How to Cite:
Wahyuni, W., & Maghfiroh, F. K. U. (2022). The effect of deep breathing exercise in minimizing pain level of primary dysmenorrhea: Study at physiotherapy students of Universitas Muhammadiyah Surakarta. *International Journal of Health Sciences*, *6*(S3), 11745–11753. https://doi.org/10.53730/ijhs.v6nS3.8828

The effect of deep breathing exercise in minimizing pain level of primary dysmenorrhea: Study at physiotherapy students of Universitas Muhammadiyah Surakarta

W. Wahyuni
Physiotherapy Department, Faculty of Health Sciences, Universitas Muhammadiyah Surakarta, Indonesia
Email: wahyuni@ums.ac.id

Firya Khoirunisa Ulayya Maghfiroh
Physiotherapy Department, Faculty of Health Sciences, Universitas Muhammadiyah Surakarta, Indonesia

***Abstract*---**Dysmenorrhea is a lower abdomen pain during menstruation that can interfere with daily activities. Based on its pathophysiology, dysmenorrhea is classified into two, namely primary dysmenorrhea and secondary dysmenorrhea. The existence of physiotherapy modalities in the form of deep breathing exercises is one form that can reduce menstrual pain so that menstrual pain cannot interfere with daily activities. The purpose of the study is to find out the effect of deep breathing exercise on the reduction of primary dysmenorrhea pain. This research method is a quasi-experiment with one group pretest-posttest. The sample taken in the study amounted to 30 respondents using purposive sampling. The Wilcoxon test showed ($p = 0.00 < 0.05$) that it can be concluded that there is an effect of giving deep breathing exercises in the reduction of primary menstrual pain in physiotherapy students semester 1-5 University of Muhammadiyah Surakarta. There is an effect of giving breathing relaxation techniques to decrease primary menstrual pain (dysmenorrhea) in physiotherapy students semester 1-5 University of Muhammadiyah Surakarta

***Keywords*---**dysmenorrhea, deep breathing exercises, pain.

Introduction

Menstruation is a natural process that will occur in every woman, characterized by periodic discharge of blood. Menstruation occurs due to the thickening of the uterine wall or endometrium that is not fertilized periodically. The menstrual cycle usually occurs for 3-7 days and will repeat over 21 to 30 days. Menstruation can cause complaints and annoyance experienced, namely, dysmenorrhea or menstrual pain. Menstrual pain or dysmenorrhea is a condition of pain that is poorly felt in the lower abdomen, which is felt before and during menstruation so that it can interfere with daily activities. Dysmenorrhea comes from the Greek dysmenorrhea, consisting of "dys" means difficult, "meno" means moon, and "rrhea" means flow. Dysmenorrhea can be interpreted as impaired menstrual blood flow (Chauhan dan Kala 2012). Dysmenorrhea is a gynecological complaint due to an imbalance of the hormone progesterone in the blood resulting in pain that often occurs in women. Women who have dysmenorrhea produce ten times more prostaglandins than women who are not dysmenorrhea. (Ernawati, Hartiti, dan Hadi 2010)

The prevalence of dysmenorrhea globally is very large (WHO,2018). More than 50% of women in each country experience dysmenorrhea. In America, the presentation rate is about 60%; in Sweden, about 72%, and in the UK, a study states that 10% of advanced school teenagers appear to miss 1-3 days each month due to dysmenorrhea. (Chayati dan Naamah 2019). Based on its pathophysiology, dysmenorrhea is classified into two, namely primary dysmenorrhea and secondary dysmenorrhea. Primary dysmenorrhea is pain during menstruation with normal pelvic anatomy. It usually begins in a teenager, while secondary dysmenorrhea is menstrual pain associated with underlying pelvic pathology. (Bernardi et al. 2019). Primary dysmenorrhea is caused due to an excess or imbalance in prostaglandin (PG) secretion from the endometrium during menstruation; prostaglandins are potent myometrium stimulants and vasoconstrictors in the endometrium. During endometrial decay, endometrial cells release PGF2-alpha at the beginning of menstrual fertilization. PGF2-alpha stimulates myometrial contraction, ischemia, and sensitization of nerve endings. Dysmenorrhea is caused by prolonged uterine contractions and decreased blood flow to the myometrium. (Çelik dan Apay 2021)

