Original Article

doi:10.31674/mjn.2023.v15i01.009

MJN

Effectiveness of Yoga on Adolescent's Menstrual Pain and Quality of Life

Lorensia Panselina Widowati*, Justina Purwarini Acihayati

Sekolah Tinggi Ilmu Kesehatan Sint Carolus, Jakarta 10440, Indonesia

**Corresponding Author's Email: lorensiapw@gmail.com*

ABSTRACT

Background: Menstrual pain is a common gynaecological complaint due to an imbalance of progesterone. It may also affect the adolescent girl's quality of life. Physical and psychosocial problems such as abdominal cramps and fatigue during the menstrual period affect daily activities, social relationships, and the school's academic performance. Yoga, one of the non-pharmacological therapies, is a technique to reduce menstrual discomfort. **Aim:** This study aims to see the effectiveness of yoga on adolescents' menstrual pain and quality of life. **Methods:** a quasi-experimental study with a group pre-test and post-test design. Prior to receiving yoga therapy, all respondents took a pre-test to measure their level of menstrual pain and quality of life. The yoga therapy consists of once-a-week yoga exercises for six consecutive weeks. All respondents followed the post-test to evaluate the yoga therapy. **Results:** On the pre-test, 49.5% of respondents experienced mild pain, and 16.2% experienced severe pain. After doing yoga therapy, 19% of the respondents did not experience pain, 52.4% experienced mild pain, and no respondents experienced severe pain. There is an effect of yoga therapy on adolescents' menstrual pain (p value=0.0001). Meanwhile, 49.5% of respondents had low quality of life during the menstruation period. After yoga therapy, 48.6% of respondents feel low quality of life during the menstruation period. There is an effect of yoga on adolescents' quality of life during menstruation (p value=0.0001). **Conclusion:** Regular yoga is an effective and recommended way for adolescents to reduce menstrual pain and improve their quality of life during the menstruation period.

Keywords: Adolescent; Menstrual Pain; Quality of Life; Yoga

INTRODUCTION

Dysmenorrhea occurs during the menstrual period. The uterine muscles contract due to a prostaglandin increase. There are primary and secondary dysmenorrheas. Primary dysmenorrhea is menstrual pain without any pelvic pathology, which is the most common complaint in adolescents (Matthewman *et al.*, 2018). Secondary dysmenorrhea is defined as menstrual pain due to an underlying pelvic pathology (Chang & Chuang, 2012). Dysmenorrhea is classified as mild, moderate, or severe pain. Dysmenorrhea may lead to physical, mental, and social disturbances (Arakawa *et al.*, 2018). Menstrual pain affects adolescents' daily activities, followed by mood swings (Pal, Mandal & Poddar, 2023). Previous studies have shown that dysmenorrhea in teenagers causes disturbances in their school activities. These occurrences can have an impact on their social and economic lives (Hailemeskel, Demissie, & Assefa, 2016).

Based on WHO data, more than 50% of women of reproductive age experience menstrual pain (WHO, 2014). In Indonesia, there are 64.25% dysmenorrheic women. There are 60–70% of adolescents who experienced primary dysmenorrhea, of which three quarters suffered mild to moderate pain and a quarter felt severe pain (Rini & Nuryanti, 2021). Risk factors for dysmenorrhea include younger age, low body mass index (BMI), smoking, early menarche, long or irregular menstrual cycles, pelvic infection, psychological disorders, genetics, and a history of sexual violence (Unsal *et al.*, 2010). Dysmenorrhea makes adolescents have a lower quality of life (Ozerdogan *et al.*, 2009). Dysmenorrhea would create anxiety, insecurity, and emotional discomfort for adolescents. These feelings disturb adolescents, which causes their behavior problems. Therefore, the adolescent's menstrual pain should be maintained properly to prevent its negative effects on the teenager's behavior (Widiyanti, 2016).

There are two main ways to reduce an adolescent's menstrual pain. The first is the pharmacological method. Analgesics, non-steroids, and hormonal therapy are the pharmacological treatments. The second is the non-

Received: December 9, 2022; Received in revised form: April 28, 2023; Accepted: June 8, 2023

pharmacological method, which includes yoga exercises, massages, and warm compresses (Khusnul, 2019). These two treatments assist women in reducing their menstrual pain.

