THE INFLUENCE PERCEPTION, NUTRITIONAL STATUS RELATED MENARCHE AMONG ADOLESCENT GIRL

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ABSTRACT

In adolescents, nutritional status has an impact on puberty, one of which is menarche. Perceptions that are considered as one of the causes of unhealthy eating behavior in adolescents. The wrong perception followed by limiting food consumption, avoiding certain types of food without paying attention to nutrition and health principles. This is to determine the relationship between perceptions, nutritional status and age of menarche in young women aged 12-15 years in Palangka Raya City. This was an observational study with a cross-sectional design on 221 young girls who were senior high school students aged 12-15 years. Measurement of perception variables using the Body Shape Questionnaire (BSQ), nutritional status based on Body Mass Index (BMI). Mean age of menarche 12 years. There was a significant relationship between nutritional status and age at menarche, the value was obtained (p = 0.04). Menarche age in adolescent girls with underweight BMI was 12.38 years slower, while menarche age with normal BMI was 11.79 years old and menarche age with overweight BMI was 12.50 years slower. The prevalence of underweight adolescents with nutritional status was 20.4%, normal was 54.3% and overweight was 25.3%. There is a relationship between perceptions and adolescent nutritional status (p = 0.00). The level of equality of perceptions of adolescents with nutritional status is considered poor (bad), the Kappa value is 0.3. Age of menarche is influenced by nutritional status. In perceiving their body size, adolescents tend to experience overestimation and underestimation. It is likely that this group of adolescents will find a greater prevalence of nutritional problems.

Keywords: perception, nutritional status, body mass index, menarche, adolescent girls

I. INTRODUCTION

Adolescents are a vulnerable group to experience nutritional problems for a number of specific reasons, including a high need for growth, diet and lifestyle. According to the World Health Organization (WHO), the teenage period of 10-19 years is marked by intense growth and development as well as physical, psychological, social and emotional changes that result in behavior modification by adolescents.1,2

Risk behavior in adolescents occurs because of their sensitivity to environmental influences. Inadequate nutrition in adolescence can potentially inhibit growth and sexual maturity, including physical changes and menarche. Menarche is the first menstruation in women, after experiencing menarche some teenage girls do not ovulate at all until one to two years after the first menstruation. Menarche is influenced by the hormones estrogen and progesterone. This hormone has a different function, estrogen functions to regulate the menstrual cycle while progesterone has an effect on the uterus, which can reduce contractions during the menstrual cycle. To optimize complaints during menarche, girls should eat foods that contain balanced nutrition. A good nutritional status is nutrition consisting of protein, fat, carbohydrates, minerals, vitamins and water which is used by the body as needed.

Nutritional status is an important factor to assess a person in good health or not suffering from diseases due to nutritional disorders, both mentally and physically. A good nutritional status in adolescents is the fulfillment of nutritional needs, namely a balance between consumption and absorption of nutrients. The impact of the
imbalance in fulfilling nutritional status is the occurrence of malnutrition and overnutrition problems\textsuperscript{5}. Abnormal nutritional status causes disruption of reproductive function. This has an impact on menstrual disorders, but will improve if the nutritional intake is good\textsuperscript{6}.

A community-based cross-sectional study, conducted in a residential colony in New Delhi, sampled 250 young women in the 10-19 age group through interviews and measurements of height and weight. Good nutritional status will affect the age of menarche to be faster. It is statistically significant to obtain a p-value of 0.00. Menarche was 95.9\% in adolescents with BMI \textless{}18.5 and 97.9\% in those with BMI \textgreater{} 18.5. Logistic regression analysis showed that when age was controlled, BMI was independently associated with menarche status (OR = 1.2, p = 0.02, 95\% CI (1.02-1.49))\textsuperscript{7}. Young women who had early menarche tended to be heavier and taller than those who had not menstruated at the same age. So, adolescents who experience sexual maturity earlier are adolescents with a high BMI\textsuperscript{8}.

