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# The Effect of Spinning Exercise on Dysmenorrhoea for Vocational Midwifery Students at The Health Polytechnic of Palangka Raya

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**Abstract**

Dysmenorrhea is pain that resembles cramps in the lower abdominal area during menstruation. Symptoms of dysmenorrhea appear in the form of pain in the midline of the lower abdomen, which begins to appear several hours before or at the same time as menstrual bleeding. This research aims to determine the effect of spinning exercise on dysmenorrhea and analyze the reduction in pain symptoms for dysmenorrhea. This research used a quasi-experimental design using a pre-post-test approach in the control and intervention groups. Data was collected on 32 students, 16 respondents in the spinning and 16 respondents in the control group-intensity measurement of spinning exercise using a cycling ergometer and measuring dysmenorrhea pain using visual analogic. The results of the statistical test between the control group and the spinning group obtained p-value = 0.027 < 0.05, which shows that group with medium and heavy-intensity spinning exercise is more effective in reducing dysmenorrhea than group with light-intensity spinning exercise. Adolescents are a group that has high activity in physical exercise. This characteristic is one of the factors for using spinning exercise treatment to treat dysmenorrhea in adolescents. This intervention becomes easier for adolescents to carry out.

## INTRODUCTION

One component of society is adolescence, the nation's next generation expected to contribute the future development. Significant physical and sexual changes occur during adolescence. Starting with puberty, which is a phase in human growth and development for both men and women. In women, puberty is followed by aspects of reproductive development, marked by the start of menstruation (menarche) (Sunarto, 2017).

Menstruation is a periodic and cyclic bleeding process due to hormonal changes in the body accompanied by desquamation of the endometrium from the uterine organ. Dysmenorrhea is pain that resembles cramps in the lower abdominal area during menstruation. Dysmenorrhea is classified into two: primary and secondary dysmenorrhea. The presence or absence of significant abnormalities in the genital or reproductive organs distinguishes the two types of dysmenorrhea. The symptoms of primary dysmenorrhea are characterized by pain in the lower central abdomen. These symptoms typically begin a few hours before or concurrently with the onset of menstrual bleeding. The pain is most intense on the first or second day, coinciding with the release of prostaglandins into the menstrual blood. The pain is felt as cramping in the suprapubic region, extending to the surface of the thighs. Other accompanying symptoms of primary dysmenorrhea include nausea/vomiting, back leg pain, and constipation. Primary dysmenorrhea also manifests symptoms such as headaches, fatigue, restlessness, diarrhea, lower abdominal cramps, and bloating. Most symptoms of primary dysmenorrhea occur within the first 24-48 hours of menstrual bleeding, with the age range typically between 17 and 22 years old (Lestari, 2019). Symptoms of primary dysmenorrhea appear in the form of pain in the midline of the lower abdomen, which begins to appear several hours before or at the same time as menstrual bleeding. The causes of primary dysmenorrhea are not fully understood, but primary dysmenorrhea is related to increased prostaglandins and leukotrienes in the endometrium just before menstruation occurs (Lestari, 2019).

Routine activities in aerobic exercise have been implemented but they are deemed unable to answer the problem of dysmenorrhea experienced by female students. Spinning exercise is a form of aerobic exercise adapted from cycling using a stationary bicycle. Research regarding, reducing PMS symptoms is still limited. By providing spinning exercises according to the measured intensity, this sport will be accepted among female students to provide a relaxing and recreational effect so that it can overcome the problem of dysmenorrhea in a fun way (Oktafiani et al., 2020).

*Spinning exercise* is an intense aerobic exercise using a stationary bicycle whose working mechanism improves the function of the heart and lungs so that it can improve blood circulation (Anjeli, 2013). A Randomized Clinical Trial (RCT) research study conducted on female students at Mazandaran University of Medical Sciences, Iran, provided evidence showing the use of exercise for dysmenorrhea (Ayu Astuti et al., 2021). Sixty-one female students with moderate and severe pain intensity primary dysmenorrhea were given a 15-minute exercise program intervention three times a week in 2 menstrual periods. The exercises were not carried out when the students felt pain. Sixty-one female students in the control group were given 250 mg of mefenamic acid capsules to drink every 8 hours from when they felt dysmenorrhea. The research results showed that the average pain intensity was significantly higher in the exercise group in the first cycle ($p = 0.058$). In the second cycle, the difference in average pain reduction in the exercise group was higher than in the mefenamic group compared to the initial research ($p = 0.056$) and the first cycle ($p = 0.007$). So, from these results, there was no significant difference in the severity or intensity of pain and duration of pain between groups ($p > 0.050$). Based on the description above, the research aims to identify the effect of spinning exercise on dysmenorrhea in Vocational Midwifery Students at the Health Polytechnic of the Ministry of Health in Palangka Raya.