Yoga is an exercise that consists of breathing, stretching movements, and relaxation techniques to increase body and mind strength. Some yoga poses, such as upavistha konasana, buddha kosana, janu sirsana, suptha baddha kosana, and madhasana, relieve, release, and reduce the intensity of menstrual pain (Manurung, 2015). Yoga balances sympathetic nerve function and increases endorphins through vagal activity (Prabhu *et al.*, 2019). Regular yoga activity heightens β-endorphin levels, which relieve pain, sharpen memory, increase sexual ability, and improve breathing, blood pressure, and appetite (Suryanti, 2020).

This study aims to see the effectiveness of yoga on adolescents' dysmenorrhea and quality of life.

METHODOLOGY

The researchers conducted a quasi-experimental study, designing a pre-test and post-test in one group. The variables' values before and after the experiment were compared. This research was conducted in Jakarta. The sample size for this research was 105 female students. The research inclusion criteria are 15–19-year-old teenage girls who experienced menarche, are physically and mentally healthy, and give consent for participating in this research.

Prior to treatment, all respondents were measured for their menstrual pain and quality of life. The research used the Numeric Rating Scale and Pediatric Quality of Life Inventory (PedsQL) Version 4.0 Teen Report (ages 13–18) to assess the intensity of menstrual pain and the level of quality of life (Varni, 2023). Then the respondents were provided with a thirty-minute yoga exercise once a week for six consecutive weeks. After the intervention was concluded, an evaluation of the respondents was conducted. The research data were analyzed using the Mann-Whitney and Wilcoxon Signed Rank Test (Harris & Hardin, 2013; Aiyegbusi, Adeagbo, & Uwem-Umoh, 2020).

Ethical Consideration

The research obtained an ethical clearance permit from The Health Research and Development Ethics Commission of STIK Sint Carolus on 1st April 2022 with reference number 055/KEPPKSTIKSC/IV/2022.

RESULTS

Table 1 shows the characteristics of the respondents. There were 81.9% of respondents under the age of 16. 96.1% experienced their menarche at the age of 10–15 years old. However, there were those who had menarche at less than 10 years old. Most of them (91.4%) had a good menstrual cycle (21–35 days).

More than half (54.3%) of the respondents had a normal BMI. Meanwhile, 35.2% of respondents had an underweight BMI, and 10.5% had an overweight BMI. The respondents performed various therapies during the menstruation period. For reducing pain, almost half of the respondents slept (49.5%), while others took relaxation (21.9%), herbal drinks (15.2%), and other therapies (13.3%). About 55.2% of respondents had a sport habit, and 62.9% had done yoga. For about 6 weeks of yoga exercise intervention, the adherence level of the participants was 94.3%.

Table 1: Respondent's Characteristic

Respondent's Characteristics	N	%
Age		
15	3	2.9
16	86	81.9
17	16	15.2
Menarche Age		
<10	4	3.9
10-15	101	96.1
Menstrual Cycle		
< 21 days	1	1.0
21- 35 days	96	91.4
>35 days	8	7.6

BMI		
Underweight	37	35.2
Normal	57	54.3
Overweight	11	10.5
Menstrual Therapy		
Herbal drink	16	15.2
Relaxation	23	21.9
Sleeping	52	49.5
Other	14	13.3
Sport Habits		
Yes	58	55.2
No	47	44.8
Yoga		
Ever	66	62.9
Never	39	37.1
Yoga Exercise Adherence		
Comply	99	94.3
Not Comply	6	5.7
Total	**105**	**100**

Table 2 shows the level of menstrual pain before and after treatments. Prior to yoga therapy, 49.5% experienced mild pain, and 16.2% experienced severe pain. After the yoga therapy concluded, the respondents replied that 19% had no pain, 52.4% had mild pain, and none of the respondents had experienced severe pain.

