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# The Relationship between Physical Activity and Omega-3 Fatty Acid Consumption with the Level of Dysmenorrhoea in Adolescent Girls at SMP PGRI 8 Denpasar

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**ABSTRACT**

Lack of physical activity and consumption of omega-3 fatty acids can be one of the factors causing dysmenorrhea. This study aims to determine the relationship physical activity and consumption of omega-3 fatty acids with the level of dysmenorrhea in female students at SMP PGRI 8 Denpasar. This research is observational with a cross-sectional design.The sample size was 62 people according to the inclusion criteria, namely being registered as active students, willing to be a sample, having menstruation, not sick, and aged 12-18 years old. Physical activity data were collected using the GPAQ, level ofdysmenorrheausing the NRS and consumption of omega 3 fatty acids using the SSQFFQ form. Statistical analysis used is the Spearman rank correlation test ($\alpha$=0.05).The results showed that 51.6% of the samples had low activity, 32.3% consumed omega-3 fatty acids in the category of severe and moderate deficits and 54.8% with moderate dysmenorrhea, and 11.3% severe. The results of the statistical analysis showed that there was a relationship between physical activity and consumption of omega-3 fatty acids with the level of dysmenorrhea ($p<0.05$).It is recommended for young women to do regular physical activity and consume enough omega-3 fatty acids to prevent dysmenorrhea.

## INTRODUCTION

Development during adolescence begins with the maturation of the physical (sexual) organs which is marked by changes such as hormonal, physical, psychological and social changes, where this condition is called puberty. One of the signs of puberty in teenage girls is menstruation. Some women get their periods without complaints, and many women get their periods accompanied by pain. This pain that arises is usually known as dysmenorrhoea[1].

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Dysmenorrhea is experienced by more than 50% of menstruating women and the reported prevalence varies widely, namely around 45-95%. As many as 64.25% of Indonesian women experience dysmenorrhoea, consisting of 54.89% primary dysmenorrhoea and 9.36% secondary dysmenorrhoea[2]. The incidence of dysmenorrhoea in Bali Province in 2014 was 48.05%[3]. In 2015, the Bali Provincial Health Service stated that the incidence of dysmenorrhea was estimated at 29,505 people, while in Denpasar the incidence of dysmenorrhea was estimated at 2,115 people, including both primary and secondary dysmenorrhoea and ranging from mild to severe degrees of dysmenorrhea[4]. In a study of female students at SMP PGRI 5 Denpasar by Fredelika et al (2021), it was found that the incidence of dysmenorrhoea was 50% with moderate pain and 20% with mild pain[5].

The high prevalence of dysmenorrhoea in adolescents has received little attention from adolescents and society. In fact, dysmenorrhoea can cause a person to become weak, without energy, pale, lack of concentration, which has a negative impact on daily activities and is even one of the most common reasons why women do not carry out activities (school, work, etc.)[6].

Many factors can influence the incidence of dysmenorrhoea. One of them is physical activity. Lack of physical activity is a risk factor for the severity of primary dysmenorrhea pain. Sufficient physical activity is needed to reduce the secretion of prostaglandin hormones[7]. Research on FK UPN Veteran Jakarta students in 2018 regarding the relationship between physical activity and sleep quality and the incidence of dysmenorrhoea, found that 17 samples (37.8%) in the low intensity physical activity group experienced severe dysmenorrhoea, 25 samples (55.6%) with low physical activity, experienced moderate dysmenorrhoea, and 3 samples (6.7%) with low physical activity experienced mild dysmenorrhoea. Samples with high intensity physical activity experienced mild dysmenorrhea as many as 4 people (50%), 2 samples each (25%) experienced moderate and severe dysmenorrhoea[8].