According to the multidimensional scoring of andersch and Milsom pain, dysmenorrhea is classified into three types, namely mild, moderate, and severe. Mild dysmenorrhea is dysmenorrhea with a state of menstrual pain without any restrictions on daily activities or other activities. As usual, moderate dysmenorrhea is menstrual pain with slightly hampered. Severe dysmenorrhea is a condition of menstrual pain with severe limitations on daily activities or not being able to do activities as usual. Deep breathing exercise can stimulate the body to remove endogenous opioids so that a pain suppressor system is formed that will decrease primary dysmenorrhea. A deep breathing exercise that has a relaxing effect can also increase the formation of endorphins in the control system. Deep breathing exercises can make the patient more comfortable by making muscle relaxation (Trisnabari dan Wahyuni 2018). Researchers hope that a person who is experienced dysmenorrhea can be resolved easily using deep breathing exercise techniques. Researchers were interested in conducting a study

entitled "The effect of deep breathing exercise on the decline of primary dysmenorrhea" based on the exposure. Based on research (Çelik dan Apay 2021), deep breathing exercises are performed 3-5 times a day with repetitions as many as 5 times in a set of exercises. The purpose of the study is to find out the effect of deep breathing exercise on the reduction of primary dysmenorrhea pain.

Material and Method

The type of research used is *Quasy Experimental Design* research. The design of the approach to this study uses *one group pre-test - post-test design***.** This study was conducted by observing two times, namely before and after being given treatment. The group was observed before the intervention, then observed again after being carried out intervention (Sugiyono 2013). The population in the study was a student of the physiotherapy study program, faculty of health sciences. The sampling technique used is a *purposive sampling* technique. This sampling is based on a certain consideration based on the respondent criteria set by the researcher. Inclusion criteria in this study: Physiotherapy students semesters 1-5 who have dysmenorrhea complaints, 2) Study subjects with healthy conditions, 3) Willing to be respondents by filling *in informed consent,* 4) Not taking pain medication or potions, 5) unmarried, 6) regular menstrual cycles. Exclusion criteria in this study are 1) Have a pathological disease related to reproduction. Drop Out Criteria: not co-operative in following the research schedule, not completed in following the course of the research, and condition subjects that deteriorate during and after running the research

The variables tied to this study were *deep breathing exercise*s and the free variable in this study was dysmenorrhea. Dysmenorrhea is a painful menstrual condition with cramping and suffering conditions most often observed as abdominal and back pain. Generally, pain is experienced on the first day of the menstrual cycle. Many women experience dysmenorrhea, which is one of the most commonly encountered gynecological disorders. Dysmenorrhea pain is applied using NRS (numeric rating scale) (Çelik dan Apay, 2021). Deep Breathing is a breathing exercise with breathing techniques slowly and deeply. A deep breathing exercise maintains breath for 5-7 seconds and then exhales for 15-20 seconds. During exercise, the person needs to breathe slowly and deeply into the nose and exhale through the nose. (Çelik dan Apay, 2021)

This study was conducted for four weeks, starting from December 2021 to January 2022. This study has received approval from the Ethics Commission of Dr. Moewardi Regional General Hospital with the registered number 1.078 / XII / HREC / 2021. Data processing is carried out with the help of the SPSS 25 program. The statistical test used is a test of the influence of giving *deep breathing exercise*s on the reduction of dysmenorrhea pain with the *Wilcoxon test.* This test was conducted to determine the difference in influence between the treatment and control groups using the *Independent Samples Test*. All research tests use a software program system on a computer.

