Scientific Foundation SPIROSKI, Skopje, Republic of Macedonia
Open Access Macedonian Journal of Medical Sciences. 2022 Oct 02; 10(B):2230-2235.
https://doi.org/10.3889/oamjms.2022.10915
eISSN: 1857-9655
Category: *B - Clinical Sciences*
Section: *Gynecology and Obstetrics*

Effect of Yoga on Dysmenorrhea in 6th Grade Elementary School Students at Rusunawa Health Center: A Quasi-Experimental Study

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Edited by: Sasho Stoleski
Citation: Nuryaningsih N, Rosyati H. Effect of Yoga on Dysmenorrhea in 6th Grade Elementary School Students at Rusunawa Health Center: A Quasi-Experimental Study. Open Access Maced J Med Sci. 2022 Oct 02; 10(B):2230-2235. https://doi.org/10.3889/oamjms.2022.10915
Keywords: Dysmenorrhea; Pain duration; Pain intensity; Yoga
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E-mail: nuryaningsih@umj.ac.id
Received: 06-Sep-2022
Revised: 18-Sep-2022
Accepted: 20-Sep-2022

Funding: This study was supported by Universitas Muhammadiyah Jakarta
Competing Interests: Each author declares that she has no commercial associations (e.g., consultancies, stock ownership, equity interest, and patent/licensing arrangement) that might pose a conflict of interest in connection with the submitted article.

Abstract

BACKGROUND: From 35 elementary school students in Marunda, 23 students (65.7%) had primary dysmenorrhea. Dysmenorrhea can interfere with student learning activities and concentration. Interventions need to be given so that students can increase their productivity and learning achievement.

AIM: This study aims to analyze the effect of yoga on dysmenorrhea in 6th grade elementary school students at Rusunawa Health Center.

MATERIALS AND METHODS: This study used a quasi-experimental approach with a non-equivalent control group design. The yoga group was given yoga practice for 3 months of the menstrual cycle. The sample consisted of 33 students in the yoga group and 33 students in the control group. Dysmenorrhea pain intensity was measured by Wong Baker Pain Rating Scale. Statistical tests used were Friedman test, Mann–Whitney test, and Ordinal Regression test.

RESULTS: There was a significant difference in pain duration and pain intensity of dysmenorrhea in the past 3 months in the yoga group ($p < 0.001$). There was a significant difference in pain duration and pain intensity of dysmenorrhea between the yoga group and control group on the measurements in the 2nd month ($p = 0.009$; $p < 0.001$) and the 3rd month ($p < 0.001$; $p < 0.001$).

CONCLUSIONS: Yoga had a significant effect in reducing the pain duration and pain intensity of dysmenorrhea in 6th grade elementary school students at Rusunawa Health Center. Midwives can educate elementary school students and young women in the working area of Rusunawa Health Center to use yoga as an alternative therapy to reduce dysmenorrhea.

Introduction

Dysmenorrhea threatens the quality of life of adolescent girls. Menstruation that occurs in adolescent girls shows normal reproductive organ maturity. Some may experience menstrual pain during menstruation. Unbearable pain that occurs shortly before or at the start of menstruation (the 1st day to several days during menstruation) is known as dysmenorrhea. Among adolescents, the most common dysmenorrhea is primary dysmenorrhea [1].

Symptoms are lower abdominal pain that can radiate to the lower back and legs. This condition often hampers daily activities and even causes the inability to move for 1–2 days each month during menstruation [2]. In a state of severe pain, it can force adolescents to stop the activity; they are doing or force a break for some time or several days. Some have nausea, vomiting, headaches, backaches, diarrhea, and severe cramps and require absences from work or school [1], [2]. This also has an impact on the decline in learning achievement for young girls at school age.

In the world, there are 60–75% of adolescents who experience primary dysmenorrhea [3]. The incidence of dysmenorrhea in adolescents in Asia is 74.5%. In Hispanic adolescent girls, the prevalence of dysmenorrhea is 85%. The incidence of dysmenorrhea in Indonesia is 55% [4]. This fact shows that primary dysmenorrhea in women, especially adolescent girls, is high both in the world and nationally.

Primary dysmenorrhea is a natural process that cannot be prevented but can be overcome. There are many simple ways to deal with dysmenorrhea including warm baths, warm compresses, light exercise, and adequate sleep [1], [2]. Many methods have been developed to treat dysmenorrhea. Yoga is an alternative in overcoming dysmenorrhea non-pharmacologically offered. The results of a 2018 meta-analysis found Yoga to be an alternative to overcome dysmenorrhea [5]. Yoga is believed to be able to discipline the body before training the mind to reach a higher level of consciousness [6]. This shows that a simple way is still an alternative to overcome primary dysmenorrhea.

