), so statistically there was no significant relationship between menarche and body height. Value on Sig. (2-tailed) shows a value of 0.006 which is  $< 0.05$ . This means that there is a significant relationship between the age of menarche and the height of female students from the 2011-2013 class at the Faculty of Medicine, Indonesian Muslim University. The conclusion of this research is that there is a significant relationship between the age of menarche and the height of female students from the

2011-2013 class at the Faculty of Medicine, Indonesian Muslim University.

According to researchers' assumptions Although height and age at menarche are both related to growth and development, they are influenced by different mechanisms. Here are several reasons why there is no direct relationship between height and accelerated age of menarche height is influenced by many genes that regulate the growth of bones, muscles and body proportions. Menarche Age Influenced by genes that regulate the reproductive system and the production of sex hormones. A complex process involving various factors, from genetics to the environment. Genetics plays an important role through growth hormones and other growth factors that regulate bone growth. Adequate nutrition, especially protein, calcium, and vitamin D, is essential to support bone growth. Thyroid hormones and sex hormones also have an important role in this process.

Additionally, environmental factors such as chronic illness, stress, and medications can also affect growth. Bone growth occurs through two main processes: longitudinal growth of the epiphyseal plate and dilated growth through bone remodeling. Height growth disorders can be caused by various factors, such as growth hormone deficiency, malnutrition, chronic disease, and genetic disorders. Based on this theory, the researchers concluded that the results of this study were similar to research by Luvianti & Qomariyah (2017) which stated that height does not completely influence the acceleration of the age of menopause, even though there is previous research which explains that height influences the acceleration of the age of menarche.

#### *The Influence of Parents' Economic Status on the Acceleration of Menarche*

Results of analysis of family planning history Results of analysis of family economic status with the acceleration of the age of menarche using Chi-square obtained a significance value amounted to 0.085, because  $p\text{-value} > \alpha$  ( $p\text{-value} > 0.05$ ), it can be concluded that there is no influence of parents' economic status on the acceleration of the age of menarche. Research in line with Asfahani et al. (2019) stated that there is no relationship between family economic status and menarche. states that parents with high income will also have family members with good nutritional status, so that this will have an impact on growth and sexual development which influences the age of menarche. However, high income does not always guarantee that all nutritional needs are met.

Based on the results of this study, the researchers assumed that families with better economic status would definitely have better nutritional intake. However, in reality this is not always the case. Factors

such as knowledge about nutrition, access to healthy food, and family eating habits also play a role. Viewed from the perspective of family economic status, the age of menarche (first menstruation) can be influenced by several factors. Children from families with low economic status tend to experience nutritional deficiencies, both carbohydrates, protein and micronutrients, which can cause delays in growth and development, including delays in menarche. In addition, excessive physical activity in children from families with low economic status, such as helping with household chores or working, can also affect reproductive development and delay the age of menarche.

Meanwhile, in research that was examined based on the economic status of the parents, it was found that the majority of those who experienced early menarche were those whose parents' economic status was adequate and above, while those with low economic status experienced a normal and late age of menarche. Researchers believe that children from families with sufficient economic status are more likely to get excessive nutritional intake, especially energy and fat. Excessive nutritional intake, especially in childhood, can accelerate physical development, including the age of menarche. In addition, children from families with sufficient economic status are more often exposed to modern lifestyles that are less physically active. Lifestyle and lack of physical activity can accelerate hormonal maturity, thereby accelerating the age of menarche.

Meanwhile, in children from families with low economic status, factors such as lack of nutrition, high physical activity, and minimal exposure to media/technology can cause a normal or even late age at menarche. However, this pattern is not universal, and other factors, such as genetics, ethnicity, and medical history, can also influence the age of menarche. However, there is not always a direct relationship between family economic status and age at menarche. Other factors, such as genetics, ethnicity, and lifestyle, can also influence the age of menarche. Therefore, a more comprehensive understanding is needed to identify the determinants of age at menarche in certain populations.

## Conclusion

This study explores the biological factors influencing the acceleration of the age of menarche in female students aged 13-14 years. Key factors include exposure to pornographic media, excess body weight, consumption of fast food, nutritional status, and genetics, particularly the history of maternal age at menarche. Early exposure to sexual content and a high-fat diet can accelerate sexual maturity by affecting hormone production, while nutritional status and

genetics also contribute significantly. The research involved 85 class VII female students, selected purposively, with data collected through questionnaires and physical measurements, then analyzed using the Chi-square test. The results indicate that exposure to pornographic media, excess body weight, consumption of fast food, nutritional status, and maternal age at menarche significantly influence the acceleration of menarche age ( $p$ -value  $< 0.05$ ). In contrast, height, sexual knowledge, and family economic status did not show a significant impact ( $p$ -value  $> 0.05$ ). These findings suggest that various biological factors, especially those related to lifestyle and genetics, play a crucial role in determining the timing of menarche. Given the significant impact of these factors, it is crucial for parents and schools to monitor and limit adolescents' exposure to pornographic media and to promote healthy lifestyle choices, including balanced nutrition and maintaining a healthy weight, to help prevent the early onset of menarche. Addressing these biological factors can contribute to better management of sexual maturation and overall adolescent health.

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## Author Contributions

N., E.W.K., N.K., R., R.F.V., S., S.M., T.A., and W.N.F. contributed to the conceptualization, data collection process, data processing, and article writing.

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## Conflicts of Interest

The authors declare no conflict of interest.

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