



Slow Stroke Back Massage Demonstrates Greater Efficacy Compared to Core Strengthening Exercises in Reducing Dysmenorrhea among Female University Students

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Abstract

Women experiencing dysmenorrhea accompanied by abdominal cramps originating from uterine muscle contractions can lead to muscle tension and cause pain that adversely affects daily activities. This study aimed to determine the effectiveness of Slow Stroke Back Massage combined with Core Strengthening Exercise in reducing dysmenorrhea. This research employed a quantitative approach with a quasi-experimental research design. Sample collection was conducted using purposive sampling method. The study was carried out from December to January 2023, with a population of 97 individuals. A total of 30 participants were selected, with Group I receiving Slow Stroke Back Massage and Group II receiving Core Strengthening Exercise. Each group underwent the intervention eight times with two days of rest in between. The reduction in pain was measured using the Visual Analogue Scale (VAS). The average pain score before the Slow Stroke Back Massage intervention was 5.307, which decreased to 3.400 after the intervention. The p-value was 0.000, indicating a significant effect of the intervention on reducing dysmenorrheal pain. The average pain score before the Core Strengthening Exercise intervention was 5.073, which decreased to 1.780 after the intervention, with a p-value of 0.001, signifying a significant effect of the intervention on reducing dysmenorrheal pain. Based on the research findings, it can be concluded that Core Strengthening Exercise is more effective than Slow Stroke Back Massage in reducing dysmenorrheal pain in female university students.

Keywords: Dysmenorrhea, Slow Stroke Back Massage, Core Strengthening Exercise

Introduction

Reproductive health in women is a critical concern during adolescence. The adolescent phase is characterized by physical, cognitive, social, and emotional development. One of the early signs of adolescence is the onset of menstruation, which can lead to dysmenorrhea (R. Ningsih et al., 2013). Menstruation is a cyclic process involving the shedding of the uterine lining, accompanied by bleeding, and it occurs regularly every month until menopause, typically around the age of 40-50 years. Many women experience menstrual issues such as menstrual pain or dysmenorrhea during their menstrual cycles. Dysmenorrhea is a symptom, not a disease, and it refers to women experiencing pain or cramps in the lower abdominal region, accompanied by symptoms like headache, nausea, and even fainting due to the severity of the pain (Rohmawati & Hartiati, 2019).

Globally, the prevalence of dysmenorrhea ranges from 16% to 91%, with 10-20% experiencing severe dysmenorrhea, which is a primary cause of school absenteeism, decreased classroom concentration, and reduced classroom participation. In the United States, the incidence of dysmenorrhea is reported to be as high as 60%, while in Sweden, it reaches up to 72%. In Indonesia, the prevalence stands at 64.25%, with primary dysmenorrhea accounting for 54.89%, and the rest suffering from secondary dysmenorrhea (Putri et al., 2021).

The physiology of the female reproductive system is complex. During puberty, typically between the ages of 13 to 16, the growth of primordial follicles in the ovaries begins, leading to the release of estrogen hormones. Hormone secretion triggers the development of secondary sexual characteristics such as breast enlargement, pubic hair growth, armpit hair growth, and eventually, the onset of the first menstrual bleeding, known as menarche. Adolescents who complain of menstrual pain experience disruption in their activities, especially at the start of menstruation due to the presence of high uterine prostaglandins, abnormal uterine activity, and emotional/psychological factors. Menstrual pain in general occurs 1-3 years after menarche, namely during adolescence or old age 15- 18 years old (Febriani, 2019)

Physiotherapy plays a significant role in addressing dysmenorrhea because it offers non-pharmacological interventions through modalities like exercise therapy and massage, aiming to reduce pain in women experiencing dysmenorrhea. Non-pharmacological interventions are considered safer as they work in harmony with the body's physiological processes. Slow Stroke Back Massage and Core Strengthening Exercises are among the physiotherapy interventions that can be applied in cases of dysmenorrhea. Slow Stroke Back Massage can alleviate menstrual pain by providing relaxation through cutaneous stimulation, promoting comfort, muscle relaxation, and enhancing blood circulation, resulting in improved blood flow (L. T. Wahyuni, 2020). One form of relaxation therapy to alleviate dysmenorrhea pain is yoga therapy, in line with research conducted by (Syah et al., 2020)The resultsshowed that the average pain value before doing yoga was 5.13 and after doing yoga was 3.33. After thestatistical test was carried out, it was found that there was a significant effect of yoga practice ondysmenorrhea pain with p-value 0.005 (p-value <0.05)