Based on the preliminary study in September 2020, it was found that 23 of 35 (65.7%) elementary school students in Marunda had primary dysmenorrhea.

Interventions need to be given to reduce dysmenorrhea in elementary school students so that they can increase productivity and learning achievement. This study aims to analyze the effect of yoga on dysmenorrhea in 6th grade elementary school students at Rusunawa Health Center, North Jakarta.

Materials and Methods

This study used a quasi-experimental approach with a non-equivalent control group design. In this study, two groups were involved, namely, the yoga group and control group. In the yoga group, measurements were taken before being given yoga practice (pre-test) and after it (post-test). The control group was not given yoga practice, but pre-test and post-test measurements were still carried out. This study analyzed the effect of giving yoga on dysmenorrhea by comparing the difference in the average post-test scores between the yoga group and control group for 3 months of the menstrual cycle. This study was conducted at Rusunawa Health Center from June to August 2021. It was not conducted in schools due to the implementation of online learning during the COVID-19 pandemic.

Research procedure

The 6th grade elementary school students who were in the two schools were divided into the yoga group and control group. Each group was evaluated for three menstrual cycles. In the first cycle, no method was presented, subjects were only asked to fill out a questionnaire during menstruation so that they could calculate the length of pain from beginning to end in hours and pain intensity. In the 2nd and 3rd month of the menstrual cycle, the yoga group was given yoga practice and asked to fill out a questionnaire during menstruation, the control group was only asked to fill out a questionnaire during menstruation.

The subjects in the yoga group were taught by a yoga trainer about each yoga movement (Lotus Pose, Embryo Pose, Cobra Pose, Wind Relieving Pose, Reclined Spinal Twist and Total Relaxation). Subjects were asked to perform yoga movements for 14 days of the menstrual cycle in 20 min/day, which could be done in the morning before breakfast or before lunch or before dinner (at least 3 h after a regular meal or 2 h after a light meal). Each subject in the yoga group received a booklet with an explanation of each movement and way of breathing. The booklet that was distributed describing the yoga movements was specially designed for this study.

Population and sample

Population was all students of the two schools (SDN Marunda 05 and SDN Marunda 02) who came to visit Rusunawa Health Center. Sample consists of 33 students in the yoga group and 33 students in the control group. This study used a consecutive sampling technique. All subjects who came and met the inclusion criteria were included in the study until the required number of subjects was met. The inclusion criteria of this study were female students who were willing to be research subjects approved by their parents, had regular monthly menstruation, experienced primary dysmenorrhea, and did not take drugs to reduce dysmenorrhea. The exclusion criteria of this study were students who did not follow the yoga practice completely in the yoga group.

Research instruments

The pain intensity of dysmenorrhea was measured by Wong Baker Pain Rating Scale, which is a linear scale that visually describes the gradation of pain levels that a patient may experience. This scale (Figure 1) consists of six facial features ranging from “no hurt” (happy face) to “hurts worst” (crying/sad face). This scale is more efficient for use in children who cannot describe the pain intensity with numbers [7].

Statistic test

Friedman test was used to determine the difference between pre-test and post-test scores in each group in the past 3 months. Mann–Whitney test was used to determine the difference in post-test scores between the yoga group and control group. Ordinal regression test was used to determine the effect of yoga on dysmenorrhea in 6th grade elementary school students at Rusunawa Health Center. The statistical test decision used a significant level of 5% (95% Confidence Interval).

Results

In pre-test, the majority of respondents in the yoga group experienced dysmenorrhea for 7–8 h (84.8%). However, in post-test 2, the majority of respondents no longer experienced dysmenorrhea (78.8%). Meanwhile, in the control group, there was no change during the past 3 months. There were even respondents who experienced dysmenorrhea for >72 h (3.0%). It is shown in Table 1.

