The Correlation Between Nutritional Status and Physical Activity with Dysmenorrhea Degrees Among Females Adolescent in Bengkulu City

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ABSTRACT
Female adolescent in their growth phase will experience menstruation. One of the menstrual disorders most often experienced by female adolescent is dysmenorrhea. This research was aimed to determine the correlation between nutritional status and physical activity with the degree of dysmenorrhea in female adolescents aged 15 years to 17 years in the city of Bengkulu, with family economic status classified as middle to upper class. This research was conducted in January - March 2020 with 100 probands. Determination of the research sample using purposive random sampling method where the students who meet the criteria by the research objectives. Physical activity data and dysmenorrhea status were obtained through the Physical Activity Level (PAL) questionnaire. Nutritional status data were obtained based on their Body Mass Index. As the result, it is known that female adolescent in Bengkulu who come from middle to upper families have a normal nutritional status of 47%, 12% less nutritional status, 26% fat nutritional status, and 15% obesity nutritional status. The physical activity of female adolescent was classified as light category 46%, moderate 33%, and heavy physical activity 21%. Female adolescent with mild dysmenorrhea status were 43%, moderate dysmenorrhea was 35%, severe dysmenorrhea was 22%. Statistically using the bivariate analysis, it showed a strong significant correlation between nutritional status and the degree of dysmenorrhea with a value of 0.430. the better the nutritional status, the lower the degree of dysmenorrhea. Meanwhile, physical activity with the degree of dysmenorrhea has a weak significant correlation with a value of -0.612. There is a multivariate correlation between the three variables, nutritional status, physical activity, and the degree of dysmenorrhea with a significance value of 0.000, which means that the three variables are related.

Keywords: *Dysmenorrhea, Female adolescent, nutritional status, physical activity*

1. INTRODUCTION

Adolescence is associated with the transition from children to adulthood. In this period, children grow up to ready step into adulthood. Beside the physical and sexual maturity, adolescents also learn widely about social interaction, economic independence, skills for adult life, and the ability to negotiate. Adolescent reproductive health is a comprehensive health condition, covering physical, mental, and social aspects, not only free from reproductive diseases that will interfere with the reproductive process and function. The changes that occur between men and women are different. During puberty changes in hormone levels affect secondary sex hormones such as androgens in men and estrogen in women. Characteristics of women include pubic hair growth, armpit hair growth, and menarche [14].

Women of reproductive age experience menstruation every month. Menstruation is periodic and cyclic bleeding from the uterus accompanied by discharge of the endometrium. This occurs when the inner lining of the uterus sheds and comes out. Several problems occur during menstruation. Types of menstrual disorders include dysfunction of uterine bleeding, dysmenorrhea (pain during menstruation), premenstrual syndrome, and amenorrhea (not

menstruating). Menstrual disorders are divided according to comfort level (sick or not), the amount of blood loss, and menstrual cycle problems.

The incidence of dysmenorrhea in the world is very large. According to several international reports, the prevalence of dysmenorrhea is very high and at least 45% -90% of women experience dysmenorrhea during the reproductive years. On average, more than 50% of women in every country experience menstrual pain. In other studies, it is said that the prevalence of primary dysmenorrhea reaches 90% inactive women [1].

Advances in technology have made lifestyle changes that lead to sedentary lifestyles and lack of physical activity. Most adolescents choose casual activities over regular exercise so that it is bad for adolescent health. The activities of young women are classified as light because most of their time is spent on school and sleeping. Besides that, young women also rarely do strenuous activities such as washing clothes, cooking, and walking [7].

Nutritional status is one of the causes of dysmenorrhea. In women who have abnormal nutritional status, they will experience dysmenorrhea, in which women who are overweight have increased levels of prostaglandins. [5] states that the more fat the more prostaglandins are formed.

2. MATERIALS AND METHODS

The data were collected in Bengkulu City. Researchers recorded the number of students. After obtaining data on the number of students, the subjects were taken using a purposive random sampling technique with approach cross-sectional.

Data collection for physical activity and dysmenorrhea was carried out by distributing questionnaires that were tested for their validity and reliability to be filled in by respondents who met the inclusion criteria. Nutritional status data were obtained from physical examinations in the form of body weight, height, and calculated body mass index (BMI) based on the BMI category of the Ministry of Health 2013. Data processing in this study used the SPSS 16 computer program.