Another factor that influences dysmenorrhoea is eating pattern (diet). Fatty acids are important nutrients for humans, because they can produce energy and are an important component for cell membranes[9]. Dietary intake of omega-3 fatty acids can reduce pain such as rheumatoid arthritis, dysmenorrhoea, intestinal diseases and neuropathy. Types of omega-3, namely eicosapentaenoic acid (EPA) and decosahexaenoic acid (DHA) are believed to reduce prostaglandin levels[10]. Consuming omega-3 fatty acids in your daily diet will reduce menstrual pain. Research by Bente, et al (2000) on women who experienced menstrual pain given fish oil supplements and fish oil with vitamin B12 showed more significant results in reducing the level of dysmenorrhoea[11]. Other research by Mandana (2011) found there is a difference in the effect of administering fish oil and ibuprofen in the treatment of primary dysmenorrhoea and found that fish oil supplements are better than ibuprofen in reducing pain in women whoexperiencing primary dysmenorrhoea[12]. Omega-3 fatty acids are effectively used to relieve menstrual pain because of their anti-inflammatory properties.

Data on school health unit visits at SMP PGRI 8 Denpasar in 2021 shows that the average reason female students visit scholl health unit is because they experience abdominal pain during menstruation or dysmenorrhoea. Initial observation results reported that female students only did sports activities during sports class hours once a week. Other activities carried out during the week are studying and sometimes helping parents sweep the yard. The lack of frequency of exercise by female students is because they do not understand the benefits of regular exercise for the body. The results of a daily consumption recall of 10 female students show that almost all of the female students consume Fe inhibitor foods such as tea, fizzy drinks and nuts and they are very fond of consuming junk food which is high in calories but low in other nutrients. Based on this description, research was conducted on the relationship between physical activity and consumption of omega-3 fatty acids with the level of dysmenorrhoea in young women at SMP PGRI 8 Denpasar.

This study aims to determine whether there is a relationship between physical activity and consumption of omega-3 fatty acids and the level of dysmenorrhoea in adolescents at SMP PGRI 8 Denpasar.

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## METHOD

This type of research is observational with a cross-sectional design. The research was conducted at SMP PGRI 8 Denpasar in December 2021. The population was 164 female students of SMP PGRI 8 Denpasar, while the sample involved was 62 people using a proportional random sampling technique followed by simple random sampling using a lottery method. The sample inclusion criteria were being registered as an active female student in class VIII and IX of SMP PGRI 8 Denpasar, willing to be a sample, having menstruated, not being sick, and aged 12-18 years. The type of data collected is primary data including data on the incidence of dysmenorrhoea by filling in the Numeric Rating Scale (NRS) questionnaire for the last three months so that the average level of pain is obtained for the last three months, physical activity data records daily activities by filling in the Global form Physical Activity Questionnaire (GPAQ), and omega-3 fatty acid consumption data by interview using the SQFFQ form which contains foods high in omega-3 fatty acid content to get the average daily consumption for one month. The independent variables are physical activity and consumption of omega-3 fatty acids and the dependent variable is the incidence of dysmenorrhoea. Processing physical activity data by calculating METs, consumption of omega-3 fatty acids using categories according to Kusharto and Supariasa in 2014, dysmenorrhea levels using categories according to Potter and Perry in 2010. Data on physical activity, consumption of omega-3 fatty acids on an interval data scale and The incidence of dysmenorrhoea is on an ordinal data scale so that bivariate analysis uses the Spearman rank correlation statistical test. at a 5% confidence level ($\alpha = 0.05$).

## RESULTS AND DISCUSSION

### Sample characteristics

The subjects in this research were 62 female students in grades VIII and IX at SMP PGRI 8 Denpasar. The age range of the samples in this study was between 13-15 years, where the highest percentage was 14 years old with 32 samples (52%). The sample distribution according to age is presented in Figure 1.

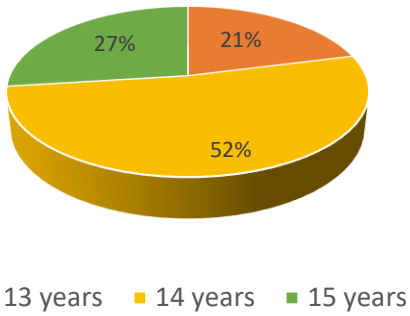


Figure 1. Sample Distribution According to Age

Based on the age of menarche of the sample, the majority of the sample experienced menarche at the age of ≥ 12 years with an age range of 12-14 years as many as 53 samples (86%). The sample distribution according to age at menarche is presented in Figure 2.