Most respondents chose to do yoga with a combination of several positions (51.5%), such as cobra

Table 1: Pain duration and pain intensity of dysmenorrhea in the yoga group and control group

Dysmenorrhea	Yoga	Control
	n (%)	n (%)
Pain duration		
Pre-test		
7–8 h	28 (84.8)	26 (78.8)
10–24 h	5 (15.2)	4 (12.1)
24–72 h	-	2 (6.1)
>72 h	-	1 (3.0)
Post-test 1		
No Hurt	2 (6.1)	-
7–8 h	30 (90.9)	26 (78.8)
10–24 h	1 (3.0)	4 (12.1)
24–72 h	-	2 (6.1)
>72 h	-	1 (3.0)
Post-test 2		
No hurt	26 (78.8)	-
7–8 h	7 (21.2)	26 (78.8)
10–24 h	-	4 (12.1)
24–72 h	-	2 (6.1)
>72 h	-	1 (3.0)
Pain intensity		
Pre-test		
Hurts little bit	18 (54.5)	20 (60.6)
Hurts little more	11 (33.3)	5 (15.2)
Hurts even more	-	4 (12.1)
Hurts whole lot	1 (3.0)	2 (6.1)
Hurts worst	3 (9.1)	2 (6.1)
Post-test 1		
No hurt	2 (6.1)	-
Hurts little bit	30 (90.9)	20 (60.6)
Hurts little more	-	5 (15.2)
Hurts even more	1 (3.0)	4 (12.1)
Hurts whole lot	-	2 (6.1)
Hurts worst	-	2 (6.1)
Post-test 2		
No hurt	26 (78.8)	-
Hurts little bit	7 (21.2)	20 (60.6)
Hurts little more	-	5 (15.2)
Hurts even more	-	4 (12.1)
Hurts whole lot	-	2 (6.1)
Hurts worst	-	2 (6.1)

pose and total relaxation (4.5%), as well as lotus pose, embryo pose, wind relieving pose, and total relaxation (4.5%). It is shown in Table 2.

Table 2: Yoga positions performed by students

Yoga	n (%)
Position	
Lotus pose	6 (18.2)
Embryo pose	5 (15.2)
Cobra pose	-
Reclined spinal twist	1 (3.0)
Wind relieving pose	-
Total relaxation	4 (12.1)
Combined	17 (51.5)
Combined	
Lotus pose, embryo pose	2 (11.8)
Embryo pose, cobra pose	1 (5.9)
Embryo pose, wind relieving pose	1 (5.9)
Embryo pose, total relaxation	2 (11.8)
Cobra pose, total relaxation	3 (17.6)
Lotus pose, embryo pose, wind relieving pose	1 (5.9)
Lotus pose, embryo pose, total relaxation	2 (11.8)
Embryo pose, cobra pose, total relaxation	1 (5.9)
Lotus pose, embryo pose, wind relieving pose, and total relaxation	3 (17.6)
All positions	1 (5.9)

In the past 3 months, there was a significant difference in pain duration and pain intensity of dysmenorrhea in the yoga group ($p < 0.001$). The pain duration and pain intensity of dysmenorrhea decreased over time from June to August 2021. Meanwhile, there was no change in the control group in the last 3 months. It is shown in Table 3.

In post-test 1, there was a significant difference in pain duration of dysmenorrhea between the yoga group and control group ($p = 0.009$), as well as post-test 2 ($p < 0.001$). Likewise with the pain intensity of dysmenorrhea, there was a significant difference between the yoga group and control group in post-test 1 ($p < 0.001$) and post-test 2 ($p < 0.001$). It is shown in Table 4.

Table 3: Difference between pre-test and post-test means

Dysmenorrhea	Yoga		Control	
	Mean	p	Mean	p
Pain duration				
Pre-test	2.5	<0.001	2.0	1.00
Post-test 1	2.3		2.0	
Post-test 2	1.2		2.0	
Pain intensity				
Pre-test	2.7	<0.001	2.0	1.00
Post-test 1	2.1		2.0	
Post-test 2	1.2		2.0	

Ordinal regression test showed that yoga had a significant effect on pain duration and pain intensity of dysmenorrhea ($p = 0.028$; $p = 0.004$). It is shown in Table 5.

Table 4: Difference between yoga group and control group

Dysmenorrhea	Mean	p
Pain duration		
Pre-test		
Yoga	32.27	0.44
Control	34.73	
Post-test 1		
Yoga	29.67	0.009
Control	37.33	
Post-test 2		
Yoga	19.76	<0.001
Control	47.24	
Pain intensity		
Pre-test		
Yoga	33.77	0.90
Control	33.23	
Post-test 1		
Yoga	26.91	<0.001
Control	40.09	
Post-test 2		
Yoga	19.12	<0.001
Control	47.88	

Discussion

The results showed that there was a significant difference in pain duration and pain intensity of dysmenorrhea in the past 3 months in the yoga group ($p < 0.001$). The pain duration and pain intensity of dysmenorrhea decreased over time from June to August 2021. Meanwhile, there was no change in the control group in the past 3 months.