Exercise has a significant relationship with reducing muscle fatigue. When experiencing dysmenorrhea, women often feel muscle cramps, especially in the lower

Slow Stroke Back Massage Demonstrates Greater Efficacy Compared to Core Strengthening Exercises in Reducing Dysmenorrhea among Female University Students

abdomen, which are cyclically induced by strong and prolonged contractions of the uterine wall. This muscle fatigue can be alleviated through physical activity, meaning that exercise can reduce the intensity of pain (Ningsih & Rahmah, 2013). The goal of Core Strengthening Exercises is to strengthen the muscle groups surrounding the lumbar region, thus reducing pain during menstruation. This can help maintain functional stability and reduce or eliminate the sensation of cramping or pain during menstruation (W. Wahyuni et al., 2019).

Based on an initial survey in Bukittinggi city at the DIII Program of Fort De Kock University, there were 97 female students experiencing dysmenorrhea.

Literature Review

Previous research conducted by Febri Monica Titia, titled "The Relationship between Characteristics of Adolescent Girls and the Incidence of Primary Dysmenorrhea in 10th and 11th Grade Students at SMAN 1 Kota Padang in 2017," indicated that among 106 female students surveyed, 74.5% experienced primary dysmenorrhea (Firdawati et al., 2020).

Previous research conducted by Azima, titled Comparison of the Effect of Massage Therapy and Isometric Exercises on Primary Dysmenorrhea: A Randomized Controlled Clinical Trial. Pain intensity had significantly reduced in the massage and exercises groups; the reduction was more significant in the massage group ($P < .001$). The results revealed a significant difference among the 3 groups in regard to the mean duration of pain after the third cycle ($P = .006$). However, no significant difference was found among the 3 groups concerning the mean level of anxiety. The results of intragroup comparisons only showed a significant reduction of anxiety level in the massage group after the third cycle ($P = .017$). (Azima et al., 2015)

Research Method

The research design employed in this study is a Quasi-Experimental Design with a Two-Group Posttest design using a Pretest-Posttest approach. The total population consists of 97 individuals, and the sample was selected using purposive sampling, with a sample size of 30 participants. Group I received Slow Stroke Back Massage, while Group II received Core Strengthening Exercises. Each group underwent the intervention treatment eight times with two days of rest in between. This study employed the Visual Analogue Scale as the measurement instrument. This linear scale visually represents the gradient of pain levels that a patient may experience, utilizing the Visual Analogue Scale for ease and simplicity. The data collection instrument used was a questionnaire adopted from the Verbal Multidimensional Scoring System.

Result and Discussion

Tabel 1

Provides the average menstrual pain scores of female college students before receiving Slow Stroke Back Massage.

Variabel	N	Mean	SD	Min	Max
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<i>Slow Stroke Back Massage</i>	15	5,307	0,5982	4,2	6,0
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Based on the data in Table 1, the research conducted on 15 respondents showed that before receiving Slow Stroke Back Massage, the average dysmenorrhea pain was 5.307, with a standard deviation of 0.658. The lowest pain score recorded was 4.2, while the highest was 6.0.

Menstruation occurs when the egg released by a woman each month is not fertilized, leading to bleeding or menstruation. Healthy women who are not pregnant and are not in menopause will experience regular menstruation. Menstruation is an essential component of the female reproductive cycle (FRC). It should be viewed as a natural, progressive, and positive biological phenomenon signifying sexual maturity.

The administration of Slow Stroke Back Massage aims to reduce menstrual pain using sensory techniques that influence the activity of the autonomic nervous system, providing comfort that can relieve tension, relax muscles, and improve circulation (Cholifah Noor & H, 2019).

