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The Effect of Pilates Exercise on Reducing Menstrual Pain in Adolescents: Literature Study

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ABSTRACT

Dysmenorrhea, or menstrual pain, is common among adolescents, with global prevalence rates reaching 59.7% to 92%. This pain, affecting the lower abdomen, back, and groin, usually begins 24 hours before menstruation and can last up to three days. Management includes pharmacological options like NSAIDs and analgesics, as well as non-pharmacological approaches. Pilates exercise is a practical, non-drug option shown to reduce menstrual pain by stimulating endorphin production, providing a natural sense of relief and comfort. Purposes : The goal of this study is to ascertain whether Pilates exercises can help adolescents who are experiencing menstrual pain. Methods : The design of this study is a literature review. Search for published articles on Google Scholar, Pubmed and GARUDA with the keywords "Pilates Exercise", "Dysminorhea / Menstrual pain". Of the three databases found 446 articles, executed as many as 432 because they did not match the research variables so that 9 articles were obtained to be read in full and 5 articles were found that met the criteria. Results: The results of the literature review of 5 literature studies conducted stated that there was an effect of pilates exercise on reducing menstrual pain in adolescents. Implications : Pilates exercise can be an effective and safe non-pharmacological treatment alternative to reduce menstrual pain in adolescent girls. Conclusion : It is hoped that pilates exercises can be recommended as an effective method in efforts to reduce menstrual pain in adolescents.

Keywords: *Dysmemorrhea, Pilates Exercise, Menstrual Pain*

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INTRODUCTION

Adolescence is a process of maturation marked by various changes such as physical, psychological, hormonal and the process of maturation of the reproductive system called puberty. When reaching adolescence, one of the things that indicates puberty in women is menstruation. Menstruation is the process of shedding the endometrium wall accompanied by bleeding due to the absence of fertilization between egg cells and sperm cells, which is influenced by various hormones and occurs in fertile women who are not pregnant or have not yet menopausal every month (Breehl & Caban, 2023).

One of the disorders that often occurs during menstruation is Dysmenorrhea. Dysmenorrhea or menstrual pain usually occurs during menstruation with symptoms such as lower abdominal pain, the pain can spread to the waist, lower back and thighs, usually felt just before or during menstruation. Dysmenorrhea also occurs in adolescent girls with complaints of pain or discomfort in the lower abdomen (independent scientific institution in Germany, 2023).

Based on data from various countries in the world, the incidence of Dysmenorrhea in the world is quite high. According to the World Health Organization (WHO), the incidence of menstrual pain in the world is very high. Epidemiological studies on the adolescent population (aged 12-17 years) in the United States, the prevalence of Dysmenorrhea reached 59.7%. Dysmenorrhea in adolescents is reported to be around 92% (Kalista, 2016). While the incidence of Dysmenorrhea is also high in Sweden as many as 72% complain of pain, 12% severe, 37% moderate and 49% mild (J Paterson, 2019).

According to a study in Indonesia, the prevalence of Dysmenorrhea reached 64.25%, of which 9.36% had secondary Dysmenorrhea and 54.89% were primary Dysmenorrhea. In a study in Bali on female students aged 15-18 years in 70 subjects with primary Dysmenorrhea, 64.3% experienced pain with mild intensity and 35.7% with moderate intensity. 70-90% of primary Dysmenorrhea incidents will have an impact on adolescents' academic and social activities. Based on data from the West Sumatra Health Service, there were more than 8143 cases of adolescents with primary dysmenorrhea, while 37% of adolescents who experienced dysmenorrhea were in the city of Padang with an incidence rate of 29% since 2015-2020.

Based on the high incidence of menstrual pain (Dysmenorrhea) in women, there are various methods used to overcome Dysmenorrhea pain, such as taking medication, conservative methods, and surgery (Nurmala, 2023). One form of conservative therapy is exercise therapy. Physical exercise shows effective results for use as a preventive and curative effort in primary Dysmenorrhea conditions. There is an exercise therapy method that can be used as a preventive and curative method in primary Dysmenorrhea conditions, namely Pilates exercise. Pilates exercise has the principles of centering, concentration, control, precision, flowing, and breathing. The goal of this exercise is to improve mental and physical strength by increasing breathing, flexibility, muscle strength, coordination, balance, and

stretching the relevant tissues while lowering prostaglandin levels to alleviate pain (Rolyta Triasari Purba, 2021).