Table 5: Effect of yoga on dysmenorrhea in 6th grade elementary school students at Rusunawa health center

Dysmenorrhea	Std. Error	Wald	p
Pain duration	1.089	4.843	0.028
Pain intensity	1.067	8.526	0.004

The results also showed that there was a significant difference in pain duration and pain intensity of dysmenorrhea between the yoga group and control group in the 2nd month ($p = 0.009$; $p < 0.001$) and the 3rd month ($p < 0.001$; $p < 0.001$). Dysmenorrhea that occurs during menstruation can be natural/physiological if it occurs in a short time and can reach its peak within 44 h, but after 2 days, it will disappear (primary dysmenorrhea). However, it becomes unnatural/pathological when it turns into severe pain that interferes with activities and

requires further examination and medication (secondary dysmenorrhea) [8]. The cause of primary dysmenorrhea is unclear but is related to uterine muscle contractions (myometrium) and the main trigger for primary dysmenorrhea is the secretion of prostaglandins, body chemicals that can cause cramps or contractions [4]. Yoga is one of the non-pharmacological alternatives used to prevent dysmenorrhea. Yoga is a unique combination of movement that is beneficial for improving physical health and breathing and meditation that can provide peace of mind. Yoga movements can reduce the scale of pain during menstruation, because yoga can improve the function of the endocrine (hormonal) glands in the body, increasing blood circulation to all body cells and the brain. It removes toxins from the body (detoxification, reduces body, mind and mental tension, increases the number and size of blood vessels that circulate blood throughout the body, and increases blood volume so that oxygen can be distributed to blood vessels in the reproductive organs where vasoconstriction occurs during dysmenorrhea) [9].

Kirca and Celik (2021), involving 60 female students (30 intervention groups and 30 control groups), also showed that there was a significant difference in the pain levels of students between the first, second, third, and fourth measurements in the intervention group ($p < 0.001$). In the control group, there was no significant difference in the pain levels of students between the first, second, third, and fourth measurements ($p > 0.05$). Yoga can be used as an effective intervention in reducing menstrual pain in women with primary dysmenorrhea [10]. Other studies also support this, Julaecha *et al*. (2020) showed a decrease between before and after the intervention (5.8 vs. 4.0 vs. 2.7), and statistically, there was an effect of yoga movement on the decrease in dysmenorrhea ($p < 0.05$) [11]. Vianti (2018) states that yoga practice is more effective than distraction techniques (listening to Mozart classical music) in reducing pain during menstruation in students of SMAN 4 Pekalongan [12]. Lestari and Putri (2018) concluded that there were differences in the pain level during menstruation between the intervention and control groups [13]. Yonglitthipagon *et al*. (2017) found a significant difference in menstrual pain, physical fitness, and quality of life in the yoga group compared to the control group. A specially designed yoga program can be an alternative treatment for primary dysmenorrhea [14]. Yang and Kim (2016) found that the menstrual pain intensity score decreased significantly in the experimental group compared to the control group ($p < 0.001$). Yoga intervention can reduce menstrual cramps and menstrual disorders in female students with primary dysmenorrhea [15]. Manurung and Rahmalia (2015) found that there was a significant difference in pain scales before and after yoga, and yoga practice was effective in reducing pain during menstruation [16]. Dauneria and Keswani (2014) who conducted a study for 3 months also found that there was a significant decrease in dysmenorrhea symptoms in the yoga group. Yoga not only corrects the physiological imbalances in the body but also improves mental health with a deeper effect on the body. In addition, side effects from the use of analgesics can be prevented [17].

In Nag and Kodali (2013), it was also found that there was a significant decrease in pain felt after the yoga intervention in the study group ($p < 0.001$). About 83.3% of respondents from the study group reported no more pain and 11.66% reported mild pain. No reduction in pain was found in the control group. Meditation and yoga can be used as alternative therapies for primary dysmenorrhea in young students [18]. Likewise with research by Rakhshaee (2011) which found that there was a significant difference in pain intensity and pain duration between pre-test and post-test in the yoga group ($p < 0.05$). The study showed that compared to the control group, there were significant differences in pain intensity and pain duration in the yoga group ($p < 0.05$). Yoga reduced pain intensity and pain duration of primary dysmenorrhea. Yoga poses were a safe and simple treatment for primary dysmenorrhea [6].