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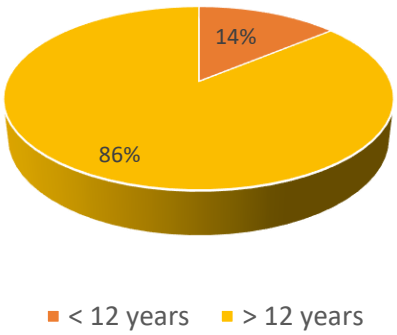


Figure 2. Sample distribution according to age at menarche

**Physical activity**

Table 1
Distribution of Sample Physical Activity

| Physical Activity | f | % |
|---|---|---|
| Low | 32 | 51.6 |
| Moderate | 30 | 48.4 |
| Amount | 62 | 100.0 |

Table 1 shows that from 62 samples, the number of samples with low and moderate physical activity was almost the same, respectively 51.6% with low activity and 48.4% with moderate physical activity and there were no samples with high physical activity.

**Consume omega-3 fatty acids**

Table 2
Distribution of Omega-3 Fatty Acid Consumption Based on Animal Protein Source

| Food Ingredient Name | n | % |
|---|---|---|
| Chicken meat | 62 | 100.0 |
| Chicken eggs | 49 | 79.0 |
| Cheese | 47 | 75.8 |
| Pindang fish | 42 | 67.7 |
| Mayonnaise | 35 | 56.5 |
| Pork | 31 | 50.0 |
| Anchovy | 21 | 33.9 |
| Tuna fish | 17 | 27.4 |
| Shrimp | 14 | 22.6 |
| Butter | 12 | 19.4 |
| Beef | 8 | 12.9 |
| Duck meat | 7 | 11.3 |
| Fish oil | 4 | 6.5 |
| Shell | 3 | 4.8 |

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The type of omega-3 fatty acid that is most consumed by samples as a source of animal protein is 100% chicken meat, while the type of omega-3 fatty acid that is least consumed as a source of animal protein by samples is fish oil 6.5% and shellfish 4.8 %.

Table 3
Consumption of Omega-3 Fatty Acids Based on Vegetable Protein Sources

| Food Ingredient Name | n | % |
|---|---|---|
| Tofu | 60 | 96.8 |
| Tempeh | 57 | 91.9 |
| Margarine | 20 | 32.3 |
| Green beans | 14 | 22.6 |
| Olive oil | 14 | 22.6 |
| Peanuts | 11 | 17.7 |
| Red beans | 9 | 14.5 |
| Soybeans | 7 | 11.3 |
| Cashew nut | 6 | 9.7 |

The type of omega-3 fatty acid most consumed by samples as a source of vegetable protein is tofu as much as 96.8%, while the type of omega-3 fatty acid that is least consumed as a source of vegetable protein by samples is soybeans 11.3% and cashews 9 .7%.

Table 4
Distribution of Sample Omega-3 Fatty Acid Consumption

| Consume Omega-3 Fatty Acids | f | % |
|---|---|---|
| Severe level of deficit | 20 | 32.3 |
| Moderate level deficit | 20 | 32.3 |
| Mild level deficit | 15 | 24.2 |
| Normal | 7 | 22.3 |
| Amount | 62 | 100.0 |

Table 4 shows that most of the samples with consumption levels of omega-3 fatty acids in the categories of severe deficit and moderate deficit, 20 samples each (32.3%) and none in the more category.

**Degree of dysmenorrhoea**

Table 5
Distribution of Sample Dysmenorrhoea Levels

| Dysmenorrhea Rate | f | % |
|---|---|---|
| Mild pain | 21 | 33.9 |
| Moderate pain | 34 | 54.8 |
| Severe pain | 7 | 11.3 |
| Amount | 62 | 100.0 |

Table 5 shows that the majority experienced moderate dysmenorrhoea, 34 samples (54.8%) and no samples complained of no pain or very severe pain.

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**Relationship/correlation analysis**

Cross tabulation of dysmenorrhoea rates based on complete physical activity is presented in Table 6.