Pilates exercises are designed to build a kind of "muscle corset" around the torso and strengthen the inner postural muscles, which can help shield the back from potential pain, stiffness, and injury during menstruation. Other fundamental principles of Pilates include the use of a series of exercises, controlled breathing, isolation of the taught muscles and routines, and careful movement control during movements. Pilates' gentle motions are intended to be revitalizing physical activities that also help to develop posture and enhance the lymphatic, respiratory, and blood circulation systems (Nurmala, 2023). The goal of this study is to ascertain whether Pilates exercises can help adolescents who are experiencing menstrual pain. Research titled "The effect of Pilates exercise on reducing menstrual pain in adolescents" is considered necessary based on the background description.

MET HODS

This study uses a literature review design, namely a specific research methodology and development carried out to collect and evaluate research related to a particular topic focus. The issue of menstruation pain was chosen as the first step in creating this literature review. More precisely, it is restricted to how Pilates exercises can lessen teenage menstrual pain. Only articles published between 2015 and 2020 will be reviewed, and the keywords pilates exercise and menstruation pain will be used. Furthermore, the analysis and synthesis of the literature can be seen starting from the abstract at the beginning of the paper, which will make this process and allow a decision whether it is worth continuing. The next stage is analyzing the text as a whole. After the screening process of the title/abstract and the entire contents of the study from the PubMed, Garuda, Ce databases, there are 9 studies that are relevant to the research question (Image 1.)