Based on the results of the 2010 Basic Health Research, it shows that young women in Indonesia experience menarche on average at the age of 13 and those who experience premature menarche occur at the age of less than 9 years. Meanwhile, the age at the latest to experience menarche is 20 years\textsuperscript{9}. In Central Kalimantan, the average age of menarche for young women is 13-14 years (41.1\%)\textsuperscript{10}. The prevalence of nutritional status (according to BMI / age), especially in Central Kalimantan for children aged 5-12 years, is 2.8\% very thin, 10.2\% thin, 10.8\% fat, and 8.0\% very fat (obesity). While the prevalence of nutritional status in adolescents aged 13-15 years is 3.3\% very thin, 8.0\% thin, 6.0\% fat, and 10.2\% very obese (obese).\textsuperscript{11}

Based on previous research, it showed that there was a significant relationship between nutritional status and early menarche (p = 0.001) and the chances of early menarche occurring in obese and obese girls were 7.85 and 2.45 times greater than students with normal nutritional status.\textsuperscript{12} In a study conducted on 273 girls in Bengali, the mean age of menarche was 12.0 years (range 10.0-16.0) years.\textsuperscript{13} Another study states that the tendency for early menarche age or menarche \textless{}12 years has a 15.90 times risk of developing breast cancer.\textsuperscript{14} In addition, there are many factors that affect the age of menarche, such as work and parental education and physical activity\textsuperscript{15,16}.

Menarche age is an important indicator of reproductive health in women. Seeing the importance of nutritional status in adolescent girls on the onset of menarche age which is related to reproductive development, the nutritional status of adolescents must be considered so that reproductive development can run normally according to the age it should be. Based on the description above, researchers are interested in conducting research to determine perceptions, nutritional status and age of menarche in young women.

\section*{II. MATERIALS AND METHODS}

This study used an analytic observational study and used a cross sectional approach. The number of samples was 221 respondents who had experienced menarche in grades 7 to 12 in four senior high schools. Data collection for January-May. The method of sampling using simple random sampling. Data collection included assessment of perceptions of nutritional status, weight and height, age of menarche, history of maternal age, socioeconomic status and physical activity. Perception is measured using the Body Shape Questionnaire (BSQ), which consists of 34 questions. Nutritional status is assessed based on the Body Mass Index (BMI), which is the ratio of body weight in kilograms to the square of height in meters (kg / m\textsuperscript{2}). Physical activity was measured using the Physical Activity Questionnaire For Adolescent (PAQ-A) cake. Socio-economy was measured using a questionnaire adapted from the 2017 Indonesian Health Demographic Survey (IDHS) and analyzed using Principal Component Analysis (PCA).\textsuperscript{17}

The data normality test is done first by looking at the skewness value and standard error. The data analysis used was bivariate and multivariate analysis. The statistical test used is the Independent T-Test to analyze data on the ordinal and dependent variables at the interval / ratio scale, the one way ANOVA statistical test for analyzing data> 2 groups while the linear regression test is for analyzing parametric data, namely independent and dependent variables at interval scale / ratio.

\section*{III. RESULTS}

\begin{table}[h]
\centering
\caption{Distribution of Respondents based on Nutritional Status, Perception, Physical Activity, Socio-Economic}
\begin{tabular}{lccc}
\hline
Variable & n (221) & 
\% \\
\hline
Body Mass Index & 
\hline
Underweight & 40 & 18.1 \\
\hline
\end{tabular}
\end{table}
Table 2. Analysis of Average Age of Menarche, Height, Weight, Age History of Maternal Menarche

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Median</th>
<th>Standard Deviation</th>
<th>Min-max</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menarche's age</td>
<td>12.00</td>
<td>12.00</td>
<td>1,779</td>
<td>9-15</td>
<td>11.76-12.24</td>
</tr>
<tr>
<td>Height</td>
<td>154.38</td>
<td>154.00</td>
<td>6,067</td>
<td>141-167</td>
<td>153.57-155.18</td>
</tr>
<tr>
<td>Weight</td>
<td>52.38</td>
<td>53.00</td>
<td>6,425</td>
<td>38-73</td>
<td>51.33-53.09</td>
</tr>
<tr>
<td>Maternal Menarche Age History</td>
<td>12.49</td>
<td>13.00</td>
<td>1,780</td>
<td>9-15</td>
<td>12.25-12.72</td>
</tr>
</tbody>
</table>