Results and Discussions

Based on the research that has been done, the following results are obtained:

Table 1
Data of Characteristics Respondents

Characteristics	Sub-group	F(%)
Age (years old)	18-19	18 (60.0)
	20-22	12 (40.0)
Body Mass Index	underweight	4 (13.3)
	Normal	18 (26.7)
	Overweight	2 (6.6)
	Obesitas	6 (20.0)
Menarche age (years old)	11-12	13 (43.4)
	13-15	17 (56.7)
Menstrual duration	<7 days	25(83.3)
	>7 days	5 (16.6)
Pain level	Mild	11 (36.6)
	Moderate	15 (50)
	severe	4 (13.3)

From table 1 above, respondents can be known based on the age of respondents ranging from the age of 18-19 years, amounting to 18 respondents (60%), and the age of respondents ranging from the age of 20-22 years, amounting to 12 respondents (40%). Respondents who have the idea of lean body mass amounted to 4 respondents (13.3%), normal amounted to 18 respondents (26.7%), overweight two respondents (6.6%), and obese six respondents (20.0%). Respondents who experienced the early age of menstruation or menarche in the age range of 11-12 years amounted to 13 respondents (43.4%), and the age range of 13-15 years amounted to 17 respondents (56.7%). Based on the long period of menstruation, respondents who had periods less than seven days amounted to 25 respondents (25.3%), and those younger than seven days amounted to 5 respondents (16.7%). Furthermore, based on the degree of menstrual pain, respondents who experienced mild pain amounted to 11 respondents (36.6%), moderate pain amounted to 15 respondents (50.0%), and severe pain amounted to 4 respondents (13.3%).

Table 2
Effect Test Results using *Wilcoxon test*

Group	Mean	*P*	Test Description
Treatment		.000	H_1 accepted
Pre-test	5.00		
Post-test	3.33		
Control		.100	H_1 rejected
Pre-test	4.60		
Post-test	4.60		

Based on table 2, the *Wilcoxon test for* the treatment group for deep breathing exercises obtained a test significance value (*p*) of 0.0001. That means H1 is accepted, or there is an influence of *giving deep breathing exercise* interventions to decrease menstrual pain or dysmenorrhea. While in the control group, a test significance value (*p*) of 0.100 and more significant than 0.05 was obtained so that the test decision was H_1 rejected, which meant that there was no significant effect in the control group that was not given *deep breathing exercise intervention.*

Table 3
Test Results Differing Influences of pre-test and post-test

Group	*P*	Test Description
intervention post-test - pre-test	.000	H_1 accepted
Control post-test- pre-test	Constant	the difference between post-test and pre-test is constant when group = control. It has been omitted.

Based on table 3, the Mann Whitney test obtained a p-value of 0.0001, which means there is a difference in influence between the treatment group given *deep breathing exercise* intervention and the control group without intervention. The average age of the respondents was 18 years old to 22 years old. The result was in line with Silaen et al. (2019), which said the prevalence of dysmenorrhea is 67% to 90% at a young age (17-24 years) and suggests that menstrual pain is tolerated by increasing age. The results of this study follow what is stated by Junizar (2011), Dysmenorrhea generally occurs at the age of 15–30 years and often occurs at the age of 15–25 years. In addition, at this age, there is also often an optimization of uterine nerve function that increases prostaglandin secretion, causing pain during menstruation or commonly called dysmenorrhea. Intan Arovah (2015), showed that respondents aged 21-25 years had a 0.013 times more frequent risk of primary dysmenorrhea than respondents aged 26-30 years.

The early age of menstruation or menarche in respondents was, on average, 11-15 years. Based on national surveys, the average age of adolescent girls in Indonesia is 12.96 years, with the prevalence of early menarche of 10.3% and late menarche of 8.8%. (Silaen, R. Ani, L. Putri 2019) It is argued that *menarche* early causes the reproductive apparatus has not functioned optimally and is not ready to face changes that cause *dysmenorrhea.* Researchers assume the age of menarche can affect respondents because the earlier the age of a person's menarche is also more often they are exposed to the pain felt so that one's experience of pain and one's experience of coping with the pain that is felt is better. Finally, someone considers pain is commonly experienced. There is a significant association between early childhood menarche and dysmenorrhea. Early menarche reflects that longer prostaglandin exposure plays a major role in dysmenorrhea and increased uterine contractions that cause pain (Penelitian dan Pengembangan Upaya Kesehatan Masyarakat, Litbangkes, dan Pimpinan Pusat Persatuan Ahli Gizi 2019).

