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The difference in the effectiveness of warm compress and active stretching exercise in reducing dysmenorrhea pain

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ABSTRACT

Introduction: Dysmenorrhea (menstrual pain) usually occurs at the beginning of menstruation, can be sharp, blunt, cyclic or persistent until the end of the menstrual phase and can last for several hours to one day.
Objective: This study aims to determine the difference in the effectiveness of warm compresses and active stretching exercises in reducing pain in dysmenorrhoea patients.
Method: The design of this study is an experimental method. Pre-test and post-test control group designs were the designs in this study. This study used 20 subjects, divided into two groups, in which the control group (n = 10) received a warm compress while the treatment group (n = 10) received an active stretching exercise. Interventions were given three times a week for four weeks. The sampling technique is simple random sampling. Pain biomarkers were measured by prostaglandin levels, while the pain was measured through a menstrual distress questionnaire (MDQ).
Results: The data analysis showed no difference in prostaglandin level in the control or treatment groups. In contrast, the MDQ value shows a significant value for both the control and treatment groups, with a mean value that is more significant in the treatment group.
Conclusion: Therefore, it can be concluded that active stretching exercise is more effective at reducing pain than warm compresses in dysmenorrhea.

Keywords: warm compress, active stretching exercise, dysmenorrhea, pain
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INTRODUCTION

Adolescence is a transition from childhood to adulthood. During this period, changes occur both in biological and physiological rapid, marked by the maturation of primary sex signs and secondary sex signs. The most notable changes in terms of maturity of the reproductive organs are marked by menstruation/menarche in women.[1] Menstruation is one of the signs in the maturation of reproductive organs, usually occurring in women at the age of 15-17 years.[2] Dysmenorrhea (pain during menstruation) usually occurs at the beginning of menstruation / first day, can be sharp, blunt, cyclic or persist until the end of the menstrual phase and can last for several hours to one day. Sometimes symptoms can last up to 72 hours. Other common symptoms are nausea, emotional changes, diarrhea, headaches.

The incidence of dysmenorrhea globally is reported to be very large, especially in Indonesia. The incidence rate is 55% and occurs in the age range of 15-17 years.[3,4] As many as 50-70% with symptoms such as cramps and pain in the pelvic area that can spread to the back to the legs, dizziness, fatigue, increased appetite, nausea, vomiting, and diarrhea. Cramps that occur will result in the release of inflammatory mediators into the systemic circulation, resulting in women experiencing increased uterine contractions, nausea, vomiting, and diarrhea that occurs in nearly 60% with primary dysmenorrhea.[5,6] Generally, dysmenorrhea interferes with the activities experienced by a woman and often results in activities being undertaken disrupted and sometimes stopped completely. Dysmenorrhea is the most commonly reported reproductive disorder and impacts functional activities.

Several studies showed that if a woman experiences dysmenorrhea and then does stretching movements focused on the abdominal area, the intensity of the pain can be lessened while increasing strength and elasticity of the pelvic muscles and spine[6]. A non-randomized study conducted by Anugraheni and Wahyuningsih (2013) compared a woman who had dysmenorrhea who actively performed stretching movements compared with women who had never done stretching exercises and had significant results in improving mood and increasing a person's functional activity.[7]

The etiology of primary dysmenorrhea is not yet fully understood but is generally related to the ovulatory cycle. Several factors are associated with the emergence of pain in primary dysmenorrhea, one of

which is a prostaglandin. Prostaglandin is a hormone that comes from the body, synthesized from essential acids. There are two types of prostaglandins: PGE2 and PGF2α, each binds to 2 aliphatic chains. Prostaglandins and their PGE2 and PGF2α particles, synthesized from arachidonic acid, are derived from the hydrolysis of phospholipid membrane cells by the enzyme lysosomal phospholipase A2. Arachidonic acid is synthesized via cyclooxygenase or lipoxygenase[8]. PGF2α is the derivates of arachidonic acid metabolism by the enzyme cyclooxygenase, which causes vasoconstriction and contraction of the myometrium, causing ischemic pain. PGF2α and PGE2 have a high ratio in endometrium and menstrual blood in women who experience primary menstrual pain (primary dysmenorrhea). However, PGF2α and PGE2 have the opposite effect, where PGF2α has the function to stimulate contractions of the uterus during all phases of the menstrual cycle. Meanwhile, PGE2 can inhibit myometrial contractility during menstruation and stimulate it during the proliferative and luteal phases. Research on the relationship of prostaglandins with the appearance of pain during menstruation has not been done much, so it is very necessary to do the research, which can then be used in the management of pain during menstruation.