The results of this study are in line with (Priscilla & Afriyanti, 2017) regarding the Influence of Cutaneous Stimulus Slow Stroke Back Massage on the Pain Scale of Primary Dysmenorrhea in Amanah Nursing College Students in Padang. It was found that there was an impact of Slow Stroke Back Massage, with more than half (75%) of the students experiencing moderate dysmenorrhea before the intervention, and after the intervention, more than half (58%) of the students experienced mild dysmenorrhea.

According to the researcher's assumptions, before receiving Slow Stroke Back Massage, the respondents' menstrual pain was in the moderate pain range with a value of 5.3. Based on interviews with the sample, some students mentioned that they had poor sleep quality, consumed a lot of fast food, which led to a lack of vegetables and fruits in their diets. Additionally, they experienced stress due to daily tasks and final assignments they were working on. This could contribute to the occurrence of dysmenorrhea because stress disrupts the endocrine system. The endocrine system is disrupted when the endometrium in the secretion phase produces prostaglandins, which cause contractions of smooth muscles, leading to dysmenorrhea. Furthermore, the body may produce excessive adrenal hormones and estrogen, leading to uterine muscle tension and excessive contractions, resulting in pain.

Table 2

Should provide the average menstrual pain scores after the administration of Slow Stroke Back Massage to female college students.

Variabel	N	Mean	SD	Min	Max
<i>Slow Stroke Back Massage</i>	15	3,400	0,6949	2,0	4,5

Slow Stroke Back Massage Demonstrates Greater Efficacy Compared to Core Strengthening Exercises in Reducing Dysmenorrhea among Female University Students

Based on Table 2, it is evident that after providing Slow Stroke Back Massage eight times to 15 respondents, the average pain score was 3.4, with a standard deviation of 0.6949. The lowest pain score recorded was 2, while the highest was 4.5.

Slow Stroke Back Massage is beneficial for reducing tension in stiff muscles and enhancing relaxation both physically and psychologically, thus reducing pain. Through massage, the release of endorphins occurs, making the respondents feel calm because menstrual pain is reduced (Rohmawati & Hartiati, 2019).

The results of this study are consistent with research conducted by (Cholifah Noor & H, 2019) effect of “cutaneous stimulation” on dysmenorrhea reduction in high school students, jepara, central java. As many as 8 (57.1%) female students had moderate dysmenorrhea, and 6 (42.9%) had mild dysmenorrhea. After the treatment of cutaneous stimulation, 7 (50.0%) students had mild dysmenorrhea and 7 (50.0%) had moderate dysmenorrhea. The reduction in dysmenorrhea after treatment was statistically significant.

According to the researcher's assumptions, menstrual pain (dysmenorrhea) after receiving Slow Stroke Back Massage therapy eight times showed that before the intervention, the Visual Analogue Scale scores for respondents ranged from a minimum of 4.2 to a maximum of 6.0. After the intervention, the scores ranged from a minimum of 2.0 to a maximum of 4.5. This reduction occurred because massage can improve blood circulation, prompting the body to produce more red blood cells that carry fresh oxygen to the muscles. Massage can reduce muscle tension and enhance physical relaxation, thus reducing pain intensity in respondents.

Table 3

Displays the average menstrual pain scores before the administration of Core Strengthening Exercises to female college students.

Variabel	N	Mean	SD	Min	Max
<i>Core Strengthenig Exercise</i>	15	5,073	0,7685	4,0	6,0

Based on Table 3, the research conducted on 15 respondents revealed that the average dysmenorrhea pain before administering Core Strengthening Exercise was 5.073, with a standard deviation of 0.7685. The lowest pain score recorded was 4.0, while the highest was 6.0.

Core Strengthening Exercise involves training the core muscle strength using resistance weight, repetitions, or muscle endurance to maintain a stable position. Exercise can improve blood circulation, leading to vasodilation of blood capillaries in muscles, which stimulates the release of endorphins and subsequently reduces menstrual pain. Core Strengthening Exercise combines the concept of lumbar stabilization, where the lumbar region is a strong part of the spine, to strengthen the body and serve as the insertion point for specific muscles that innervate nerves in specific areas (Puspitasari & Faudu, 2018).