## RESEARCH METHODS

This quantitative research used a quasi-experimental design with a pre-test-post-test. This research consists of two groups: a treatment group and a control group. The treatment group consisted of two groups, one group with medium-intensity spinning exercise and one group with heavy-intensity spinning exercise, while the control group was given light-intensity spinning exercise. In this design, both groups are assessed before and after being given treatment, and then a comparison of the conditions before and after the treatment is carried out.

Spinning exercise is an intense aerobic exercise using a stationary bicycle. It is a type of aerobic physical activity that enhances the performance of the heart and lungs, thereby improving and facilitating blood circulation. When blood circulation is optimal, the body utilizes more oxygen for cellular metabolism. The intervention consists of two groups: treatment and control groups. The treatment group comprises two subgroups, one engaged in moderate-intensity spinning exercise and the other in high-intensity spinning exercise. Meanwhile, the control group undergoes a spinning exercise at a low intensity. In this design, both groups undergo an assessment before and after the intervention, and a comparison is made between the conditions before and after the research. The intervention involves a stationary bike training program with a frequency of three weekly sessions, each lasting 30 minutes (including a 5-minute warm-up, 20-minute core exercise, and 5-minute cooldown) for three weeks. After the three-week intervention, participants wait for the next menstrual cycle.

The population in this study were students of the Vocational Midwifery Study Program at the Health Polytechnic of the Ministry of Health in Palangka Raya who experienced dysmenorrhea. The sampling method was consecutive sampling. In consecutive sampling, all subjects who meet the selection criteria are included in the research. There are inclusion criteria to prevent research bias, namely (a) First-year midwifery student residing in the dormitory, (b) Age of the student is 17-19 years, (c) Menarche occurred at age greater than 12 years, (d) Experiencing moderate-level dysmenorrhea, (e) Menstrual cycle regularity observed for the past three months, with a range of 2-35 days and menstruation duration of 3-7 days, (f) Engages in regular physical exercise, (g) Has not used any pain relievers during menstruation, (h) Willing and voluntarily agrees to follow research procedures, (i) Possesses a Normal Body Mass Index.

The total number of samples for all test groups was 32 students. The selected samples were grouped into the treatment and spinning exercise control groups, which met the inclusion criteria, with 16 students from each group as respondents. The intervention group will be divided based on sequence 1-16, and the control group will be divided based on sequence 17-32. The independent variable in this

study was the intensity of spinning exercise by measuring the Cycling Ergometer, and the dependent variable was the intensity of dysmenorrhea by measuring Visual Analogic. The data analysis employed is bivariate analysis, specifically the Mann-Whitney and Wilcoxon Signed Ranks tests. This research has a letter of permission number 503.3/0108/DPMPTSP/SPP-IP/II/2022 from the representative department in Palangka Raya and has passed ethical clearance from the Ethic Committee of Health Research Poltekkes Kemenkes Palangka Raya with number 038/III/KE.PE/2022.

## RESULT

Table 1 shows that based on the age of the respondents, 10 people (62.5%) in the spinning group respondents who were 21 years old. while 13 people (81.3%) in the control group were 21 years old. Eight people (50%) with the highest age of menarche in the spinning group were 12 years of age, while in the control group, six people (37.5%) with the highest period of menarche were 12 years of age. Seven people (43.8%) with the highest duration of menstruation in the spinning group were five days and seven days. Seven people (43.8%) with the highest duration of menstruation were five days in the control group. Six people (37.5%) with the most significant menstrual cycle had a 28-day cycle, while in the control group, eight people (50%) with the highest menstrual cycle had a 30-day cycle.