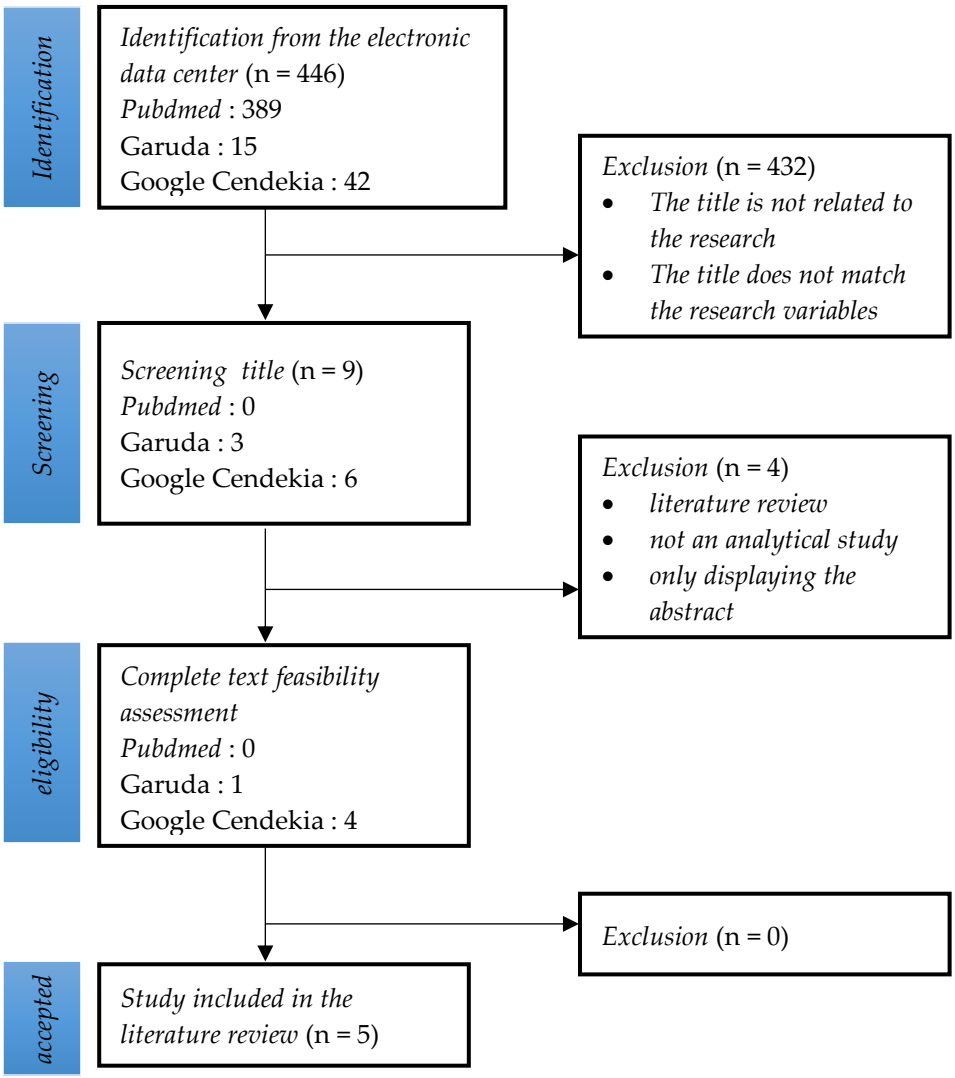

Image 1. Prism Diagram of the Literature Search Process

Using the terms Pilates Exercise, Menstrual Pain, the literature review search was conducted across three databases: Google Scholar, PubMed, and Garuda. All journals comprise the study's population. Pilates Exercise's Impact in Mitigating Adolescent Menstrual Pain. After the title/abstract screening process, there were 446 journals and then 432 journals were selected because they were not included in the criteria. The results of the journals showed that among the 5 journals reviewed, there were 5 journals that had a quasi-experimental design, 1 journal with a pre-experimental design. In total, 5 literature review journals. The selected journals were then studied one by one and then matched the inclusion and exclusion criteria, then selected journals that had good quality.

RESULTS

Table 1. Tabulation of Menstrual Pain in Adolescents Before Being Given Pilates Exercise

No.	Author Name and Year	Types and Design of Research	Population and sample	Before	Research result
1	Rolyta Triasari Purba, Putu Ayu Sita Saraswati, Made Widnyana, Luh Made Indah Sri Handari Adiputra in 2020 (Rolyta Triasari Purba, 2021).	quasi experimental with Pretest-Posttest Control Group Design.	Sampling using non-probability sampling technique with purposive sampling. The research subjects were 30 samples. There was a treatment group given pilates exercise and a control group.	There is menstrual pain before pilates exercise was conducted on students of SMA Negeri 3 Denpasar.	There is an effect of Pilates exercise on reducing menstrual pain in female students at State Senior High School 3 Denpasar.
2	Reza Elfira, Siti Saadah, Sariestys Rismawati in 2017 (Elfira, 2018).	Quasi experimental and time series research design	The population of this study was all female students of grade X, XI, XII of SMKN Sukaresik who experienced primary dysmenorrhea during January-February 2017, the sampling technique used Purposive Sampling technique, namely 100 people.	It falls into the moderate pain category before pilates exercise was conducted on students.	There is an effect of Pilates exercise on reducing menstrual pain in female students.
3	Marinda Amelia in 2015 (Amellia, 2015)	Quasi experimental with Pretest-Posttest	The total sample of 30 respondents was divided into 2 groups, namely 15	There is menstrual pain before pilates	There is an effect of Pilates exercise on

		Control Group Design research design	respondents in the treatment group and 15 respondents in the control group. The treatment group was given Pilates Exercise for 3 weeks with an exercise frequency of 3 times per week for 50 minutes.	exercise was conducted on teenagers.	reducing menstrual pain in adolescents
4	Yellyta Ulsafitri in 2016 (Ulsafitri, 2017).	Quasi experimental with Pretest-Posttest Control Group Design research design.	The population taken was 15 people, in which the sample was taken using the total sampling method of all students with the Statistical Program for Science (SPSS).	There is menstrual pain before pilates exercise was conducted on university students	There is a significant influence on the scale of primary menstrual pain before and after Pilates Exercise in students.
5	Alvina Destyaningrum, Atun Raudotul Ma'rifah, Maria Paulina Irma Susanti in 2017 (Destyaningrum et al., 2017).	Pre Experimental One Group Pretest and Posttest Design	The population in this study was 32 respondents with sampling using Purposive Sampling with a total of 18 respondents.	There is menstrual pain before pilates exercise was conducted on teenagers.	Menstrual discomfort significantly affects the effectiveness of Pilates workouts.