Table 2: Frequency Distribution of Respondents Based on Menstrual Pain Before and After Yoga Intervention

Variable	**Before Yoga**		**After Yoga**	
	N	**%**	**N**	%
No Pain	3	2.9	20	19.0
Mild Pain	52	49.5	55	52.4
Moderate Pain	33	31.4	30	28.6
Severe Pain	17	16.2	0	0
Total	105	100	105	100

This research performed the PedsQL questionnaire, measuring the quality-of-life in low and high score categories based on the mean values as the cut-off point. The researchers implemented the Kolmogorov-Smirnov Test as the research data normality test. Afterward, the data on the quality of life before yoga therapy was normally distributed (p value $0.2 > 0.05$). On the other hand, the data on the quality of life after yoga therapy was not distributed normally (p value $0.0001 < 0.05$). Consequently, the cut-off points for measuring the quality-of-life prior to yoga therapy were mean values. The cut-off points for the quality of life after yoga therapy were median values. Table 4 shows the slight decrease in data before (49.5% respondents) and after (48.6% respondents) yoga therapy on low quality of life.

Table 3: Frequency Distribution of Respondents Based on Quality of Life Before and After Yoga Intervention

Quality of Life	**Mean**	**Median**	**SD**	**Min**	**Max**
Quality of life before yoga	72.43	73.91	14.59	40.22	100
Quality of life after yoga	77.59	80.43	13.03	45.65	100

Table 4: Frequency Distribution of Respondents Based on Quality of Life Before and After Yoga Intervention

Quality of life	Before yoga		After yoga	
	n	%	n	%
Low	52	49,5	51	48.6
High	53	50,5	54	51.4
Total	105	100	105	100

Table 5 describes 50 respondents who experienced a decrease in menstrual pain, 7 respondents experienced an increase in menstrual pain, and 48 respondents did not experience any change in menstrual pain after the yoga therapy intervention. Based on the respondent's data, who experienced a decrease in menstrual pain, the pain mean values decreased by 29.77. Afterwards, according to the respondent's data, who experienced an increase in menstrual pain, the pain mean values increased by 23.50. The data indicates that the Z score is -5,638 (*p* value 0.0001), which concludes that there is an effect of yoga therapy on menstrual pain in adolescent girls.

Table 5: Analysis of the Effect of Yoga on Menstrual Pain in Adolescent Girls

Effect of Yoga on Menstrual Pain		n	Mean Rank	Sum of Ranks	Z	*P* value
Menstrual pain after yoga - Menstrual pain before yoga	Negative ranks	50[a]	29.77	1488.50	-5.638	0.0001
	Positive ranks	7[b]	23.50	164.50		
	Ties	48[c]				
	Total	105				

Table 6 describes 66 respondents who had an increasing quality of life. Its mean score increased by 49.61. There were 16 respondents who said their quality of life had not changed before or after the yoga therapy. Subsequently, there were 23 respondents who had a decreasing quality of life. Their mean values decrease by 31.20 in quality of life. Based on the analysis, there is an effect of yoga therapy on the quality of life for adolescent girls (Z score -5.261; *p* value 0.0001).

Table 6: Analysis of the Effect of Yoga on the Quality of Life in Adolescent Girls

Effect of Yoga on the Quality of Life		n	Mean Rank	Sum of Ranks	Z	*P* value
Quality of Life after yoga- Quality of Life before yoga	Negative ranks	23[a]	31.20	717.50	-5.261	0.0001
	Positive ranks	66[b]	49.61	3287.50		
	Ties	16[c]				
	Total	105				

DISCUSSION

Most respondents to this research were middle-aged adolescents experiencing puberty. Puberty is a series of events that lead to sexual maturity, including accelerated growth, skeletal maturation, the development of sexual characteristics, and fertility. Menarche is the sign of puberty in adolescents (Wulandari *et al.*, 2018). The prevalence of dysmenorrhea in Indonesia is 64.25%, and the primary dysmenorrhea's initial onset usually occurs within 6 to 12 months after menarche and follows with 8 to 72 hours of pain (Larasati & Alatas, 2016).