**Table 1. Characteristic Respondents (n=16)**

| Characteristic Respondents | *Spinning Group* | | Control Group | |
|---|---|---|---|---|
| | n | % | n | % |
| **Age** | | | | |
| 20 years old | 6 | 37.5 | 3 | 18.7 |
| 21 years old | 10 | 62.5 | 13 | 81.3 |
| **Total** | **16** | **100** | **16** | |
| **Menarche** | | | | |
| 12 years old | 8 | 50 | 6 | 37.5 |
| 13 years old | 4 | 25 | 5 | 31.25 |
| 14 years old | 2 | 12.5 | 2 | 12.5 |
| 15 years old | 2 | 12.5 | 2 | 12.5 |
| 16 years old | 0 | 0 | 1 | 6.25 |
| **Total** | **16** | **100** | **16** | **100** |
| **Menstrual Period** | | | | |
| 4 days | 2 | 12.4 | 1 | 6.2 |
| 5 days | 7 | 43.8 | 7 | 43.8 |
| 6 days | 0 | 0 | 2 | 12.5 |
| 7 days | 7 | 43.8 | 6 | 37.5 |
| **Total** | **16** | **100** | **16** | **100** |
| **Menstrual Cycle** | | | | |
| 23 days | 0 | 0 | 1 | 6.25 |
| 28 days | 6 | 37.5 | 2 | 12.5 |
| 31 days | 2 | 12.5 | 0 | 0 |
| 30 days | 0 | 0 | 8 | 50.0 |
| 32 days | 2 | 12.5 | 0 | 0 |
| 33 days | 1 | 5.5 | 0 | 0 |
| 25 days | 4 | 25 | 5 | 31.25 |
| **Total** | **16** | **100** | **16** | **100** |

Table 2 shows that in the control group (n=16) before the treatment group was given spinning exercise (control group pre-test results), the most pain experienced was a level of discomfort at number 4 (moderate pain). Respondents with the highest level of pain experienced were at number 4 (mild pain) as many as seven people (43.8%), while the least experienced pain was at number 8 (severe pain). In the treatment or spinning group (n=16) before getting spinning exercise (pre-test spinning group), the most common experience was number 4 (moderate pain) as many as six people (37.5%) and the respondents experienced the least amount of pain in the pain level number 7 (severe pain) as many as

three people (18.8%). Table 2 shows that the control group (n=16) in the post-test results showed that respondents experienced the most pain at number 4 (moderate pain). The most severe pain is experienced at number 8 (severe pain), while the lightest is number 2 (mild pain). The most pain was felt at number 4 (moderate pain) by six people (37.5%), and one person (6.3%) experienced at number 8 pain scale.

**Table 2. Analysis Univariate of Pain Scale (n=16)**

| Pain Scale | Control Group | | | | Spinning Group | | | |
|---|---|---|---|---|---|---|---|---|
| | Pre | | Post | | Pre | | Post | |
| | n | % | n | % | n | % | n | % |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 12.5 |
| 2 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 25.0 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6.3 |
| 4 | 7 | 43.8 | 2 | 12.5 | 6 | 37.4 | 5 | 31.2 |
| 5 | 2 | 12.5 | 6 | 37.5 | 3 | 18.8 | 1 | 6.3 |
| 6 | 2 | 12.5 | 3 | 18.8 | 4 | 25 | 2 | 12.4 |
| 7 | 4 | 25 | 4 | 25 | 3 | 18.8 | 1 | 6.3 |
| 8 | 1 | 6.2 | 1 | 6.2 | 0 | 0 | 0 | 0 |

Meanwhile, somebody experienced menstrual pain in female students in the treatment or spinning group (n=16) after receiving spinning exercise (post-test results) most widely shared at number 4 (moderate pain). Respondents who experienced the lightest pain were at number 0 (no pain) as many as two people (12.5%), and somebody felt the most severe pain at number 7 (severe pain) as many as one person (6.3%). The most pain was experienced at number 4 (moderate pain) by five people (31.3%), and one person (6.3%) experienced at number 7 (severe pain).

**Table 3. Analysis of Shapiro Wilk**

| Kelompok | Statistic | df | Sig |
|---|---|---|---|
| Pre Control Group | .820 | 16 | .005 |
| Post Control Group | .839 | 16 | .009 |
| Pre Spinning Group | .896 | 16 | .070 |
| Post Spinning Group | .946 | 16 | .426 |

Table 3. The normality test is one of the requirements for carrying out the Wilcoxon test. The data was less than 50 samples, so the normality test used Shapiro-Wilk. The test criteria calculated significance p-value ($\alpha$) > 0.05, the data is usually distributed. If the estimated significance value ($\alpha$) < 0.05, the data is not normally distributed.