Univariate data analysis (descriptive analysis) was presented in table form along with percentage and frequency to describe the distribution of nutritional status, physical activity, and degree of dysmenorrhea. Bivariate analysis of this study, there are two relationships to be seen, namely the relationship between physical activity and the degree of dysmenorrhea and the relationship between nutritional status and the degree of dysmenorrhea. This analysis uses the statistical test Chi-square. But

it does not meet the requirements, then an alternative test is carried out, namely the test, Fisher the significance limit $\alpha \leq 0.05$. The multivariate analysis of this study is the relationship between nutritional status and physical activity with the degree of dysmenorrhea. This analysis uses the Spearman test.

3. RESULT AND DISCUSSION

3.1 Nutritional Status

Nutritional status is determined by calculating the body mass index of women according to the Ministry of Health [4] with the category of undernutrition. normal, fat, and obese.

Table 1. Frequency Distribution of Nutritional Status in Bengkulu City

Nutritional Status Category	Frequency (n)	Percentage (%)
Undernutrition	12	12.0
Normal	47	47.0
Fat	26	26.0
Obesity	15	15.0
Total	100	100.0

In the Table 1, the results of the frequency distribution of the nutritional status of students in Bengkulu City show that the highest frequency is normal nutritional status as many as 47 people (47%), Fat 26 people (26%), Obesity 15 people (15%) and undernutrition as many as 12 people. (12%). Adolescent nutritional status is determined from the body condition of adolescents which is calculated based on BMI which is categorized (underweight, normal, obese, and obese) based on the Ministry of Health [4] regarding Anthropometric Standards for Assessing the Nutritional Status of Children and Adolescents.

Based on the table, students have a 47% normal nutritional status. A good nutritional status is an expected condition for students. Students who have good nutritional status will have better concentration power. This energy requirement is needed to improve students' learning abilities which include thinking skills and learning activities. Malnutrition also causes the person concerned to suffer from a disease more easily. Referring to the nutritional status of women based on the Ministry of Health [4], it can be taken the point that the nutritional status of female students in Bengkulu City is mostly normal. included in private schools with a fairly high monthly tuition fee and annual fee. Researcher suspect that the economic conditions of the students' parents fall into the economic category that is more than adequate or middle and above. An economy that is more than adequate allows the fulfillment of

family nutrition so that students have adequate nutrition and nutrition.

3.2 Physical Activity

Physical activity is determined based on the criteria for Physical Activity Level (PAL) according to [6]. After filling in, the PAL value of each activity will be calculated by multiplying the Physical Activity Ratio (PAR) with the time it takes to carry out these activities, then summing it up. and the total is divided by 24 hours [6]. After that, the PAL value was obtained and each subject was classified into the PAL criteria, namely light physical activity, moderate physical activity, and heavy physical activity. The results of physical activity research can be seen in Table 2 as follows:

Table 2. Frequency Distribution of Physical Activity in Bengkulu City

Physical Activity Category	Frequency (n)	Percentage (%)
Light Activity	46	46.0
Moderate Activity	33	33.0
Heavy Activity	21	21.0
Total	100	100.0

Table 2 regarding the results of the frequency distribution of student physical activity in Bengkulu City shows that the highest frequency was light physical activity as 46 people (46%), moderate physical activity as many as 33 people (33%), heavy physical activity as many as 21 people (21%). Students with light physical activity with a total of 46 people are thought to tend to like activities in the room such as watching TV for hours. Watching TV is an activity that many teenagers now do, doing tasks, sleeping for a long time. According to [9], the level of physical activity performed by adolescents is differentiated by the duration and frequency of activity.

In Table 2, students had light physical activity, which amounted to 46%. Meanwhile, strenuous physical activity only amounted to 21%. Researchers suspect that outdoor activities are not very popular because the weather outside is hot, sweats too much, and gets tired easily due to Bengkulu, which is hotter weather, and the busy learning activities of the students. In addition to carrying out learning activities, students also carry out activities at school such as extracurricular activities and sports. The level of independence affects the level of physical activity ranging from light, moderate, to heavy physical activity. In addition to the level of independence, sports facilities and other facilities at

school can be used freely and can also increase the physical activity of students.