Based on the national survey, the average menarche age for adolescent girls in Indonesia is 12.96 years. Women who had menarche age under 12 years have a 23% higher possibility of experiencing dysmenorrhea. The possibility is high because of the prolonged exposure to prostaglandins that cause abdominal cramps and pain (Larasati & Alatas, 2016). Research on high school students in Kendari also showed a relationship between the early age of menarche and the incidence of dysmenorrhea. The reproductive organs have not developed optimally at that age. The cervix is narrower at a younger age. Those conditions make abdominal cramps more painful during menstruation. Early menarche can increase negative psychological reactions such as anxiety, fear, and depression because adolescents are not mentally ready to experience menstruation (Nurwana, Sabilu & Fachlevy, 2017).

Most respondents have a good menstrual cycle. Research in Iran shows that there is a positive relationship between a short menstrual cycle and dysmenorrhea incidence (Habibi *et al.*, 2015). A primary cause of dysmenorrhea is an irregular menstrual cycle. Research in Ethiopia states that adolescents with irregular menstrual cycles experience

primary dysmenorrhea almost twice as often as those who regularly have monthly menstrual cycles (Azagew, Kassie & Walle, 2020).

Our study showed that there is an effect of yoga therapy on menstrual pain in adolescent girls. The effect of yoga therapy on menstrual pain was also found in a study of 75 adolescents, in which almost half of the respondents experienced a significant reduction in menstrual pain. Several yoga movements during menstruation can reduce menstrual pain if done properly. During menstruation, yoga provides strength, stimulates the brain, chest, lungs, and liver, and can maintain hormonal balance in the body (Amru & Selvia, 2022). Similar results were seen in a study that proved that there were differences in the level of menstrual pain before and after yoga therapy (Firdausi & Aini, 2018). Another study showed that there was a decrease in the level of menstrual pain and a shorter duration of pain in the group of adolescents who did yoga therapy. Yoga or physical exercise can produce endorphins that act as a natural sedative and stimulate the brain to provide a sense of comfort and reduce pain during contractions. Exercise has been shown to increase 4-5 times β-endorphin levels in the blood. This increase will be captured by receptors in the hypothalamus and limbic system for emotional management (Sari, Nasifah & Trisna, 2018).

A positive effect on reducing menstrual pain was also found in adolescents who did yoga exercises three times a week for three months. In addition, yoga is also known to reduce the number of menstrual days with abdominal pain. Yoga consists of meditation, relaxation (yoga nidra), breathing exercises, and various physical movements. Patients who were observed after doing yoga regularly showed a decrease in abdominal cramps, heavy bleeding, and irregular menstruation (Unniraman, Changran & Unnikrishnan, 2015).

This study showed the effect of yoga on quality of life. A comparison study between yoga and acupressure for dysmenorrhea treatment showed a higher score in the physical, psychological, and environmental domains of quality of life, while the differences only appeared in the physical part in the acupressure group. Effective management of menstrual symptoms is essential for improving reproductive health and quality of life in young women (Kucukkelepce *et al.*, 2021). Similar studies with two basic yoga movements (slow and fast pranayama) have been shown to improve the quality of life in women with dysmenorrhea. By deep breathing, pranayama repairs blood oxygenation, reducing pain and improving quality of life (Ganesh, Madhushree & Andrea, 2015). A systematic review of 14 studies provides strong evidence that yoga is associated with significant improvements in most quality-of-life domains, including physical pain and discomfort, sleep quality, concentration, negative feelings, social relationships, and work capacity. There were four studies showing a positive correlation between the duration of the yoga intervention and the rate of improvement in quality of life. Better recovery in menstrual pain, depression, anxiety, insomnia, and dysphoria, as well as autonomic parameters and a sense of well-being, was reported with frequent yoga intervention (McGovern & Cheung, 2018). Quality-of-life improvements, physical pain decreases, and discomfort are associated with the results of yoga exercise. Specifically, women with primary dysmenorrhea who did 6-month yoga interventions reported higher levels of energy and focus, decreased sleep disturbances, insomnia, and confusion. In addition, stress levels, social relations, and work capacity were reported to be of better quality because they could actively participate in daily life during menstruation (Tsonis *et al.*, 2021). Symptoms like fatigue, back pain, and headaches further impact the adolescent girl's ability to attend school regularly and affect school attendance and academic performance, improvements in facilities. Therefore, support must be made to address this issue (Karmakar *et al.*, 2023).