**Table 4. Effect of Spinning Exercise**

| Pre-Post Intervention | Spinning Group (n=16) | Control Group (n=16) | *p-value* |
|---|---|---|---|
| **Pre-Test** | | | |
| Mean | 5.25 | 5.38 | |
| Median | 5.00 | 5.00 | |
| Modus | 4 | 4 | 0.002 |
| Min-Max | 4-7 | 4-8 | |
| SD | 1.1833 | 1.455 | |
| CI-95% | 4.52-5.88 | 4.60-6.15 | |
| **Post-Test** | | | |
| Mean | 3.44 | 5.13 | |
| Median | 4.00 | 5.00 | |
| Modus | 4 | 4 | 0.339 |
| Min-Max | 0-7 | 2-8 | |
| SD | 2.032 | 1.857 | |
| CI-95% | 2.35-4.52 | 4.14-6.11 | |

The Wilcoxon test is a non-parametric test used to measure whether there is a difference in the average value of two paired sample groups. The Wilcoxon test can be used for research designs that use pre-post-tests. The p-value used is $p < 0.05$, there is a difference in the average value before and after, and the p-value is > 0.05, which means there is no difference in the average value before and after.

Table 4. The mean pain experienced by the spinning group before treatment was 5.25, the median value was 5.00, or pain in the moderate interval, and the highest pain scale felt was 7 (severe pain) with a standard deviation of 1.183 and a 95% confidence level in the range 4.52 – 5.88. Meanwhile, in the control group, before treatment, the mean pain in the control group was 5.38, and the median value was 5.00 (moderate pain). The highest pain scale experienced by this group was 8, with a standard deviation of 1.455 and a 95% confidence level in the range of 4.60 – 6.15. After treatment in the spinning group, the average pain decreased to 3.44. The median value decreased to 4.00 with a standard deviation of 2.032. The lightest pain scale was 0 (no pain), and the highest pain scale was 7 (severe pain) according to the confidence level. 95% 2.35 – 4.52. In the control group, after the second measurement, the average pain experienced was 5.13, with a median value of 5.00. The lightest pain scale is number 2 (moderate pain), and the most significant pain scale is number 8 (severe pain), with a standard deviation of 1.857 and a 95% confidence level of 4.14 – 6.11. The p-value in the spinning group after spinning or intervention was 0.002, which means the p-value <0.005, which means there is a difference after turning. Then, in the control group, the p-value was 0.339 > 0.005, which means there was no difference in pain in the control group. So, there is a significant difference between spinning exercise and the reduction of dysmenorrhea in Vocational Midwifery students at the Health Polytechnic of the Ministry of Health, Palangka Raya.

**Table 5. Decreased of Dysmenorrhea**

| Group | Mann Whitney U | N | p-value |
|---|---|---|---|
| Post-Control – Post Spinning | 71.000 | 32 | .027 |

Table 6. Mann-Whitney U-Test is a non-parametric test that compares two population means from the same population. Based on the Mann-Whitney test, the statistical value was 0.027, where the p-value was <0.05, which means that giving treatment in the form of spinning exercises was more effective in reducing pain than providing heat therapy (stomach compresses).

## DISCUSSION

Primary dysmenorrhea is general menstrual cramps that are not due to another disease. The pain usually begins 1 or 2 days before or when menstrual bleeding begins and is felt in the lower abdomen, back, or thighs. Symptoms of primary dysmenorrhea mostly appear in the first 12-48 hours of menstrual bleeding, with an age range of 17-22 years (Fauziah, 2015). In this research, the pain scale before the spinning exercise differs from the pain scale after the spinning exercise. In line with Marsida et al., (2013) conducted analytical observations using a cohort approach in 2012 on medical students in Malang. Thirty-eight female students with primary dysmenorrhea were treated with cycling and a control group without exercise for a month. The research results showed that the treatment group who regularly did cycling (2-3x/week, 30-60 minutes) for one month experienced a reduction in the degree of dysmenorrhea by 78.9% or as many as 15 female students. Meanwhile, 84.2% of 16 female students in the control group had a constant degree of dysmenorrhea. The analysis results using a paired t-test with a confidence level of 95% and $p < 0.05$ showed a significant value of 0.000, and the effect of cycling on reducing dysmenorrhea was 66.3% (Oktafiani et al., 2020).

Dysmenorrhea treatment can be divided into pharmacological and non-pharmacological. Pharmacological treatment of dysmenorrhea such as the use of ibuprofen NSAIDs (Non-Steroid Anti Inflammatory Drugs) is the most common pharmacological treatment used to treat dysmenorrhea, such as mefenamic acid, naproxen sodium, and Celebrex. Then, non-pharmacological treatments include herbal products, heat therapy, acupuncture, and exercise. Physical exercise can reduce dysmenorrhoea. Physical exercise can improve and increase blood flow throughout the body, stimulating the release of endorphins, which act as non-specific analgesics (Puspita & Wahyurianto, 2022). One physical exercise that can be done is the spinning exercise.