MATERIALS AND METHODS

Study design

The design of this study was an experimental study with a randomized pre-test and post-test group control design. Group 1 was given intervention in the form of Active Stretching Exercise, and group 2 as a control group was given intervention in the form of warm water compress.

Place and Time

The study was conducted at the Biochemistry Laboratory of the Faculty of Medicine, Udayana University, for four months, beginning August to September 2017. Therapeutic interventions for each study sample were conducted three times a week for four weeks.

Populations and Samples

The target population for this study was female students with primary dysmenorrhea. The affordable population in this study were female students in semester I and semester III Physiotherapy Study Program, Faculty of Medicine, Udayana University, who had primary dysmenorrhea. Based on sample calculations, the minimum sample needed in this study was 9 participants. The number of study participants was added by 10% to become 10 participants in each treatment group to anticipate the subject drop-out.

Research procedure

The two groups were both measured for pain using the Menstrual Distress Questionaire in the pre-test and post-test. The subject gives answers to each parameter. Before measuring the pain level, subjects were given an explanation of the Menstrual Distress questionnaire. Subjects were asked to answer several questions with criterion values: never, rarely, sometimes, often, always. Then, when the pain appeared, the blood was taken from each respondent to measure prostaglandin levels.

Procedure for Warm Water Compress Implementation

Warm compresses are applied to the front and side of the abdomen and back. This intervention was carried out 3 times a week for 4 weeks with a duration of 15 minutes per session.

Procedure for Implementing Active Stretching Exercise

Active stretching exercise is applied through the movement of stretch paint, lower trunk rotation, buttock hip stretch, abdominal strengthening (curl up), and bridging. Each movement is held for 20 seconds and repeated three times. This intervention was carried out three times a week for four weeks.

RESULTS

Subject Baseline Characteristics

Table 1 above describes the sample characteristics based on sex and age. The total number of samples in the control group and the treatment group is 20 peoples

Prostaglandin Decrease Test Mean Difference Before and After Intervention in the Control and Treatment Groups. The test results are listed in Table 3.

Comparison of Prostaglandin Level between Groups

Based on Table 2, the results of a decrease in prostaglandin values were analyzed by Wilcoxon sign rank test before and after intervention in the control group with a value of p = 0.241 or p> 0.05, which means that there was no significant difference in the decrease in prostaglandin level before and after the intervention.

Table 1. Gender distribution of the research subjects.

CHARACTERISTICS	CONTROL GROUP (n=10) *f* (%)	TREATMENT GROUP (n=10) *f* (%)
GENDER (%)		
WOMEN	10(100)	10(100)
AGE (year)		
Mean ± SD	19.60±0.516	19.50±0.527

Table 2. The Results of Prostaglandin Value Analysis with the Wilcoxon Sign Rank Test Data

Data of Groups	P value
Control groups	0.241
Treatment groups	0.093

Evaluating the Effect of Warm Compress and Active Stretching between The Research Groups

Based on Table 3 shows a decrease in MDQ values analyzed by paired sample t-test before and after the intervention in the control group with a value of p = 0.002 or p <0.05, which means that there was a significant difference in the decrease in MDQ values before and after giving warm water compresses. Likewise, in the treatment group, p = 0.000 or p <0.05 was obtained, which means a significant difference in the decrease in MDQ values before and after administration of active stretching exercise.

Post-Test Difference Test For MDQ Impairment Before And After Intervention Between Control And Treatment Groups

The Comparison Of MDQ Post-Test Impairment Between Before And After The Intervention In The Two Groups That Were Given Warm Water Compress Intervention In The Control Group And The Active Stretching Exercise Intervention In The Treatment Group Was Tested With Independent Sample T-Test. The Test Results Are Listed In The Following Table 4.

Table 4 shows the calculations regarding the difference in mean impairment of MDQ values , i.e., p = 0.004 or p <0.05, between the two intervention groups. This indicates that there are significant differences between the two pieces of training.

Table 3. MDQ Value Analysis Results with Paired Sample t-test.

Data Group	Before intervention	after intervention	P-value
	Mean±SD	Mean±SD	
Control groups	86.7±3.23	79.00±3.40	0.002
Treatment groups	87.40±4.55	72.00±6.83	0.000

Table 4. Comparison between MDQ value between Groups in Pre-Intervention and Post-Intervention

	Data groups	Mean±SD	P-value
Pre-Test	Control groups	86.70±3.23	0.696
	Treatment groups	87.40±4.55	
Post-Test	Control groups	79.00±3.40	0.010
	Treatment groups	72.00±6.83	
Difference	Control groups	7.70±5.67	0.004
	Treatment groups	15.40±4.86	