According to [8], one of the factors that influence physical activity is diet. because if the amount of food and food portions is more, the body will feel tired easily and do not want to do activities such as sports or other activities. By doing regular physical activity or doing sports the body will produce endorphins. This hormone can function as a natural sedative produced by the brain, causing a feeling of comfort.

3.3 The Dysmenorrhea Degree

Dysmenorrhea degree is determined by knowing the Dysmenorrhea Index Value which consists of three categories, namely mild dysmenorrhea, moderate dysmenorrhea, and severe dysmenorrhea. The results are obtained in the table as follows:

Table 3. Frequency Distribution of Dysmenorrhea Degree in Bengkulu City

Dysmenorrhea Category	Frequency (n)	Percentage (%)
Mild Dysmenorrhea	43	43.0
Moderate Dysmenorrhea	35	35.0
Severe Dysmenorrhea	22	22.0
Total	100	100.0

Table 3 shows the results of the data on the frequency distribution of the degree of dysmenorrhea of female students in Bengkulu City during menstruation, most of whom experienced mild dysmenorrhea with 43 students (43%), 35 people with moderate dysmenorrhea, while 22 people with severe dysmenorrhea (22 %). Most of the students had mild dysmenorrhea as many as 43 people (43%). This can be caused because the intensity of pain in different individuals is influenced by individual descriptions of pain, perception, and experience of pain.

According to [3] factors that cause dysmenorrhea are nutritional status, physical activity, and age of menarche. If the nutrition intake is good, the increase in prostaglandin levels will decrease. These prostaglandins are a strong stimulant of myometrial contraction as well as a vasoconstrictive effect of blood vessels. Regular physical activity increases blood perfusion which can reduce the sensation of heaviness in the pelvic and congestive dysmenorrhea. Increased levels of prostaglandins will result in uterine contractions and vasoconstriction of blood vessels, so the blood flow to the uterus decreases so that the uterus does not get an adequate oxygen supply, causing pain. According

to [1], the endometrium in the secretion phase produces prostaglandin F2, causing contraction of smooth muscles. If excessive levels of prostaglandins enter the bloodstream, besides dysmenorrhea, other effects can also be seen such as nausea, vomiting, diarrhea. hence the increase in prostaglandin levels plays an important role in the onset of dysmenorrhea.

3.4 The Correlation Between Nutritional Status and Dysmenorrhea Degree

The correlation between two variables between nutritional status and the dysmenorrhea degree was determined by cross-tabulation analysis IN Table 4. Based on the results of statistical tests using the chi-square test in Table 4, it is known that the number of boxes with an expected count value is less than five which makes the chi-square test not fulfill the requirements. Then the data was tested using an alternative test, namely the fisher's test which can be seen in Table 5.

Based on the results of statistical tests using the chi-square test in Table 5, it is known that the p-value = 0.000. To determine whether there is a relationship or not, the significant level of p is compared with the error level $\alpha = 0.05$ ($p < 0.05$), so it can be concluded that there is a relationship between nutritional status and the dysmenorrhea degree in female students in Bengkulu City.

According to [11], states that good nutritional status or optimal nutritional status occurs when the body gets enough nutrients that are used efficiently to allow physical growth, brain development, and general health. And based on Supariasa [12], the students with malnutrition status have a one-fifth greater risk of experiencing dysmenorrhea compared to students with normal nutritional status in conditions of insufficient nutritional status in the body, this results in reduced nutrient stores because will be used to fill that insufficiency. This condition causes a weak physical condition so that the resistance to pain will be reduced. In addition to causing a decrease in physical condition to become weak, malnutrition is also very easy to cause fatigue. This is due to a weak physical condition. The disadvantage of being underweight is that you are easily tired.