In addition, a meta-analysis study by Kim (2019) also showed that compared to not practicing yoga, yoga intervention had a significant impact on reducing menstrual pain levels in women with the primary dysmenorrhea [5]. Yoga interventions have been shown to reduce prostaglandin and homocysteine levels and also stimulate the secretion of beta-endorphins which act as non-specific analgesics [19], [20], [21], [22], [23], [24], [25]. Ko *et al*. (2016) found a significant difference between the experimental and control groups regarding pain intensity and pain duration ($p < 0.05$), thyroid stimulating hormone ($p < 0.002$), follicle stimulating hormone ($p < 0.02$), luteinizing hormone ($p < 0.001$), and prolactin ($p < 0.02$) [26].

In Chien *et al*. (2013), as many as 30 women from the dysmenorrhea group and 30 from the control group completed the study. Homocysteine levels were higher in the dysmenorrhea group when compared to healthy controls before the yoga intervention ($p < 0.05$). There was a statistically significant difference in homocysteine levels between before and after 8 weeks of yoga training ($p < 0.05$). The yoga intervention was found to be associated with a reduction in the severity of dysmenorrhea and could be effective in lowering homocysteine levels after an 8-week intervention period. These observations suggest that yoga has a therapeutic effect on women by restoring endothelial function [25]. Homocysteine is known to increase oxidative stress in many tissues [27]. To understand the level of oxidative stress in dysmenorrhea women, the study of Sun *et al*. (2005) investigated and found, for the 1st time, that the predominance of oxidative stress induced by homocysteine plays an important role in the pathophysiological mechanism of dysmenorrhea symptoms [28].

According to medical theory, pain can be described as a spiral: pain-tension-fear-pain. The relaxation part of therapy affects tension, whereas

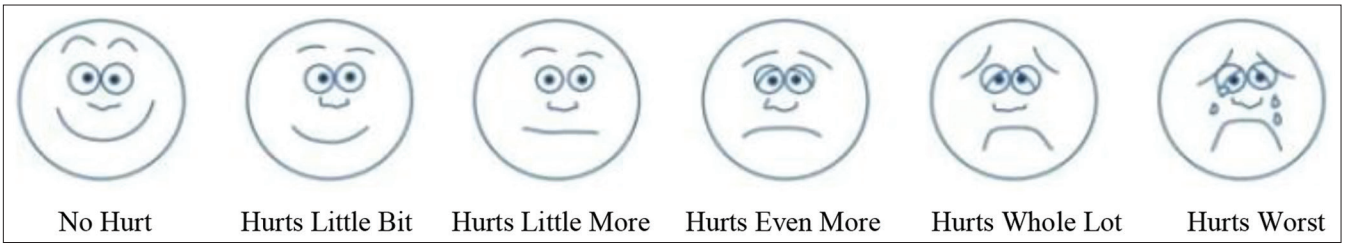

Figure 1: Wong Baker pain rating scale to measure dysmenorrhea pain intensity

suggestion affects fear. Yoga is believed to reduce pain by helping the brain's pain centers to regulate the control mechanisms located in the spinal cord and the secretion of natural painkillers in the body. The breathing exercises used in yoga can also reduce pain, because it can help the body to relax and reduce tension. Breathing awareness helps achieve calmer and slower breathing and aids in relaxation and pain management [29]. Yoga is increasingly being recommended for dysmenorrhea, premenstrual syndrome, and other disorders in premenopausal women, both in Europe and the United States [30], [31]. Therefore, yoga is practiced as part of an exercise program to improve general health, reduce stress, increase flexibility, strengthen muscles, and relieve certain physical symptoms, such as chronic pain [32].

Conclusions

Pain duration and pain intensity of dysmenorrhea in the yoga group decreased over time from June to August 2021. Meanwhile, in the control group, there was no change in the past 3 months. There was a significant difference in pain duration and pain intensity of dysmenorrhea between the yoga group and control group.

From this study, it can be concluded that yoga had a significant effect in reducing the pain duration and pain intensity of dysmenorrhea in 6th grade elementary school students at Rusunawa Health Center. Midwives can educate elementary school students and young women in the working area of Rusunawa Health Center to use yoga as an alternative therapy to reduce dysmenorrhea. The head of Rusunawa Health Center as an internal policy maker can also include yoga education in work program to improve the health of elementary school students and young women.

Acknowledgment

The authors would like to thank Universitas Muhammadiyah Jakarta for funding this research. This research is part of Hibah Internal Universitas Muhammadiyah Jakarta.

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