Source: Primary Data, 2020

Table 1 shows that from a total sample of 221 adolescent girls, the majority of respondents with normal body mass index were 149 young women, the most female adolescents' nutritional status was normal, namely 102 respondents, the most female adolescents perceived themselves as normal as many as 105 respondents, the majority of young women were doing moderate activities. as many as 123 respondents and the majority with the upper level socioeconomic level as many as 132 young women. Based on the data above, the average age of menarche in adolescents is 12 years, the median is 12 years and a standard deviation of 1,779 years with a minimum age of menarche of 9 years and a maximum of 15 years. From the results of the interval estimation, it can be concluded that 95% is believed that the mean age of menarche in adolescent girls is between 11.76 years and 12.24 years.

The average height of adolescent girls was 154.38 cm, median 154.00 cm and standard deviation of 6,067 cm with minimum height 141 cm and maximum 167 cm. From the results of the interval estimation, it can be concluded that 95% of the time it is believed that the average height of young girls is between 153.57 cm and 155.18 cm. The average body weight of young women was 52.38 kg, the median was 53.00 kg and the standard deviation was 6,425 kg with a minimum body weight of 38 kg and a maximum of 73 kg. From the results of the interval estimation, it can be concluded that it is 95% believed that the average body weight of adolescent girls is between 51.33 kg and 53.09 kg.

Meanwhile, the mean age history of maternal menarche was 12.49 years, median 13.00 years and standard deviation 1,780 years with a history of maternal menarche age of at least 9 years and a maximum of 15 years. From the results of the interval estimation, it can be concluded that 95% of the time it is believed that the mean history of maternal menarche is between 12.25 and 12.72 years.

Table 3. Analysis of Kappa Perceptions of Nutritional Status

<table>
<thead>
<tr>
<th>Nutritional status</th>
<th>Underweight n (%)</th>
<th>Normal n (%)</th>
<th>Overweight n (%)</th>
<th>Kappa</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perception</td>
<td></td>
<td></td>
<td></td>
<td>0.3</td>
<td>0.00</td>
</tr>
</tbody>
</table>

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Based on the results of the Cohen's Kappa test, it was found that the level of perception of respondents with poor nutritional status was obtained because the Kappa value was 0.3. These results indicate that not all young women agree on their nutritional status. This is proven by 10 (9.5%) young women with underweight nutritional status who consider themselves normal and 9 (15.5%) respondents consider themselves overweight. Likewise, 23 (39.7%) women with normal nutritional status considered themselves underweight and 18 (31.0%) respondents considered themselves overweight. Meanwhile, 9 (15.5%) girls with overweight nutritional status considered themselves underweight and 16 (15.2%) respondents considered themselves normal.

Table 4. Analysis of Average Age of Menarche Based on Physical and Socio-Economic Activities

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>Min-max</th>
<th>Mean</th>
<th>SD</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body Mass Index</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underweight</td>
<td>40</td>
<td>9-15</td>
<td>12.38</td>
<td>1.659</td>
<td>0.04</td>
</tr>
<tr>
<td>Normal</td>
<td>149</td>
<td>9-15</td>
<td>11.79</td>
<td>1.772</td>
<td></td>
</tr>
<tr>
<td>Overweight</td>
<td>32</td>
<td>9-15</td>
<td>12.50</td>
<td>1.832</td>
<td></td>
</tr>
<tr>
<td>Physical Activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light</td>
<td>98</td>
<td>9-15</td>
<td>12.10</td>
<td>1.842</td>
<td>0.44</td>
</tr>
<tr>
<td>Moderate</td>
<td>123</td>
<td>9-15</td>
<td>11.92</td>
<td>1.730</td>
<td></td>
</tr>
<tr>
<td>Social Economy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On</td>
<td>132</td>
<td>3-15</td>
<td>11.76</td>
<td>1.954</td>
<td>0.03</td>
</tr>
<tr>
<td>Under</td>
<td>73</td>
<td>9-15</td>
<td>12.15</td>
<td>1.672</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>9-15</td>
<td>12.94</td>
<td>1.692</td>
<td></td>
</tr>
</tbody>
</table>