CONCLUSION

Yoga exercise has the effect of decreasing menstrual pain and improving quality of life in adolescents. This study implies that regular yoga exercise in the long term, before, during, and after periods, will certainly have a better effect on menstrual pain and quality of life. Dysmenorrhea in adolescents needs to be considered because it affects not only the physical but also psychological, social, and school activities. Providing nursing care to adolescent girls with health promotion and non-pharmacological interventions such as yoga is a great investment to optimally improve the adolescent's quality of life.

Conflict of Interest

The authors declare that there is no conflict of interest.

ACKNOWLEDGEMENT

The authors are thankful to the institutional authority for giving the necessary permission to complete the present work.

REFERENCES

Aiyegbusi, A. I., Adeagbo, C. A., & Uwem-Umoh, S. I. (2020). Comparative efficacy of core strengthening and stretching exercises on systemic and quality-of-life symptoms in adolescent college students with primary dysmenorrhea. *New Nigerian Journal of Clinical Research, 9*(16), 59. https://doi.org/10.4103/nnjcr.nnjcr_36_19

Amru, D. E., & Selvia, A. (2022). Pengaruh Senam Yoga Terhadap Penurunan Nyeri Haid Pada Remaja Putri Di Institut Kesehatan Mitra Bunda. *Midwifery Care Journal, 3*(1), 22–29. https://doi.org/10.31983/micajo.v3i1.8191

Arakawa, I., Momoeda, M., Osuga, Y., Ota, I., & Koga, K. (2018). Cost-effectiveness of the recommended medical intervention for the treatment of dysmenorrhea and endometriosis in Japan. *Cost Effectiveness and Resource Allocation, 16*(1), 1–10. https://doi.org/10.1186/s12962-018-0097-8

Armour, M., Parry, K., Curry, C., Ferfolja, T., Parker, M. A., Farooqi, T., ... & Holmes, K. (2022). Evaluation of a web-based resource to improve menstrual health literacy and self-management in young women. *Journal of Psychosomatic Research, 162*, 111038. https://doi.org/10.1016/j.jpsychores.2022.111038

Azagew, A. W., Kassie, D. G., & Walle, T. A. (2020). Prevalence of primary dysmenorrhea, its intensity, impact and associated factors among female students' at Gondar town preparatory school, Northwest Ethiopia. *BMC Women's Health, 20*, 1-7. https://doi.org/10.1186/s12905-019-0873-4

Chang, S. F., & Chuang, M. H. (2012). Factors that affect self-care behaviour of female high school students with dysmenorrhoea: A cluster sampling study. *International Journal of Nursing Practice, 18*(2), 117–124. https://doi.org/10.1111/j.1440-172X.2012.02007.x

Eka Widiyanti, D. E. V. I. (2016). *Pengaruh Nyeri Haid (Dismenorhea) Terhadap Aktifitas Sehari-Hari Pada Remaja Di Smp N 2 Ponorogo* (Doctoral dissertation, Universitas Muhammdiyah ponorogo). http://eprints.umpo.ac.id/2166/. Accessed on 17th October , 2022.

Firdausi, L. Y., & Aini, E. N. (2018). Perbedaan tingkat nyeri dismenorhea sebelum dan sesudah dilakukan yoga pada mahasiswa. *Journal Informasi Kesehatan Indonesia, 4*(1), 26-32.