*Spinning exercise* is an intense aerobic exercise using a stationary bicycle. It is a type of aerobic physical exercise whose working mechanism is to improve the function of the heart and lungs. Spinning exercise improves blood circulation. If blood circulation is good, the body uses oxygen for cell metabolism (Ginanjar et al., 2018). Physical activities that include aerobic exercise are brisk walking, jogging or jogging, swimming, dancing, or cycling. *Cycling* is a physical activity that is a relaxing and recreational sport. Currently, cycling is a sport that is currently in demand among the public. Even in fitness places, what is currently popular is cycling using a spinner/stationary bike. This exercise is an affordable form of exercise and can provide many benefits for the body. Cycling is the most popular type of physical activity because it can be done by anyone, even people who are overweight or obese. Several studies have proven the benefits of spinning exercise, generally aerobic, for fitness and managing dysmenorrhea.

According to several journals, one of the benefits of spinning exercise is maintaining hormonal balance. The mechanism of decreasing the intensity of dysmenorrhea follows the pathophysiology that primary dysmenorrhea occurs due to endometrial prostaglandin and leukotriene mechanisms. After ovulation occurs, fatty acids will increase in the phospholipids of cell membranes. Then arachidonic acid and other omega-7 fatty acids are released and initiate a flow of prostaglandin and leukotriene mechanisms in the uterus, which results in a mediated inflammatory response, tension during menstruation (menstrual cramps), and other menstrual melamines. The result of arachidonic acid metabolism is a prostaglandin (PG) F2-alpha, which is a cyclooxygenase (COX) that causes hypertonus and vasoconstriction in the myometrium resulting in ischemia and menstrual pain (Harel, 2006). One way is to stimulate the release of endorphins, which act as specific analgesics that inhibit and help create natural anti-pain in the body to reduce primary dysmenorrhea (Proctor & Farquhar, 2006).

The results of Abbaspour's (2006) study showed that the severity and duration of dysmenorrhea were reduced by exercise ($p<0.01$). Cycling can reduce the degree of dysmenorrhea because static cycling is a type of aerobic exercise and a sport with elements of recreation and relaxation. Cycling can produce endorphins. *Endorphins* are neuropeptides produced by the body when relaxed/calm. Endorphins are produced in the brain and spinal cord. This hormone can function as a natural sedative produced by the brain, providing comfort and reducing pain during endometrial contractions (Proctor & Farquhar, 2006).

Cycling has been proven to increase levels of the hormone endorphin four to five times in the blood. When someone does cycling, it will provide proprioceptive stimulation, which will be transmitted through large fibers to the reticular formation, thalamus, and limbic system. From here, there will be a release of endorphins, which will activate a descending pain inhibitory pathway (to the bloodstream) and inhibit transmission and pain management so that it can reduce the degree of dysmenorrhea (Aganoff & Boyle, 1994).

Cycling also increases the efficiency of lung function and the number and size of blood vessels (Aganoff & Boyle, 1994). The aspect of physiological and psychological will occur if a person is trained with an intensive exercise intensity program based on the overload principle, progressively increasing the workload, number of repetitions, movements, and levels of repetition intensity. In this study, the intensity used was intensity. Medium intensity can be determined via FITT (Frequency, Intensity, Time, Type) (Ginanjar et al., 2018). Several studies explain that the body will produce endorphin hormones produced in the brain and spinal cord by doing sports. This hormone can function as a natural sedative produced by the brain, causing a feeling of comfort through the relaxation and recreation techniques it produces so that it can be used to reduce the symptoms of pain caused by dysmenorrhea ((Proctor & Farquhar, 2006).

## CONCLUSION

The average menstrual pain before spinning exercise in the treatment group was moderate pain, and the control group had an average pain scale of moderate pain. The average menstrual pain after spinning exercise in the treatment group decreased. In the control group also has decreased. However, this value was included in the moderate pain category, so there was no change. Significant menstrual pain (dysmenorrhea) before and after the control group treated pain using light-intensity spinning exercise.

The statistical test results obtained showing a significant effect of spinning exercise on reducing dysmenorrhea in Vocational Midwifery students at the Palangka Raya Ministry of Health Polytechnic. The results of the statistical test measuring the second pain scale between the control group and the spinning group, which shows that spinning exercise is more effective in reducing dysmenorrhea than light-intensity spinning exercise carried out by the control group on Vocational Midwifery students at the Palangka Raya Ministry of Health Polytechnic.

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