According to a study by (Sharma et al., 2022) titled "Effect of Core Strengthening Exercise in Primary Dysmenorrhea," the average pain before intervention was 6.396, and

after intervention, it was 4.068. This indicates a reduction in pain, as Core Strengthening Exercise can strengthen the muscles around the spine, reducing pain during excessive contractions in menstruation.

Based on the researcher's assumptions, menstrual pain before Core Strengthening Exercise, as observed in 15 respondents with Visual Analogue Scale scores above 4, may be attributed to a lack of physical activity, as indicated by respondent interviews. Reduced physical activity can lead to an increase in dysmenorrhea because of decreased blood circulation and oxygen levels. Additionally, a lack of exercise can weaken core muscles, resulting in reduced body strength for functional movements and decreased overall endurance, leading to pain during menstruation.

Table 4
Should provide the average menstrual pain scores after the administration of Core Strengthening Exercise to female college students.

Variabel	N	Mean	SD	Min	Max
<i>Core Strengthening Exercise</i>	15	1,780	0,5784	1,0	2,0

Based on Table 4, the research conducted on 15 respondents showed that the average dysmenorrhea pain after the administration of Core Strengthening Exercise was accompanied by a standard deviation of 0.5784. The lowest pain score recorded was 1.0, while the highest was 2.0.

During physical exercises like Core Strengthening Exercise, the capillaries in the muscles experience vasodilation. This process occurs through the action of nitric oxide. Nitric oxide enters and reduces the influx of calcium into smooth muscles, leading to increased metabolism and improved blood flow to ischemic tissues. This vasodilation is responsible for the reduction in pain experienced during primary dysmenorrhea (Putri et al., 2021).

Core Strengthening Exercise strengthens the abdominal muscles, gluteus maximus, and extensor muscles of the back, mobilizing the lower lumbar region, thus enhancing lumbar stability. When the muscles around the lumbar region become stronger, it can help reduce pain during the stressful period of menstruation (W. Wahyuni et al., 2019).

The results of this study align with the research conducted by W. Wahyuni et al. (2019) on the Effectiveness of Core Strengthening Exercise in Reducing Pain Due to Primary Dysmenorrhea, involving 15 female students. It was found that there was a decrease in menstrual pain, with an average score of 4.60 before the intervention and 2.33 after the intervention, indicating a difference before and after the administration of Core Strengthening Exercise.

According to the researcher's assumptions, after receiving eight sessions of Core Strengthening Exercise therapy, menstrual pain in the respondents improved. Before the intervention, the lowest pain score recorded was 4.0, and the highest was 6.0. After the intervention, the lowest pain score was 1.0, and the highest was 2.0. This reduction in pain occurred because the respondents consistently performed the exercises, allowing their bodies

Slow Stroke Back Massage Demonstrates Greater Efficacy Compared to Core Strengthening Exercises in Reducing Dysmenorrhea among Female University Students

to provide twice the usual amount of oxygen. Oxygen enters the blood vessels, which experience vasoconstriction, leading to decreased pain during the menstrual cycle. Respondents mentioned that initially, they felt uncomfortable, but after eight sessions, their core stability improved. According to interviews with the respondents, Core Strengthening Exercise can be done individually, does not require a large space, and does not incur additional costs.

Table 5

Should present the influence of Slow Stroke Back Massage on the reduction of dysmenorrhea in female college students.

Variabel	N	Mean	SD	Mean deferen	P value
<i>Sebelum Slow Stroke Back Massage</i>	15	5,307	0,5982	1,907	0,000
<i>Sesudah Slow Stroke Back Massage</i>		3,400	0,6949		

Based on Table 5, after the implementation of Slow Stroke Back Massage intervention on 15 respondents, it was observed that there was a decrease in menstrual pain. There is a significant difference in the average menstrual pain before and after the implementation of Slow Stroke Back Massage, with an average difference of 1.907 and a p-value of 0.000. With a p-value of $0.000 < (0.05)$, the null hypothesis (H_0) is rejected, indicating that the administration of Slow Stroke Back Massage has an effect on reducing menstrual pain in female college students.