This study found that respondents who had period lengths of 25-28 days had as many as 25 respondents with a percentage (83.3%). Respondents who experienced more than 28 days had as many as five respondents with a percentage (16.7%). In research (Larasati, T. A. dan Alatas 2016), higher menstrual lengths were found in adolescents who menstruated for seven days or more than those who menstruated for less than seven days. In theory, it is said that the more prolonged menstruation occurs, the more often the uterus contracts, resulting in more prostaglandins being excreted. Excessive prostaglandins will cause pain, and continuous contractions of the uterus alone can cause the blood supply to the uterus to stop so that dysmenorrhea occurs.

In this study, respondents had an average body mass index that was categorized as usual. The petite body mass index is 16.0, and the largest is 33.8. Nutritional status is said to be good if the necessary nutrients, protein, fat, carbohydrates, minerals, vitamins, and water, are used by the body. Malnutrition that is less or limited and affects growth and the function of the body's organs will also cause impaired reproductive function. Malnutrition will have an impact on menstrual disorders but improve when the nutritional intake is good (Fakultas et al. 2018)

A study conducted by Vlachou (2019) also showed that there were no significant differences in smoking, exercise, body mass index (BMI), and duration of the menstrual cycle in the mild, moderate pain, severe pain, and painless groups ($p > 0.1$). A study from Barcikowska (2020) states that there is no significant relationship between BMI and Dysmenorrhea ($p=0.271$). Underweight and overweight nutritional status when compared to normal nutritional status, the results are no meaningful relationship between nutritional status and dysmenorrhea (Penelitian dan Pengembangan Upaya Kesehatan Masyarakat et al. 2019). Based on the analysis of the data in the Table of the treatment group against the decrease in dysmenorrhea test significance value (p) of 0.000 and smaller than 0.05, the test decision is H_1 accepted. The provision of a deep breathing exercise intervention on pain reduction is carried out for one week, affecting reducing dysmenorrhea pain.

A deep breathing exercise is a breathing exercise with breathing techniques slowly and deeply, using the diaphragm muscle to allow the abdomen to lift slowly and the chest to expand fully (Mohamed EL Mokadem 2017). A deep breath can overcome pain based on the theory of reticular activation, which inhibits pain stimulus when a person receives sufficient or excessive sensory input, thus causing inhibition of pain impulses to the brain (pain is reduced or not felt by the client). A pleasant sensory stimulus will stimulate the secretion of endorphins so that the pain stimulus felt by the client becomes reduced. The relaxation of breath at work has the best effect for a short period of time. Overcome intensive pain lasts only a few minutes, for example, during the implementation of invasive procedures or while waiting for analgesic work.

In research (Indasari, Haniarti, dan Hengky 2020), He said that dysmenorrhea is a sour taste at the bottom during menstruation until it can interfere with daily activities. Indasari, Harniarti, And Henky's research showed that there was a difference in the reduction in the pain scale before the deep breathing relaxation technique and the deep breathing relaxation technique was carried out.

Compared, the control group obtained a test significance value (*p*) of 0.100 and more significant than 0.05, so the test decision was H1 rejected, which means that there was no significant influence on the control group that was not given breathing exercise intervention.
The results of statistical tests on the difference in the effect of intervention management in the treatment group and control group obtained *a p-value* of 0.000, where if the p < 0.05 is significant, it can be concluded that there is a decrease in pain before and after *deep breathing exercise*. As said by (Çelik dan Apay 2021), In his research, it was said that there was a difference in the level of pain in the group, and in the control group, there was no significant change. When the technique of relaxation of breath in sympathetic and increased activity in parasympathetic results in a decrease in heart rate, blood pressure, respiratory rate, dilation of peripheral vessels, muscle tension, and pain perception (Çelik dan Apay 2021). Trisnabari dan Wahyuni (2018) said that there is an influence on the provision of *deep breathing exercise*s on dysmenorrhea pain.

Conclusion

Giving breath relaxation techniques to reduce menstrual pain (dysmenorrhea) in physiotherapy students is an effect. Based on the conclusions of the study results, the authors suggest that students are expected to practice deep breathing relaxation techniques as a treatment effort to reduce menstrual pain so that it does not interfere with activities during menstruation.