Source: Primary Data, 2020

Table 5. Linear Regression Analysis. History of Maternal Menarche Age, Height, Weight

<table>
<thead>
<tr>
<th>Variable</th>
<th>r</th>
<th>R2</th>
<th>Line Equations</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal Menarche Age</td>
<td>0.14</td>
<td>0.02</td>
<td>Age of menarche in adolescent girls = 13,827 + (-0.146) * history of maternal menarche age</td>
<td>0.03</td>
</tr>
<tr>
<td>Age History</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Height</td>
<td>0.15</td>
<td>0.02</td>
<td>Menarche age for young women = 4.889 + 0.046 * height</td>
<td>0.01</td>
</tr>
<tr>
<td>Weight</td>
<td>0.13</td>
<td>0.01</td>
<td>Menarche age for girls = 9,993 + 0.038 * body weight</td>
<td>0.03</td>
</tr>
</tbody>
</table>

Source: Primary Data, 2020

Based on Table 4. The results of the statistical analysis of the one way ANOVA test showed that there was a significant relationship between nutritional status and the age of menarche, the value was obtained (p = 0.04) and there was a significant relationship between social economy and the age of menarche, the value was obtained (p = 0.03). Based on the results of the Independent T-Test above, it shows that there is no significant relationship between physical activity and the age of menarche (p = 0.44). Based on Table 5. The results of the linear regression test showed a significant relationship between the age of maternal menarche (p = 0.03), height (p = 0.01) and body weight (p = 0.03) on the age of menarche.

The bivariate test result which has a p-value <0.25 means that this variable can be entered into the multivariate model after conducting the first assumption test. After multivariate analysis, the regression equation model is obtained as follows:
Age of menarche = 7.054 + 0.026 TB + 0.035 BW - 0.133 Age history of maternal menarche + 0.506 Socioeconomic

Based on the equation model above, it shows that the greater the Beta value, the greater the effect on the dependent variable, meaning that young women with high socioeconomic levels will increase the incidence of menarche by 0.506 after controlling for height, weight and age history of menarche.

IV. DISCUSSION

Based on this study, it was found that the average age of menarche was 12 years, a median of 12 years and a standard deviation of 1.779 years with a minimum age of menarche of 9 years and a maximum of 15 years. From the results of the interval estimation, it can be concluded that 95% of the time it is believed that the mean age of menarche in adolescents is between 11.76 years and 12.24 years. In previous studies, it was stated that respondents who had fat nutritional status experienced menarche age under 13 years (p = 0.001) 19. Another study involving adolescent girls aged 12-17 years in Brazil, showed that about 15% of girls had their first period before the age of 11; 60% of adolescents experience menarche between 11 and 12 years of age, and about 99% of adolescents have had menstruation by 14 years20.

A study conducted on a group of 243 adolescent girls aged 10-16 years to evaluate the relationship between BMI at menarche and the selected growth acceleration parameters showed that the mean age of menarche for all groups was 12.59 (Me = 12.52, Min = 9.9, Max = 16.2). there was a statistically significant relationship between BMI level and age at menarche. Menarche age decreased significantly with increasing nutritional status (H = 33.2, p <0.01).21

A similar study was also conducted by NurrahmawatiLasandang et al., Stated that respondents with fat nutritional status were more in the group of young women who experienced early menarche, namely as much as 13.4%. Based on these results it can be concluded that there is a significant relationship between nutritional status and age of menarche in young women because the value of p = 0.000.22 Abnormal nutritional status causes disruption of reproductive functions such as menstrual disorders6. The causes of early menarche come from internal and external factors. Internal factors are due to hormonal imbalance whereas, external factors are caused by nutrient intake in the food consumed6. Young women who had early menarche tended to be heavier and taller than those who had not menstruated at the same age. So, adolescents who experience sexual maturity earlier are adolescents with a high BMI8. Overweight nutritional status is often associated with exposure to the hormones estrogen and progesterone, which is high in the effects of fatty foods15.