The calm and rhythmic massage with applied pressure increases blood circulation, enhances physical and mental relaxation, thus blocking pain signals to reach the brain. Slow Stroke Back Massage (SSBM) aims to reduce moderate pain intensity by promoting the release of endorphins. SSBM involves gently and rhythmically stroking the respondent's skin for 10 minutes (Priscilla & Afriyanti, 2017).

Providing massage by stimulating the skin can inhibit pain signals from the body by influencing the hypothalamus and the pain gate that stimulates the anterior pituitary to produce endorphins, which make the respondent feel comfortable.

The results of the research conducted by (Mukhoirotin & Zuliani, 2009) on the Utilization of Cutaneous Stimulation Slow Stroke Back Massage to Reduce the Intensity of Menstrual Pain (Dysmenorrhea) in the Darul 'Ulum Jombang Dormitory with a sample of 20 respondents indicated a decrease in menstrual pain. The average menstrual pain before the intervention was 5.85, and after the intervention, it was 4.80.

The findings regarding the effectiveness of Slow Stroke Back Massage in reducing dysmenorrhea align with the study conducted by Priscilla and Afriyanti (2017). This research concluded that Slow Stroke Back Massage can reduce the menstrual pain scale in female students, with the percentage of respondents experiencing moderate dysmenorrhea decreasing from more than half (75%) before the intervention to 58.2% experiencing mild dysmenorrhea after Slow Stroke Back Massage.

According to the researcher's assumptions, there is an influence of Slow Stroke Back Massage on the reduction of dysmenorrhea. After 8 sessions of Slow Stroke Back Massage, there was a noticeable change in menstrual pain among the 15 respondents, with an average pain score of 5.3 before the intervention and an average of 3.4 after the intervention. The reduction in menstrual pain is attributed to the dilation of blood vessels, which helps alleviate muscle tension. When blood vessels widen, the supply of nutrients and oxygen to cells increases, enhancing physical and psychological relaxation. It's not surprising that respondents felt comfortable during the intervention.

Table 6
Should present the influence of Core Strengthening Exercise on the reduction of dysmenorrhea in female college students

Variabel	N	Mean	SD	Mean deferen	P value
<i>Sebelum Core Strengthening Exercise</i>	15	5,073	0,7685	3,293	0,001
<i>Sesudah Core Strengthening Exercise</i>		1,780	0,5784		

Based on Table 6, this research was conducted on 15 respondents who were given Core Strengthening Exercise intervention. The results showed a decrease in average menstrual pain concerning the reduction of dysmenorrhea in female university students before and after the intervention, with an average difference of 3.293. Prior to the intervention, respondents had an average menstrual pain score of 5.073. After the Core Strengthening Exercise intervention, the average menstrual pain score, as measured by the Visual Analogue Scale, decreased to 1.780 with a p-value of 0.001. The value of $0.001 < (0.05)$ rejects the null hypothesis (H_0), indicating that Core Strengthening Exercise has an effect on reducing dysmenorrhea in female university students.

During menstruation, endometrial cells undergo shedding, releasing prostaglandin F2 alpha (PGF2 alpha), a group of essential fatty acids. This release stimulates the uterine muscles and affects blood vessels, leading to ischemia and vasoconstriction. Exercise can increase blood flow to the muscles and stimulate the release of endorphins, acting as non-specific analgesics, thereby reducing the duration and severity of dysmenorrhea (Puspitasari & Faudu, 2018).

According to a previous study conducted by Sandeep Kaur (2014), Core Strengthening Exercise can be used as an alternative therapy to alleviate menstrual pain. Sandeep Kaur suggests that Core Strengthening Exercise can strengthen the abdominal muscles, minimizing the pain caused by uterine contractions during menstruation.