Ganesh, B. R., Madhushree, P. D., & Andrea, R. H. (2015). Comparative study on effect of slow and fast phased pranayama on quality of life and pain in physiotherapy girls with primary dysmenorrhoea: Randomized clinical trial. *International Journal of Physiotherapy and Research, 3*(2), 928-37. https://doi.org/10.16965/ijpr.2015.115

Günebakan, Ö., & Acar, M. (2023). The effect of tele-yoga training in healthy women on menstrual symptoms, quality of life, anxiety-depression level, body awareness, and self-esteem during COVID-19 pandemic. *Irish Journal of Medical Science (1971-), 192*(1), 467-479. https://doi.org/10.1007/s11845-022-02985-0

Habibi, N., Huang, M. S. L., Gan, W. Y., Zulida, R., & Safavi, S. M. (2015). Prevalence of primary dysmenorrhea and factors associated with its intensity among undergraduate students: a cross-sectional study. *Pain Management Nursing, 16*(6), 855-861. https://doi.org/10.1016/j.pmn.2015.07.001

Hailemeskel, S., Demissie, A., & Assefa, N. (2016). Primary dysmenorrhea magnitude, associated risk factors, and its effect on academic performance: Evidence from female university students in Ethiopia. *International Journal of Women's Health, 8*, 489–496. https://doi.org/10.2147/IJWH.S112768

Harris, T., & Hardin, J. W. (2013). Exact Wilcoxon signed-rank and Wilcoxon Mann–Whitney ranksum tests. *The Stata Journal, 13*(2), 337-343. https://doi.org/10.1177/1536867X1301300208

Karmakar, M., Panduragan, S. L., Said, F. B. M., & Poddar, S. L. (2023). Impact of Menstrual Distress During

Menstruation to Promote Coping Strategies. In *Perspectives on Coping Strategies for Menstrual and Premenstrual Distress* (pp. 212-236). IGI Global. https://doi.org/10.4018/978-1-6684-5088-8.ch012

Kertapati, Y., Sahar, J., Nursasi, A. Y., & Mutyah, D. (2022). The Effect of Chair Yoga with Spiritual Intervention on the Life Satisfaction of Older Adults. *The Malaysian Journal of Nursing (MJN), 14*(2), 60-66. https://doi.org/10.31674/mjn.2022.v14i02.011

Khusnul K.D. (2019). "The Effect of Giving Yoga on Reducing the Intensity of Menstrual Pain (Dysmenorrhea) in Young Women at MTsN Sidorejo Kab. Madiun By: Dewi Khusnul Khotimah Nursing Study Program." In Madiun, 117. http://repository.stikes-bhm.ac.id/650/. Accessed on 18th November , 2021.

Kucukkelepce, D. S., Unver, H., Nacar, G., & Tashan, S. T. (2021). The effects of acupressure and yoga for coping with premenstrual syndromes on premenstrual symptoms and quality of life. *Complementary Therapies in Clinical Practice, 42*, 101282. https://doi.org/10.1016/j.ctcp.2020.101282

Larasati, T. A., & Alatas, F. (2016). Dismenore primer dan faktor risiko Dismenore primer pada Remaja. *Journal Majority, 5*(3), 79-84. https://juke.kedokteran.unila.ac.id/index.php/majority/article/view/1040. Accessed on 19th September , 2022.

Manurung, M. F., & HD, S. R. H. R. (2015). Efektivitas Yoga Terhadap Nyeri Dismenore Pada Remaja. *Journal Online Mahasiswa (JOM) Bidang Ilmu Keperawatan, 2*(2), 1258-1265. https://jom.unri.ac.id/index.php/JOMPSIK/article/view/8291/0. Accessed on 19th September , 2022.

Matthewman, G., Lee, A., Kaur, J. G., & Daley, A. J. (2018). Physical activity for primary dysmenorrhea: a systematic review and meta-analysis of randomized controlled trials. *American Journal of Obstetrics and Gynecology, 219*(3), 255-e1. https://doi.org/10.1016/j.ajog.2018.04.001

McGovern, C. E., & Cheung, C. (2018). Yoga and quality of life in women with primary dysmenorrhea: a systematic review. *Journal of Midwifery & Women's Health, 63*(4), 470-482. https://doi.org/10.1111/jmwh.12729

Nurwana, N., Sabilu, Y., & Fachlevy, A. F. (2017). *Analisis faktor yang berhubungan dengan kejadian disminorea pada remaja putri di SMA Negeri 8 Kendari Tahun 2016* (Doctoral dissertation, Haluoleo University). https://doi.org/10.1111/jmwh.12729. Accessed on December 9th, 2022.