Table 4. Results of Cross-Tabulation Analysis of the Correlation between Nutritional Status and Dysmenorrhea Degrees in Bengkulu City

Dysmenorrhea		Nutritional Status				Total
		Undernutrition	Normal	Fat	Obesity	
Mild Dysmenorrhea	Count	4.0	35.0	3.0	1.0	43.0
	Expected Count	5,2	20.2	11.2	6.4	43.0
Moderate Dysmenorrhea	Count	3.0	10.0	19.0	3.0	35.0
	Expected Count	4,2	16.4	9.1	5.2	35.0
Severe Dysmenorrhea	Count	5.0	2.0	4.0	11.0	22.0
	Expected Count	2,6	10.3	5.7	3.3	22.0
Total	Count	12.0	47.0	26.0	15.0	100.0
	Expected	12.0	47.0	26.0	15.0	100.0

Table 5. Chi-Square Analysis Results Correlation Between Nutritional Status and Dysmenorrhea Degree Student in Bengkulu City

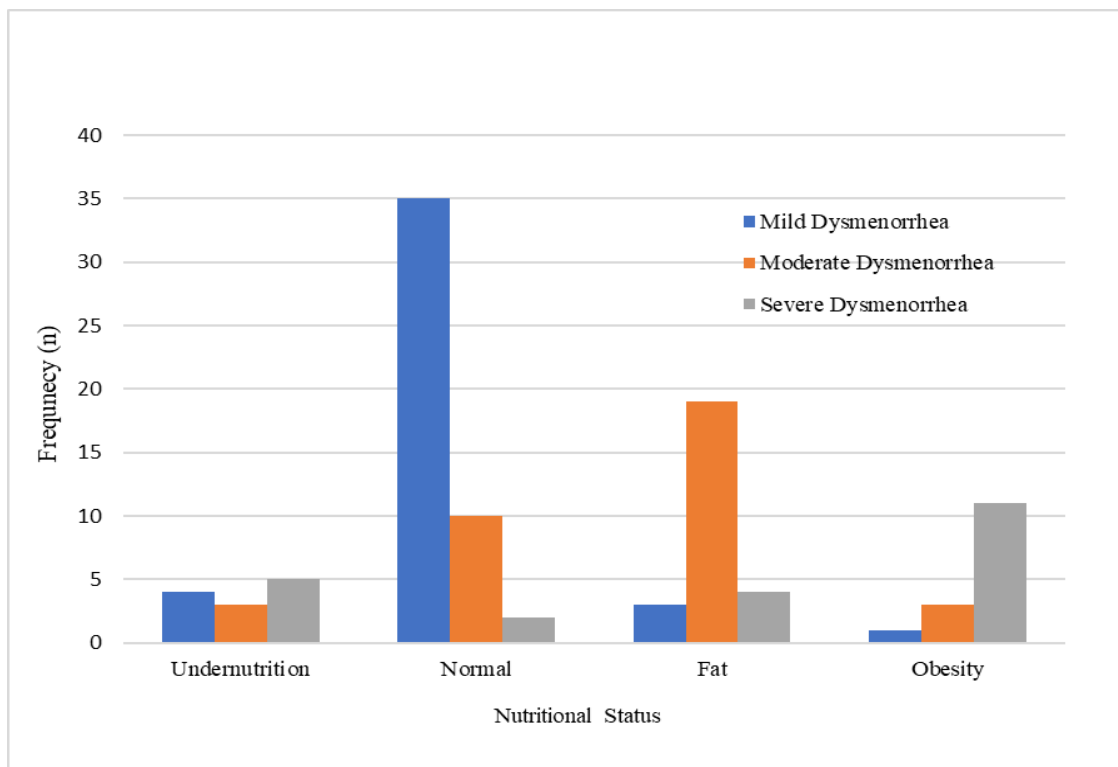|	Value	Df	Point Probability
Pearson Chi-Square	63.601[a]	6	.000
Likelihood Ratio	60.868	6	.000
Fisher's Exact Test	57.690		.000
Linear-by-Linear Association	17.764[b]	1	.000
N of Valid Cases	100		
Pearson Chi-Square	Value		

Figure 1. Graph of correlation between Nutritional Status and Dysmenorrhea Degree for Students in Bengkulu City

The results of the above research are also supported by the statement of [2] which states that inadequate or limited nutritional status will not only affect the growth and function of organs in the body but will also disrupt reproductive function. This will have an impact on menstrual disorders, but it will improve if the nutritional intake is good. Young women need to maintain a good nutritional status by eating a balanced diet because it is very much needed during menstruation. When menstruation in the luteal phase, the need for nutrition increases, if this is ignored the impact will occur complaints that cause discomfort during the menstrual cycle.