Table 6
Distribution of Dysmenorrhea Levels Based on Physical Activity

| Physical Activity | Dysmenorrhea Rate | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Light | | Mild | | Heavy | | Amount | |
| | n | % | n | % | n | % | n | % |
| Low | 5 | 23.8 | 22 | 64.7 | 5 | 71.4 | 32 | 51.6 |
| Moderate | 16 | 76.2 | 12 | 35.3 | 2 | 28.6 | 30 | 48.4 |
| Amount | 21 | 100.0 | 34 | 100.0 | 7 | 100.0 | 62 | 100.0 |

Table 6 shows that the 34 samples with moderate levels of dysmenorrhoea mostly had low physical activity as many as 22 samples (64.7%). In addition, of the 21 samples experiencing mild levels of dysmenorrhoea, 16 samples (76.2%) had moderate physical activity. Thus, based on the cross tabulation results, it can be said that there is a tendency that the lower the physical activity carried out by the sample, the more impact it will have on the incidence of dysmenorrhoea. The results of the analysis used the Spearman Rank correlation test and obtained a p value <0.05, so it can be said that there is a significant relationship between physical activity and the level of dysmenorrhoea.

Meanwhile, the distribution of dysmenorrhea levels based on consumption of omega-3 fatty acids is described in Table 7.

Table 7
Distribution of Dysmenorrhea Based on Omega-3 Fatty Acid Consumption

| Consume Omega-3 Fatty Acids | Dysmenorrhea Rate | | | | | | Amount | |
|---|---|---|---|---|---|---|---|---|
| | Light | | Mild | | Heavy | | | |
| | n | % | n | % | n | % | n | % |
| Severe level of deficit | 2 | 9.5 | 15 | 44.1 | 3 | 42.9 | 20 | 32.3 |
| Moderate level deficit | 7 | 33.3 | 11 | 32.4 | 2 | 28.6 | 20 | 32.3 |
| Mild level deficit | 8 | 38.1 | 5 | 14.7 | 2 | 28.6 | 15 | 24.2 |
| Normal | 4 | 19.0 | 3 | 8.8 | 0 | 0.0 | 7 | 11.3 |
| Amount | 21 | 100.0 | 34 | 100.0 | 7 | 100.0 | 62 | 100.0 |

Table 7 shows that of the 34 samples who experienced mild dysmenorrhoea, 15 people (44.1%) had levels of omega-3 fatty acid consumption in the severe deficit category. In addition, of the 7 samples who experienced severe levels of dysmenorrhoea, there were 2 people each (28.6%) with moderate levels of deficit and mild levels of omega-3 fatty acid consumption, while 21 samples had mild levels of dysmenorrhea as many as 4 samples (19 %) has consumption of omega-3 fatty acids in the normal category. Thus, based on the results of the cross tabulation, it can be said that there is a trend where the more adequate the consumption of omega-3 fatty acids in the sample, the incidence of dysmenorrhea in the sample decreases. The results of the analysis using the Spearman Rank correlation test obtained a value of (p<0.05), so it can be said that there is a significant relationship between consumption of omega-3 fatty acids and the level of dysmenorrhoea.

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**Discussion**

During adolescence there are changes that occur such as hormonal, physical, psychological and social changes, where this condition is called puberty. One of the signs of puberty in teenage girls is menstruation. Every woman's menstrual experience is different, such as experiencing menstruation which is accompanied by pain and is commonly known as dysmenorrhoea. There are several causes of dysmenorrhoea, namely age, age at menarche, stress, nutritional status, physical activity, and nutritional intake13. Physical activity is the dominant factor associated with dysmenorrhoea. Exercising and moving a lot will improve blood flow and the body will be stimulated to produce endorphins which work to reduce pain and create a feeling of happiness[14]. Apart from that, endorphins can cause a feeling of comfort and produce short-term non-specific analgesics to reduce dysmenorrhoea[15].