DISCUSSION

1. The Presence of Menstrual Pain in Adolescents Before Being Given Pilates Exercise

All five of the reviewed studies address the issue of menstruation pain in teenagers prior to engaging in Pilates exercises. Rolyta Triasari Purba et al. in 2020, Reza Elfira et al. in

2017, Marinda Amelia in 2015, Yellyta Ulsafitri in 2016, and Alvina Destyaningrum et al. in 2017 were the researchers who carried out this study.

In the study of Rolyta Triasari Purba, et al. in 2020, the results of the analysis above showed that the treatment group initially had an average degree of primary dysmenorrhea of 5.13 ± 1.45 categorized as moderate and after being given Pilates exercise intervention decreased to 2.67 ± 1.11 categorized as mild with a value of p = 0.000 (p, 0.05) meaning that there was a significant difference in reducing the degree of primary dysmenorrhea before and after being given Pilates exercise in female students at SMA Negeri 3 Denpasar. In the results of the analysis of the control group which initially had an average degree of primary dysmenorrhea of 5.20 ± 1.82 categorized as moderate and after decreasing to 4.33 ± 1.49 categorized as moderate with p = 0.032 (p <0.05) meaning that there was a significant difference in reducing the degree of primary dysmenorrhea in the control group.

In the study of Reza Elfira, et al in 2017, it was found that primary dysmenorrhea pain in students before being given Pilates exercise was in the moderate pain category for 68 people (68%), and very severe pain for 2 people (2%). Primary dysmenorrhea pain in students after being given Pilates exercise was in the mild pain category for 66 people (66%), and moderate pain for 1 person (1%).

In Marinda Amelia's 2015 study, it was found that after the Wilcoxon test was conducted on the treatment group, a Z value of -3.497 (p value 0.001) was obtained, while in the control group a Z value of -2.126 (p-value 0.033) was obtained. The Mann Whitney test obtained a Z value of -3.597 (p-value 0.001) is a difference in the effect of giving Pilates Exercise between the treatment and control groups on reducing menstrual pain of primary dysmenorrhea in adolescents aged 18-21 years. In Yellyta Ulsafitri's 2016 study, the results of 15 respondents showed that most respondents experienced severe pain (53.3%) before doing Pilates exercise and decreased to a mild pain scale (40) after doing Pilates exercise. In the study by Alvina Destyaningrum et al. in 2017, the results of the differences in the scale of dysmenorrhea pain before and after Pilates exercise were obtained on 18 respondents. The Pretest variable was obtained with a Mean rank of 2.89 and the Posttest with a Mean rank of 0.61 and a p value of 0.000 was obtained.

Dysmenorrhea occurs during menstruation in young women. Menstruation is a uterine bleeding cycle as a sign that the female body's uterine organs are functioning. During menstruation, the endometrium experiences large amounts of prostaglandins, which increase strong myometrial contractions and can press on blood vessels, causing pain (Fitrica et al., 2023). Risk factors for dysmenorrhea include high menstrual blood volume, long menstrual duration, and a history of dysmenorrhea pain in the family. Adolescents who experience menstrual pain often feel muscle cramps, especially in the lower abdomen, which are caused by strong and prolonged contractions of the uterine wall. This causes muscle fatigue and reduced physical activity, so physical exercise is needed to overcome it. The elasticity of the

abdominal muscles is influenced by the level of oxygen that supplies the organ. If oxygen levels are maximally sufficient, pain will decrease. In addition, the release of the hormone prostaglandin during menstruation can also reduce pain (Kumalasari, 2024).