Poor nutritional status can cause a weak body condition which affects the decrease in resistance to pain. The results of this study are supported by [11] which states that in a state of deficient nutritional status, there is an insufficient nutrient in the body. This condition causes a weak physical condition so that the resistance to pain will be reduced. It can directly cause a decrease in physical condition to become weak, malnutrition is also very easy to cause fatigue. This is due to a weak physical condition. The disadvantage of being underweight is that you are easily tired.

3.5 The Correlation Between Physical Activity and Dysmenorrhea Degree

The correlation of two variables between physical activity and the dysmenorrhea degree was determined by cross-tabulation analysis as write in Table 6. Based on the results of statistical tests using the chi-square test, there are also boxes with an expected count value of less than five, which makes the chi-square test not fulfilled the requirements. Then the data was tested using an alternative test, namely the Fisher's test which can be seen in Table 7.

Based on the results of statistical tests using the chi-square test in Table 7, it is known that the *p-value* = 0.000. To find out whether there is a relationship or not, the significant level of *p is* compared with the error level $\alpha = 0.05$ ($p < 0.05$) so that it can be concluded that there is a relationship between physical activity and the degree of dysmenorrhea in female students in Bengkulu City.

Menstrual pain occurs due to increased contraction of the uterine muscles innervated by the sympathetic nervous system. Stress increases sympathetic activity which will lead to an increase dysmenorrhea because physical activity helps

Table 6. Results of Cross-Tabulation Analysis of the Correlation between Nutritional Status and Dysmenorrhea Degrees in Bengkulu City

Dysmenorrhea		Physical Activity			
		Light Activity	Moderate Activity	Heavy Activity	Total
Mild Dysmenorrhea	Count	6.0	16.0	21.0	43.0
	Expected Count	19.8	14.2	9.0	43.0
Moderate Dysmenorrhea	Count	24.0	11.0	0.0	35.0
	Expected Count	16.1	11.6	7.4	35.0
Severe Dysmenorrhea	Count	16.0	6.0	0.0	22.0
	Expected Count	10.1	7.3	4.6	22.0
Total	Count	46.0	33.0	21.0.0	100.0
	Expected Count	46.0	33.0	21.0	100.0

Table 7. Chi-Square Analysis Results Correlation Between Physical Activity and Dysmenorrhea Degree Student in Bengkulu City

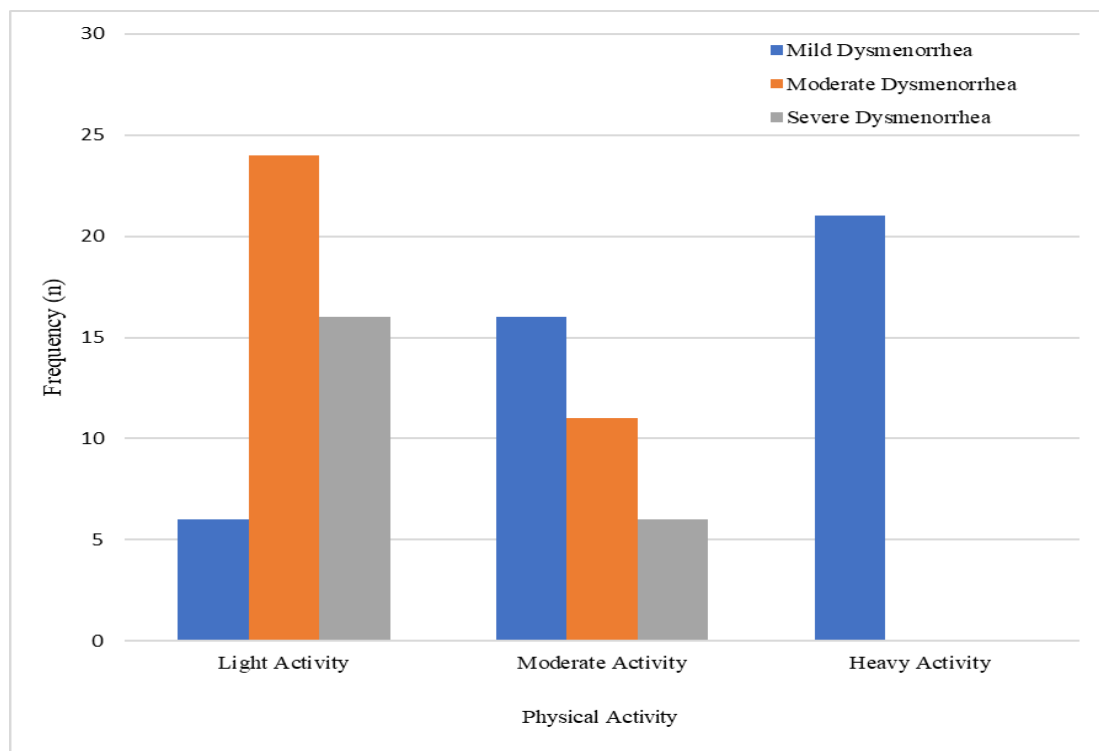|	Value	Df	Point Probability
Pearson Chi-Square	45.206	4	.000
Likelihood Ratio	55.434	4	.000
Fisher's Exact Test	48.698		.000
Linear-by-Linear Association	35.343	1	.000
N of Valid Cases			
Pearson Chi-Square	100		