Based on the researcher's assumption, Core Strengthening Exercise can reduce menstrual pain in female university students because it is an effective exercise in reducing menstrual pain intensity. It can also be safely used as an alternative therapy to alleviate dysmenorrhea. The average menstrual pain score before and after treatment showed a

Slow Stroke Back Massage Demonstrates Greater Efficacy Compared to Core Strengthening Exercises in Reducing Dysmenorrhea among Female University Students

difference of 3.293 with a p-value of 0.001, indicating that Core Strengthening Exercise has an impact on reducing menstrual pain. This exercise involves five movements repeated three times each, activating the core muscles, dilating blood vessels, and increasing blood flow to all organs, including the uterus, resulting in reduced menstrual pain. Regular Core Strengthening Exercise can maintain pelvic stability and enhance core muscle strength. Exercise can stimulate the release of endorphins, reducing the degree of dysmenorrhea pain.

Table 7

Effectiveness of Slow Stroke Back Massage Combined with Core Strengthening Exercise in Reducing Dysmenorrhea in Female University Students

Variabel	N	Mean	SD	P value
<i>Slow Stroke Back Massage</i>	15	3,400	0,6949	0,000
<i>Core Strengthening Exercise</i>		1,780	0,5784	

Based on Table 7, after administering Slow Stroke Back Massage and Core Strengthening Exercise to 15 respondents, it is evident that both interventions led to a reduction in dysmenorrhea among female university students. The average menstrual pain score for female students after receiving Slow Stroke Back Massage was 3.400, while the average menstrual pain score after Core Strengthening Exercise was 1.780. There was a significant difference in the average menstrual pain between the two intervention groups, with an average difference of 1.62, and a p-value of 0.000, which is less than the significance level of 0.05. This rejection of the null hypothesis (Ho) suggests that there is a difference in the effectiveness of Slow Stroke Back Massage and Core Strengthening Exercise.

Slow Stroke Back Massage involves a technique of stroking the respondent's back skin in a circular motion for 10 minutes with 12-15 repetitions per minute. Proper massage can reduce pain perception and help alleviate muscle tension. According to a study by Mukhoirotin et al. (2020), titled "The Effect of Slow Stroke Back Massage on Primary Dysmenorrhea: Beta-Endorphin Levels, Interleukin-6, Tumor Necrosis Factor, and Pain Intensity," it was found that SSBM intervention can increase endorphin, IL-6, and TNF levels while decreasing pain intensity. This occurs because Slow Stroke Back Massage promotes the release of endorphins and inhibits the transmission of pain signals.

Based on the theory of endogenous opiates, where opiate receptors in the brain and spinal cord determine when the central nervous system activates morphine-like substances called endorphins and enkephalins in response to pain. The release of endogenous opiates can be stimulated by stimuli on the skin and muscles. Endorphins inhibit C fibers at pre- and post-synapses and delta A fibers in the dorsal horn while activating larger sensory nerve fibers (A-beta). As a result, pain signals entering the spinal cord are blocked, leading to a decrease in pain perception (Mukhoirotin et al., 2020).

The results of a study conducted at 'Aisyiyah University Yogyakarta by Puspitasari & Faudu (2018) showed that Core Strengthening Exercise led to a reduction in pain scores from 60.00 before the intervention to 35.00 after the intervention. This indicates the impact of Core

Strengthening Exercise on reducing menstrual pain in female students at 'Aisyiyah University Yogyakarta.

Based on the researcher's assumption, the implementation of Slow Stroke Back Massage and Core Strengthening Exercise has an impact on reducing dysmenorrhea in female students. After eight sessions of Slow Stroke Back Massage and Core Strengthening Exercise, a reduction in menstrual pain was observed through Visual Analogue Scale measurements. The decrease in menstrual pain is attributed to the effects of Slow Stroke Back Massage and Core Strengthening Exercise, which can reduce muscle tension, influence hormone regulation, and dilate blood vessels.

Core Strengthening Exercise can alleviate pain in female students with dysmenorrhea because it strengthens the muscles of the back, abdomen, and pelvis. Dysmenorrhea in women can be caused by lumbar instability, and if the lumbar muscles are weak, it can lead to pain in the abdomen, thighs, and back. Training the muscles around the lumbar area increases their strength, making them better prepared to maintain stability during menstruation.

Conclusion

This research can be concluded that the administration of core strengthening exercise is more effective than slow stroke back massage in reducing dysmenorrhea pain in female university students.

Declaration of conflicting interest

The authors declare that there is no conflict of interest in this work.

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