Based on a literature study with an analysis of 5 articles reviewed, it states that there is menstrual pain in adolescents before being given Pilates exercise. From these 5 journals, there are also similarities and differences from each research method, population and sample, sampling technique, test results used and the results obtained.

2. Reduction of Menstrual Pain in Adolescents After Being Given Pilates Exercise

Of the 5 articles reviewed, all articles discussed the reduction of menstrual pain in adolescents after being given Pilates exercise, namely those conducted by Rolyta Triasari Purba, et al. in 2020, Reza Elfira, et al. in 2017, Marinda Amelia in 2015, Yellyta Ulsafitri in 2016, Alvina Destyaningrum, et al. in 2017.

In adolescents after being given pilates exercise, in the study of Rolyta Triasari Purba, et al. in 2020, the results of the analysis above showed that the treatment group initially had an average degree of primary dysmenorrhea of 5.13 ± 1.45 categorized as moderate and after being given pilates exercise intervention decreased to 2.67 ± 1.11 categorized as mild with a value of p = 0.000 (p, 0.05) meaning that there was a significant difference in the decrease in the degree of primary dysmenorrhea before and after being given pilates exercise in female students at SMA Negeri 3 Denpasar. In the results of the analysis of the control group which initially had an average degree of primary dysmenorrhea of 5.20 ± 1.82 categorized as moderate and after decreasing to 4.33 ± 1.49 categorized as moderate with p = 0.032 (p <0.05) meaning that there was a significant difference in the decrease in the degree of primary dysmenorrhea in the control group.

In the study of Reza Elfira, et al in 2017, it was found that primary dysmenorrhea pain in students before being given Pilates exercise was in the moderate pain category for 68 people (68%), and very severe pain for 2 people (2%). Primary dysmenorrhea pain in students after being given Pilates exercise was in the mild pain category for 66 people (66%), and moderate pain for 1 person (1%). In the study of Marinda Amelia in 2015, it was found that after the Wilcoxon test was carried out on the treatment group, a Z value of -3.497 (p value 0.001) was obtained, while in the control group a Z value of -2.126 (p-value 0.033) was obtained. The Mann Whitney test obtained a Z value of -3.597 (p-value 0.001) is a difference in the effect of giving Pilates Exercise between the treatment and control groups on reducing primary dysmenorrhea menstrual pain in adolescents aged 18-21 years

In Yellyta Ulsafitri's 2016 study, the results of 15 respondents showed that most respondents experienced severe pain (53.3%) before doing Pilates exercise and decreased to a mild pain scale (40) after doing Pilates exercise. In Alvina Destyaningrum et al's 2017 study, the results of the difference in the scale of dysmenorrhea pain before and after Pilates exercise

were obtained on 18 respondents, the Pretest variable was obtained with a Mean rank of 2.89 and Posttest with a Mean rank of 0.61 and a p value of 0.000 was obtained.

Physical activity or exercise is one way to relax to reduce pain, including menstrual pain, because when exercising, the body will produce endorphin hormones. This hormone plays a role in providing a sense of calm to the brain so that the body feels comfortable (Sri et al., 2024).

3. The Effect of Pilates Exercise on Reducing Menstrual Pain in Adolescents

The test results used from 5 articles discussing the effect of pilate exercise on reducing menstrual pain in adolescents used different statistical test results, namely 3 articles used the T Test statistical test, namely in the research of Rolyta Triasari Purba, et al. in 2020, Reza Elfira, et al. in 2017, Yellyta Ulsafitri in 2016. 1 article used the Wilcoxon Test and the Mann Whitney Test, namely in the research of Marinda Amelia in 2015. 1 article used the Wilcoxon test, namely in the research of Alvina Destyaningrum, et al. in 2017.