Figure 2. Graph of the Correlation between Physical Activity and the Dysmenorrhea Degree for Students in Bengkulu City

Table 8. Results of Cross-Spearman Analysis Correlation between Nutritional Status and Dysmenorrhea Degree Student in Bengkulu City

		Dysmenorrhea	Nutritional Status	Physical Activity
Dysmenorrhea	Correlation Coefficient	1.000	.430[**]	-.612[**]
	Sig. (2-tailed)	.	.000	.000
	N	100	100	100
Nutritional Status	Correlation Coefficient	.430[**]	1.000	-.466[**]
	Sig. (2-tailed)	.000	.	.000
	N	100	100	100
Physical Activity	Correlation Coefficient	-.612[**]	-.466[**]	1.000
	Sig. (2-tailed)	.000	.000	.
	N	100	100	100

accelerate the transportation of large amounts of in the degree of dysmenorrhea by increasing the intensity of uterine contractions. Doing regular physical activity can reduce the symptoms of PG so that PG does not accumulate excessively on the uterine wall, which then reduces pain [10].

Regular physical activity can increase the number and size of blood vessels that supply blood throughout the body including the reproductive organs, so that blood flow becomes smooth and this can reduce the symptoms of dysmenorrhea. An increase in the volume of blood flowing throughout the body, including the reproductive organs, will facilitate the supply of oxygen to blood vessels experiencing vasoconstriction so that dysmenorrhea can be reduced [13]

3.6 Multivariate Correlation Between Nutritional Status, Physical Activity and Dysmenorrhea Degree

The multivariate correlation between nutritional status and physical activity with the dysmenorrhea degree was determined by cross-spearman analysis as follows.

The data show that all variables have a significant correlation. The correlation between physical activity and the dysmenorrhea degree shows a value of -0.612. This means that one variable affects other variables but goes in the opposite direction (if one variable changes in value towards a positive direction, then the other variable will also change but go in a negative direction). With this coefficient value, it is known that the strength of the relationship between variables is in the weak category, meaning that changes in one variable affect other variables

such as nutritional status but do not have a large enough impact.

The correlation between nutritional status and dysmenorrhea degree shows a correlation with a value of 0.430. The correlation coefficient value falls into the moderate correlation category. The correlation between physical activity and nutritional status shows a value of -0.466. Just like the relationship between physical activity and dysmenorrhea, with this coefficient value, it is known that the strength of the relationship between variables is in the weak category, meaning that changes in one variable affect other variables but do not have a large enough impact. Of these three variables, physical activity, nutritional status, and degree of dysmenorrhea have a significance value of 0.000, which means that there is a 1% probability of error and 99% correctness. The three variables are related.

4. CONCLUSION

Based on the results of the research and discussion above, it can be concluded that the nutritional status of female students in Bengkulu City is 12% malnutrition,47% normal, 26% fat, and 15% obese. Physical activity among students in Bengkulu City was 46% light physical activity, 33% moderate physical activity, and 21% vigorous physical activity. The dysmenorrhea degree among female students in Bengkulu City was 43% mild dysmenorrhea, 35% moderate dysmenorrhea, 22% severe dysmenorrhea. There is a strong and significant correlation between nutritional status and the dysmenorrhea degree in female students in Bengkulu City. There is a weak significant relationship between physical activity and the dysmenorrhea degree among female students in Bengkulu City. There is a multivariate correlation

between the three variables, namely nutritional status, physical activity with a dysmenorrhea degree.

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