References

Bernardi, Mariagiulia, Lucia Lazzeri, Felice Petraglia, Federica Perelli, dan Fernando M. Reis. 2019. "Dysmenorrhea and related disorders [version 1 ; peer review : 3 approved]." 6:1–7.

Çelik, Aslı Sis, dan Serap Ejder Apay. 2021. "Effect of progressive relaxation exercises on primary dysmenorrhea in Turkish students: A randomized prospective controlled trial." *Complementary Therapies in Clinical Practice* 42(November 2020):101280.

Chauhan, Madhubala, dan Jyoti Kala. 2012. "Relation between dysmenorrhea and body mass index in adolescents with rural versus urban variation." *Journal of Obstetrics and Gynecology of India* 62(4):442–45.

Chayati, Umi Nur, dan Lutfia Uli Na'mah. 2019. "Penerapan Kombinasi Pijat Effleurage dan Pemberian Air Kelapa Hijau terhadap Penurunan Nyeri Dismenore pada Remaja Putri Usia 13-15 Tahun." *The 10th University Research Colloqium 2019 Sekolah Tinggi Ilmu Kesehatan Muhammadiyah Gombong* 14–21.

Dan, Kualitatif. n.d. *sugiyono 2013*.

Ernawati, Tri Hartiti, dan Idris Hadi. 2010. "Terapi Relaksasi Terhadap Nyeri Dismenore pada Mahasiswi Universitas Muhammadiyah Semarang." *Prosiding Seminar Nasional* (18):106–13.

Fakultas, Mahasiswa, Kedokteran Universitas, Bagian Histologi, Fakultas Kedokteran, dan Universitas Baiturrahmah. 2018. "Hubungan Indeks Massa Tubuh dengan Kejadian Dismenore pada Mahasiswi Angkatan 2015 Fakultas Kedokteran Universitas Baiturrahmah Padang." 7–11.

Indasari, Nur, Haniarti, dan Henni Kumaladewi Hengky. 2020. "Efektifitas Pemberian Teknik Relaksasi Nafas Dalam Terhadap Penurunan Nyeri Haid (Dismenore) Pada Remaja Putri Asrama Tahfizh Pondok Pesantren Ddi Ad Mangkoso." *Jurnal Manusia dan Kesehatan* 3(2):199–2015.

Intan Arovah, Novita. 2015. "Program Latihan Fisik Rehabilitatif Pada Penderita Penyakit Jantung." *Medikora* (1):11–22.

Larasati, T. A., And, dan F. Alatas. 2016. "Dismenore Primer dan Faktor Risiko Dismenore Primer pada Remaja." *Majority* 5(3):79–84.

Mohamed EL Mokadem, Naglaa. 2017. "Cold Application and Breathing Exercises to Reduce Pain and Anxiety During Chest Tube Removal." *American Journal of Nursing Science* 6(4):285.

Penelitian dan Pengembangan Upaya Kesehatan Masyarakat, Pusat, Badan Litbangkes, dan Dewan Pimpinan Pusat Persatuan Ahli Gizi. 2019. "Usia Menarche Perempuan Indonesia Semakin Muda." *Jurnal Kesehatan Reproduksi* 10(2):163–71.

Silaen, R. Ani, L. Putri, W. 2019. "Prevalensi Dysmenorrhea Dan Karakteristiknya Pada Remaja Putri Di Denpasar." *Jurnal Medika Udayana* 8(11):1–6.

Trisnabari, Hindari Mernasantia, dan Wahyuni. 2018. "Manfaat Deep Breathing Exercise Terhadap Nyeri Haid Primer Pada Mahasiswi S1 Fisioterapi Universitas Muhammadiyah Surakarta." *The 7th University Research Colloqium* 755–61.

Bernardi, Mariagiulia, Lucia Lazzeri, Felice Petraglia, Federica Perelli, dan Fernando M. Reis. 2019. "Dysmenorrhea and related disorders [version 1 ; peer review : 3 approved]." 6:1–7.

Çelik, Aslı Sis, dan Serap Ejder Apay. 2021. "Effect of progressive relaxation exercises on primary dysmenorrhea in Turkish students: A randomized prospective controlled trial." *Complementary Therapies in Clinical Practice* 42(November 2020):101280.