In the study of Rolyta Triasari Purba, et al. in 2020, the results of the analysis above showed that the treatment group initially had an average degree of primary dysmenorrhea of 5.13 ± 1.45 categorized as moderate and after being given Pilates exercise intervention decreased to 2.67 ± 1.11 categorized as mild with a value of p = 0.000 (p, 0.05) meaning that there was a significant difference in reducing the degree of primary dysmenorrhea before and after being given Pilates exercise in female students at SMA Negeri 3 Denpasar. In the results of the analysis of the control group which initially had an average degree of primary dysmenorrhea of 5.20 ± 1.82 categorized as moderate and after decreasing to 4.33 ± 1.49 categorized as moderate with p = 0.032 (p <0.05) meaning that there was a significant difference in reducing the degree of primary dysmenorrhea in the control group.

Before receiving Pilates exercises, 68 students (68%), according to Reza Elfira et al.'s 2017 study, reported having moderate pain from their primary dysmenorrhea, while 2 students (2%), reported having very severe pain. Primary dysmenorrhea pain in students after being given Pilates exercise was in the mild pain category for 66 people (66%), and moderate pain for 1 person (1%).

In Marinda Amelia's 2015 study, the treatment group's Z value following the Wilcoxon test was -3.497 (p value 0.001) was determined to be -3.497, while the control group's Z value was -2.126 (p-value 0.033). When comparing the treatment and control groups, the Mann Whitney test revealed a difference in the impact of Pilates exercises on lowering menstrual pain associated with primary dysmenorrhea in teenagers aged 18 to 21 years, with a Z value of -3.597 (p-value 0.001).

In Yellyta Ulsafitri's 2016 study, the results of 15 respondents showed that most respondents experienced severe pain (53.3%) before doing Pilates exercise and decreased to a mild pain scale (40) after doing Pilates exercise. In Alvina Destyaningrum et al's 2017 study,

the results of the difference in the scale of dysmenorrhea pain before and after Pilates exercise were obtained on 18 respondents, the Pretest variable was obtained with a Mean rank of 2.89 and Posttest with a Mean rank of 0.61 and a p value of 0.000 was obtained.

The improvement in pilates exercise proficiency also suggests that the right amount of exercise is being done to enhance participant abilities. Because the endorphin concentration is steady in the afternoon, pilates is best performed in the afternoon, whether on a specific day or before or during menstruation. Since endorphin levels are greater in the afternoon and lower at night, the afternoon is the ideal time to perform pilates because endorphin levels are stable during this period(Ayu Andera, 2024).

Pilates movements involve the pelvic area because pelvic movements increase circulation in the pelvic area and massage the internal organs. Light exercise is highly recommended to reduce dysmenorrhea. Pilates exercises can improve blood circulation, correct muscle and postural imbalances, and restore vitality to the body and mind, which helps reduce pain, increase metabolism, regulate hydrodynamic balance and hemodynamic conditions, and improve circulation in the pelvic area (Anugrah, 2022).

Teenage menstruation pain has been demonstrated to be significantly reduced by Pilates exercises. Menstrual pain is frequently caused by stiff muscles in the abdominal and pelvic regions, which can be relaxed with Pilates movements that emphasize core development, flexibility, and deep breathing. In addition, Pilates also stimulates the production of endorphins, natural calming hormones that can help reduce pain. By doing Pilates regularly, adolescents can experience a significant decrease in the intensity and duration of menstrual pain, as well as an increase in overall quality of life (Elslemy et al., 2023).

CONCLUSIONS

Based on the results of the literature review, it can be concluded that Pilates exercise is effective in reducing the intensity of menstrual pain in adolescents. This exercise improves blood circulation, relieves muscle tension, and increases the production of **endorphins** , which are natural analgesics produced by the body. Pilates also improves posture and increases flexibility, which helps relieve pain associated with muscle contractions during menstruation.

As a low-impact exercise, Pilates exercise is safe and can be done by anyone, including teenagers who experience primary dysmenorrhea. With regular practice, Pilates can help reduce prostaglandin levels in the body, hormones that play a role in causing excessive contractions in the uterus that cause pain.

This study also found that the Pilates exercise method has the potential to be a safer long-term solution compared to pharmacological therapy such as the use of NSAIDs which have side effects such as digestive disorders and kidney damage if used long-term.

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