DISCUSSION

The warm water compress decreased MDQ values were analyzed by paired sample t-test before and after intervention in the control group with p = 0.002 or p <0.05, which means a significant difference in the decrease in MDQ values before and after giving warm water compresses. The results of this study were supported by Anugraheni and Wahyuningsih and Dahlan and Syahminan, who stated that giving warm water compresses can reduce pain in dysmenorrhea.[7,9] In addition, Lowdermilk *et al.* explain that dysmenorrhoea pain can be reduced by non-pharmacological therapy in the form of warm compresses because it provides a sense of security for patients by using fluids or devices that cause warmth in parts of the body that need it.[10] The results in the heat transfer to the stomach so that the compressed stomach becomes warm, there is a dilation of blood vessels in the area that is experiencing pain and increased blood flow in the area so that the perceived dysmenorrhoea pain will decrease or disappear. According to Lowdermilk *et al.,* non-pharmacological arm compresses are very beneficial in reducing dysmenorrhoea pain.[10] Muscle relaxation occurs and reduces uterine ischemia so that pain can be reduced. Active stretching exercise also decreased MDQ values. It was analyzed by paired sample t-test before and after intervention in the control group with a value of p = 0,000 or p <0.05, which means significant differences in the decrease in MDQ values before and after administration of active stretching exercise.

The results of this study support the theory conveyed by Maidartati et al., which states that active stretching exercise can increase muscle strength while increasing joint mobility and flexibility of the muscle; when muscle groups are given stretching, then stretch reflex works automatically to contract by stretching the muscles to protect it from excessive stretching, the reflex that occurs in the Golgi tendon will be activated and inhibit tension by relaxation through muscle lengthening when there is increased tension (tension) in the muscle group.[11]

According to Bobak, women with dysmenorrhea who have warm compresses when experiencing dysmenorrhea respond by vasodilation from target specific tissues such as muscles, which is the mechanism performed when giving warm compresses to the body[12]. Where the body will respond by sending signals to the hypothalamus, the hypothalamus has an important role in controlling bodily functions, including the release of hormones from the pituitary gland and homeostasis function of the body, when the hypothalamus responds to signals from the internal environment in the form of temperature changes the effector gives signals to the body in the form of dilation of blood vessels (vasodilation) which is regulated by the vasomotor system that is in the medulla oblongata under the control of the hypothalamus so that vasodilatation of the tissue occurs, the mechanism will affect the connective tissue such as muscles to relax in certain muscle groups. However, the effect produced on the warm compress

is pseudo only about 10-20 minutes after using the warm compress. The target-specific tissue will experience increased back pain is a drawback of a therapy for some cases related to connective tissue such as muscles, ligaments, and tendons.

From the results of this study it can be concluded that, the two interventions have different results in which active stretching exercise has more effective and significant results in reducing dysmenorrhea pain by working targets to reduce muscle tension caused by the release of substance P produced by the brain with a mechanism muscle lengthening of the golgi tendon. Decreased muscle mobility due to reduced physical activity causes changes in the muscle structure. It can change the pain receptors produced by a particular muscle group so that it causes motion limitations due to increased muscle stiffness. Mobility of a specific muscle group can be improved through various therapies and rehabilitation, such as active stretching, passive stretching or some other exercise therapy. Based on the results of studies on active stretching exercise and warm compresses have the advantage of reducing the level of pain produced by muscle tension.[12,13] However, active stretching exercise has the advantage of actively influencing changes in muscle length and tendons which will overall affect changes in anatomy, physiology and biomechanics which will result in biomechanical function in joints and tissue metabolism and active mobilization will affect the movement of primary muscles in the body involved in the mobility of a muscle particle.[14] Meanwhile, warm compresses do not cover the results and the mechanism produced by the active stretching exercise. Still, rather short-lived results are more generated by the mechanism of the warm compresses.

Based on the results of previous studies and studies, it can be concluded that the reduction in pain levels can be achieved significantly by both types of therapy through the components that have been described. However, active stretching exercise is more effective in reducing pain compared to warm compresses because several important components are involved and successfully obtained during the implementation of vigorous stretching exercise, which is very useful and applied in cases of primary dysmenorrhea.

CONCLUSION

Based on the results of this study, it can be concluded both compresses warm water or provision of active stretching exercise is effective in reducing pain in dysmenorrhoea. Active stretching exercise is more effective in reducing pain than warm water compresses in dysmenorrhoea. For the future study, we recommended assessing other therapy to compare with active stretching exercise, which can be used to reduce pain in dysmenorrhea

CONFLICT OF INTEREST

All authors declared that there is no conflict of interest regarding this article.

AUTHOR CONTRIBUTION

All authors contributed equally to the research process and the writing of this article.

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ETHICS APPROVAL

This research was ethically approved with ethical clearance number 1734/UN14.2.2.VII.14/LT/2020.

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