Adequate nutritional status is very important to maintain health conditions because malnutrition has an impact on the risk of disease, disease progression and increases the risk of death.23 Being overweight in childhood is associated with precocious puberty in girls. Age at menarche was inversely related to BMI (unstandardized regression coefficient beta = - 0.70; 95% CI, - 0.84 to - 0.56).The level of nutritional status at the age of menarche has a significant relationship with growth and the level of biological maturity in girls. A higher BMI at menarche is associated with an earlier incidence of menarche.24

The mean age history of maternal menarche in the previous study was 13 years with a minimum age of 11 years and a maximum of 15 years. Hereditary / genetic factors influence the incidence of menarche. The history of maternal menarche is related to the age of menarche in young women.25

Adolescent perceptions of their nutritional status indicate that not all girls agree with their nutritional status. 10 (9.5%) respondents considered themselves normal and 9 (15.5%) respondents considered themselves overweight. Likewise, 23 (39.7%) women with normal nutritional status considered themselves underweight and 18 (31.0%) respondents considered themselves overweight. Meanwhile, 9 (15.5%) girls with overweight nutritional status considered themselves underweight and 16 (15.2%) respondents considered themselves normal. Adolescent perceptions according to their nutritional status will affect their diet.26

A cross sectional study was conducted on 300 college students (150 male and 158 female) aged 18-25 years. The majority of study subjects (81%: 58.2% women and 41.8% men were dissatisfied with their nutritional status. There was a significant and strong correlation (R2 = 0.84, p <0.001) between perceptions of nutritional status as seen based on BMI and actual BMI. Actual BMI showed a strong significant correlation with false perceptions (r = 0.57, p <0.001).27
Several factors that were significant to the age of menarche were socioeconomic (p = 0.03), history of maternal age (p = 0.03), height (p = 0.01), body weight (p = 0.03). Parents with higher incomes improve socio-economic conditions which will affect the health condition of the family so that it affects the age of menarche in young women.\textsuperscript{28} The results of this study are in line with research on 58 adolescent girls in 2016 showing that the age of early menarche mostly occurs in upper-level socioeconomic status due to the higher income of parents, thereby increasing the ability to meet nutritional needs.\textsuperscript{29} The mean age history of maternal menarche in the previous study was 13 years with a minimum age of 11 years and a maximum of 15 years. Hereditary / genetic factors influence the incidence of menarche. The history of maternal menarche is related to the age of menarche in young women.\textsuperscript{25}

In contrast to the results of research conducted on 144 respondents, there was a significant relationship between physical activity (p = 0.02)\textsuperscript{30}. Likewise, a study conducted by SeptianaWulandari stated that there was a significant relationship between physical activity and the age of menarche (p = 0.015). Respondents with light physical activity who experienced rapid menarche were more than respondents with heavy physical activity who experienced rapid menarche.\textsuperscript{16}

Strenuous physical activity causes ovarian activity to decrease. So that estrogen levels are lower where estrogen is needed in the menarche process. In addition, regular or routine physical activity or doing strenuous physical activity will burn fat in the body, where someone who has low levels of fat in the body will slow down the age of menarche.\textsuperscript{30}

Whereas someone who has light physical activity, the endometrial maturation activity will be faster and will cause more rapid menarche, because someone with light physical activity tends to have a lot of fat in the body.\textsuperscript{30} In adolescent girls who have heavy activity but have experienced menarche at a younger age or early menarche can be caused by other factors such as good nutritional status, high economic status, heredity, exposure to mass media, and psychological adolescents.\textsuperscript{30}

V. CONCLUSION

Based on the results of the study, the results obtained were height, weight, age history of maternal menarche, socioeconomic, and age-related menarche. The results of the perception analysis found that there are adolescents who experience underestimation, namely perceiving themselves to be thinner than the actual situation and overestimation, namely perceiving themselves to be thinner than the actual situation. Further studies on a larger sample are needed to investigate adolescent nutrition problems so that appropriate interventions can be given according to the problem.

Acknowledgement

We thank for all students who completed the questionnaires. Special thanks to the school principals and the teachers who actively participated in this study; their contribution was crucial to the success of this study data collection.

Compliance with Ethical Standards

As the authors we declare that we have no conflict of interest in this study.

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