Based on the sperman rank correlation test, it was found that there was a significant relationship between physical activity and the level of dysmenorrhoea. The strength of the relationship is shown by the r value or correlation coefficient of -0.382, so that the more physical activity you do, the lower the level of dysmenorrhoea. The results of this study are in line with research conducted by Sari et al (2018) which states that there is a relationship between physical activity and dysmenorrhoea. Adolescent girls with very light physical activity are 4.3 times more likely to develop dysmenorrhea compared to adolescent girls with light physical activity[16]. However, the results of this study are different from research conducted by Khairunnisa and Maulina (2016), which showed that there was no relationship between physical activity and menstrual pain (p=0.238) with some respondents who had heavy physical activity levels also experiencing severe menstrual pain (6.7%)[17]. This study also found that 2 samples (3.2%) with moderate physical activity experienced severe dysmenorrhoea and 5 samples (8.1%) with low physical activity experienced mild dysmenorrhoea. This can occur due to several other factors that can influence the occurrence of dysmenorrhea apart from physical activity.

One of the nutrients needed to reduce dysmenorrhea is food that contains omega-3 and omega 6, such as those contained in fish, eggs, soybeans or in the form of food supplements. Omega-3 fatty acid metabolism in disease prevention is related to eicosanids (prostaglandins, thromboxanes and leukotrienes). Omega-3 fatty acids have a positive effect on health because they can have a relaxing effect on muscles[18]. Additionally, omega-3 fatty acids can inhibit the activity of mitogens and activate protein kinases, which are involved in the modulation of central sensitization caused by inflammation and neuropathic pain, suggesting another potential pathway to inhibit menstrual pain transmission.

Based on the sperman rank correlation test, it was found that there was a significant relationship between consumption of omega-3 fatty acids and the level of dysmenorrhoea. The strength of the relationship is shown by the r value or correlation coefficient of -0.358, which means that the more adequate consumption of omega-3 fatty acids the sample is, the level of dysmenorrhoea in the sample will decrease. During the menstrual period, adolescents with dysmenorrhea have higher intrauterine pressure and have twice as many prostaglandin levels in menstrual blood than adolescents who do not experience pain. Omega-3 provides the starting point for making hormones that regulate blood clotting, contraction and relaxation of artery walls, and inflammation. The results of this study are in line with research conducted by Hidayati et al (2017) which stated that there was a relationship between the consumption of foods rich in omega-3 fatty acids and the incidence of dysmenorrhoea in female students at SMAN 1 Gondangrejo Karanganyar[19].

The research also found that 7 samples (11.3%) experienced mild levels of dysmenorrhoea whose consumption of omega-3 fatty acids was in the moderate deficit category. Apart from that, there were 3 samples (4.8%) who experienced moderate levels of dysmenorrhoea whose consumption of omega-3 fatty acids was in the normal category. Meanwhile, there were 5 samples (8.1%) who experienced moderate levels of dysmenorrhoea whose consumption of omega-3 fatty acids was in the mild deficit category and there were 2 samples (3.2%) who experienced severe levels of dysmenorrhea who had consumption of omega-3 fatty acids in the category mild level of deficit, 1 sample experienced

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menarche at <12 years of age. Therefore, increasing consumption of omega-3 fatty acids can cause increased incorporation of oil into the uterus, so that prostaglandin production is reduced and can result in reduced myometrial contractions, uterine vasoconstriction and ischemia and diligent physical activity can reduce stress indirectly and can reduce feelings of discomfort. painful. Getting used to light exercise and regular physical activity before and during menstruation makes blood flow in the muscles around the uterus smoother, so that pain can be reduced.

## CONCLUSION

The number of samples with low physical activity was 51.6% and 48.4% had moderate physical activity.Most of the samples had consumption of omega-3 fatty acids in the category of severe deficit and moderate deficit, 20 samples each (32.3%) while 24.2% were in the mild deficit category and 22.3% were in the normal category. . At the dysmenorrhea level, most of the sample (54.8%) experienced moderate pain, 33.9% experienced mild pain, and 11.3% experienced severe pain. There is a significant relationship between physical activity and consumption of omega-3 fatty acids and the level of dysmenorrhea ($p<0.05$).

It is recommended that female students increase their consumption of foods that are sources of omega 3 fatty acids such as nuts such as peanuts, red beans and soybeans and make use of sports facilities at school, such as extracurricular activities, so that they can increase physical activity.

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