Ozerdogan, N., Sayiner, D., Ayranci, U., Unsal, A., & Giray, S. (2009). Prevalence and predictors of dysmenorrhea among students at a university in Turkey. *International Journal of Gynecology and Obstetrics, 107*(1), 39–43. https://doi.org/10.1016/j.ijgo.2009.05.010

Pal, S., Mandal, M., & Poddar, S. (2023). Coping Strategies for Menstrual and Premenstrual Distress: An Overview. *Perspectives on Coping Strategies for Menstrual and Premenstrual Distress*, 133-155. https://doi.org/10.4018/978-1-6684-5088-8.ch008

Prabhu, S., Nagrale, S., Shyam, A., & Sancheti, P. (2019). Effect of yogasanas on menstrual cramps in young adult females with primary dysmenorrhea. *International Journal of Physiotherapy and Research, 7*(4), 3129-3134. https://dx.doi.org/ 10.16965/ijpr.2019.140

Rini, F. S., & Nuryanti, Y. (2021). Pengaruh Senam Yoga Terhadap Dismenorea Pada Remaja Putri di Pondok Pesantren Sirojul Mubtadi'in Tahun 2o2o. *Simposium Nasional Mulitidisiplin (SinaMu), 2*. https://jurnal.umt.ac.id/index.php/ senamu/article/view/3243/2233

Sari, K., Nasifah, I., & Trisna, A. (2018). Pengaruh Senam Yoga Terhadap Nyeri Haid Remaja Putri. *Journal Kebidanan, 103*-115. https://doi.org/10.35872/jurkeb.v10i02.283

Suryanti, P. E. (2020). Yoga Sebagai Upaya Meringankan Nyeri Haid Pada Remaja Perempuan. *Journal Yoga dan Kesehatan, 3*(2), 195-202.

Tsonis, O., Gkrozou, F., Barmpalia, Z., Makopoulou, A., & Siafaka, V. (2021). Integrating Lifestyle Focused Approaches into the Management of Primary Dysmenorrhea: Impact on Quality of Life. *International Journal of Women's Health*, 327-336. https://doi.org/10.2147/IJWH.S264023

Unniraman, P., Changran, K. M., & Unnikrishnan, P. (2015). Effect of Yoga on menstrual problems in Adolescents. *International Journal of Yoga and Allied Sciences, 4*(1), 15–21. http://indianyoga.org/wp-content/uploads/2015/05/v4-issue1-article3.pdf. Accessed on 18th November, 2021.

Unsal, A., Ayranci, U., Tozun, M., Arslan, G., & Calik, E. (2010). Prevalence of dysmenorrhea and its effect on quality of life among a group of female university students. *Upsala Journal of Medical Sciences, 115*(2), 138–145. https://doi.org/10.3109/03009730903457218

Wardani, I. G. A. N., & Suryanti, P. E. (2020). Yoga as an Effort to Relieve Menstrual Pain in Adolescent Girls. *Journal Yoga dan Kesehatan, 3*(2), 195-202. https://doi.org/10.25078/jyk.v3i2.1747

World Health Organization . (2014). Action for the Rights of Children (ARC) Child and Adolescent Development-Revision Child and Adolescent Development Contents. *Child and Adolescent Development*, 1–131. https://www.unhcr.org /media/action-rights-children-arc-foundations-child-and-adolescent-development. Accessed on 18th November, 2021

Wulandari, A., Hasanah, O., & Woferst, R. (2018). Gambaran kejadian dan manajemen dismenore pada remaja putri di kecamatan lima puluh kota pekanbaru. *Journal Online Mahasiswa (JOM) Bidang Ilmu Keperawatan, 5*(2), 468-476. https://jom.unri.ac.id/index.php/JOMPSIK/article/view/21161. Accessed on 9th December , 2022.

Varni, J. W. (2023). Scaling and Scoring of the Pediatric Quality of Life Inventor, PedsQL, Mapi Research Trust. Version 21.3: March 2023 https://www.pedsql.org/PedsQL-Scoring.pdf.. Accessed on 18th November, 2021.