Chauhan, Madhubala, dan Jyoti Kala. 2012. "Relation between dysmenorrhea and body mass index in adolescents with rural versus urban variation." *Journal of Obstetrics and Gynecology of India* 62(4):442–45.

Chayati, Umi Nur, dan Lutfia Uli Na'mah. 2019. "Penerapan Kombinasi Pijat Effleurage dan Pemberian Air Kelapa Hijau terhadap Penurunan Nyeri Dismenore pada Remaja Putri Usia 13-15 Tahun." *The 10th University Research Colloqium 2019 Sekolah Tinggi Ilmu Kesehatan Muhammadiyah Gombong* 14–21.

Dan, Kualitatif. n.d. *sugiyono 2013*.

Ernawati, Tri Hartiti, dan Idris Hadi. 2010. "Terapi Relaksasi Terhadap Nyeri Dismenore pada Mahasiswi Universitas Muhammadiyah Semarang." *Prosiding Seminar Nasional* (18):106–13.

Fakultas, Mahasiswa, Kedokteran Universitas, Bagian Histologi, Fakultas Kedokteran, dan Universitas Baiturrahmah. 2018. "Hubungan Indeks Massa Tubuh dengan Kejadian Dismenore pada Mahasiswi Angkatan 2015 Fakultas Kedokteran Universitas Baiturrahmah Padang." 7–11.

Indasari, Nur, Haniarti, dan Henni Kumaladewi Hengky. 2020. "Efektifitas Pemberian Teknik Relaksasi Nafas Dalam Terhadap Penurunan Nyeri Haid (Dismenore) Pada Remaja Putri Asrama Tahfizh Pondok Pesantren Ddi Ad Mangkoso." *Jurnal Manusia dan Kesehatan* 3(2):199–2015.

Intan Arovah, Novita. 2015. "Program Latihan Fisik Rehabilitatif Pada Penderita Penyakit Jantung." *Medikora* (1):11–22.

Larasati, T. A., And, dan F. Alatas. 2016. “Dismenore Primer dan Faktor Risiko Dismenore Primer pada Remaja.” *Majority* 5(3):79–84.

Mohamed EL Mokadem, Naglaa. 2017. “Cold Application and Breathing Exercises to Reduce Pain and Anxiety During Chest Tube Removal.” *American Journal of Nursing Science* 6(4):285.

Penelitian dan Pengembangan Upaya Kesehatan Masyarakat, Pusat, Badan Litbangkes, dan Dewan Pimpinan Pusat Persatuan Ahli Gizi. 2019. “Usia Menarche Perempuan Indonesia Semakin Muda.” *Jurnal Kesehatan Reproduksi* 10(2):163–71.

Silaen, R. Ani, L. Putri, W. 2019. “Prevalensi Dysmenorrhea Dan Karakteristiknya Pada Remaja Putri Di Denpasar.” *Jurnal Medika Udayana* 8(11):1–6.

Trisnabari, Hindari Mernasantia, dan Wahyuni. 2018. “Manfaat Deep Breathing Exercise Terhadap Nyeri Haid Primer Pada Mahasiswi S1 Fisioterapi Universitas Muhammadiyah Surakarta.” *The 7th University Research Colloqium* 755–61.

Rinartha, K., Suryasa, W., & Kartika, L. G. S. (2018). Comparative Analysis of String Similarity on Dynamic Query Suggestions. In *2018 Electrical Power, Electronics, Communications, Controls and Informatics Seminar (EECCIS)* (pp. 399-404). IEEE.

Suryasa, I. W., Rodríguez-Gámez, M., & Koldoris, T. (2021). Get vaccinated when it is your turn and follow the local guidelines. *International Journal of Health Sciences*, *5*(3), x-xv. https://doi.org/10.53730/ijhs.v5n3.2938

Amir, . F., Suhron, M., & Sulaihah, S. (2021). Family care model development in treating schizophrenia patients that have self-deficit nursing based system: Structural equation modeling analysis. International Journal of Health & Medical Sciences, 5(1), 7-14. https://doi.org/10.21744/ijhms.v5n1.1808