



# Original Research Article Analysis of Factors Influencing the Incidence of Dysmenorrhea

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*Globally, the prevalence of dysmenorrhea in women is still high. Dysmenorrhea in adolescent girls that is not treated can interfere with daily activities and learning activities. Therefore, adolescents need to learn and understand the factors that affect dysmenorrhea. This study aims to determine the factors that influence the incidence of dysmenorrhea. This study was case control in design. The study included 300 participants, 120 of whom were selected using the purposive sampling technique from among the adolescent girls in the Muzamzamah Chosyi'ah Dormitory of Darul 'Ulum Islamic Boarding School. A questionnaire was employed as the research tool. At a significance level of  $\alpha < 0.05$ , the data were analyzed using the chi-square test and logistic regression. The results of the analysis test showed that there was no effect of menarche age and the number of menstrual flow on the incidence of dysmenorrhea ( $p > 0.05$ ). The incidence of dysmenorrhea was influenced ( $p < 0.05$ ) by the menstrual cycle, duration of menstruation, family history, and BMI. The dominant factor influencing the incidence of dysmenorrhea was family history ( $p = 0.000$ ;  $Exp(B)$ : 129.98). Family history of dysmenorrhea has a greater potential for the occurrence of dysmenorrhea because it is related to genetic factors that pass on traits to their offspring. It is recommended to adopt a healthy lifestyle such as exercising regularly, fulfilling balanced nutritional needs, and maintaining ideal body weight.*

**Keywords :** Dysmenorrhea, menstrual cycle, menstrual duration, family history, BMI.

## INTRODUCTION

Dysmenorrhea often occurs after menarche. The pain felt decreases after menstruation, but this complaint continues during the menstrual period in some women which has an impact on daily activities (Mukhoirotin and Fatmawati, 2016). Some young women are unable to do activities and have to lie down because of the pain experienced. In addition, some faint, feel nauseous to vomit, and even roll around in bed. The condition is very disturbing for adolescent girls to learn so that their performance at school decreases. Thus, young women must know the conditions that occur so that they can deal with these conditions (Azizah, 2014).

Based on WHO data (2018), the global prevalence of dysmenorrhea is very high. In each country, about > 50% of women experience dysmenorrhea, namely 60% in America; 72% in Sweden; and 10% of adolescents in the UK so that every month they miss 1-3 days of school (Chayati & Na'mah, 2019). In Indonesia, the prevalence of dysmenorrhea is around 64.52% with primary dysmenorrhea (54.89%) and secondary dysmenorrhea (9.36%) (Fahimah, Margawati and Fitranti, 2017). In East Java, the prevalence of dysmenorrhea was 11,565 in adolescent girls aged 10-20 years (BPS Provinsi Jawa Timur, 2015).

Initial study in Dormitory XI Muzamzamah Chosyi'ah Darul 'Ulum (February 19, 2021), out of 26 adolescent girls suffering from dysmenorrhea as many as 20 (77%) with mild dysmenorrhea of 5 (25%); moderate of 8 (40%); and severe of 7 (35%). While those who did not experience dysmenorrhea were 6 (23%) adolescent girls. During menstruation, adolescents complained of dizziness, abdominal pain, nausea, pain in the waist, limited activity, missed school so that learning activities were disrupted.

Risk factors that affect the incidence of dysmenorrhea are early menarche, rarely or never exercise, length and menstrual cycle, family history, stress, other habits such as consuming junk food, consuming alcohol and smoking (Kural et al., 2015). Menarche at an early age (<12 years) causes problems and unpreparedness in adolescent girls (Aditiara, 2018). Early menarche reflects longer exposure to prostaglandins which play a major role in dysmenorrhea through increased uterine contractility resulting in pain (French, 2005; Grandi et al., 2012) and ovulatory cycles that are not established immediately after menarche (Harel, 2012). Prolonged menstrual periods and heavier menstrual flow are determined by prostaglandins (Habibi et al., 2015; Ibrahim et al., 2015). The amount of menstrual blood that does not exceed 80 ml is categorized within normal limits, with changing pads 2 - 6 times / day (Saifuddin, Rachimhadhi and Wiknjastro, 2018). According to (Larasati, T. A. and Alatas, 2016), a significant relationship was found between familial predisposition and dysmenorrhea. In addition, high levels of fat in the body affect the production of the hormone estrogen, resulting in high and abnormal estrogen levels. Imbalance in estrogen levels results in menstrual disorders (Novita, 2018).

Dysmenorrhea can be intervened with pharmacological and non-pharmacological measures.

Pharmacological measures can use Non-steroidal anti-inflammatory drugs (NSAIDs) and Oral contraceptive pills (OCPs). These treatments can cause side effects despite their benefits, including: drug dependence, abdominal pain, nausea, diarrhea, sleep disturbances, kidney and liver complications and indigestion (Kashefi et al., 2010; Shahla Gharloghi et al., 2012; Chen, Chien and Liu, 2013; Nasehi et al., 2013; Wang et al., 2013). The failure rate of pharmacological treatment is about 20-25% (Navvabi Rigi et al., 2012). This study aims to determine the factors that influence the incidence of dysmenorrhea in adolescent girls in dormitory XI Muzamzamah Chosyi'ah Pondok Pesantren Darul 'Ulum Jombang.

## METHODOLOGY

The research design used an analytic survey method with a case control approach. The research subjects were all adolescent girls of Pondok Pesantren Darul 'Ulum Jombang (Asrama Muzamzamah Chosyi'ah) totaling 300 respondents, with a sample of 120 respondents taken using purposive sampling, divided into two groups, namely the case group (60 adolescent girls with dysmenorrhea), and the control group (60 adolescent girls without dysmenorrhea). The research instrument used a questionnaire. The questionnaire was prepared based on the theory of factors affecting dysmenorrhea. Data were analyzed by chi-square test and logistic regression. Data collection was carried out after passing the ethical clearance test from the Ethics Commission of the Darul Ulum Jombang Higher Islamic Boarding School University with Ethical Test No. 058-KEP-Unipdu/7/2021.

## RESULT AND DISCUSSION

### RESULT

The characteristics of the subjects in this study were age and education.

Table 1.I Characteristics of Research Subjects

Respondent Characteristics	Frequency (F)	Percentage (%)
Age		
a. Early adolescence (11-13 years old)	37	31
b. Middle adolescence (14-16 years old)	59	49
c. Late adolescence (17-20 years old)	24	20
Education		
a. Junior high school	72	60
b. High school	48	40
c. Higher Education	0	0

The age of the respondents, almost half were middle adolescents as many as 59 (49%) respondents, and early adolescents as many as 37 (31%) respondents and a small proportion of 24 (20%) respondents were in their late teens. The education of the respondents was mostly junior high school as many as 72 (60%) respondents, and high school education was obtained by almost half as many as 48 (40%) respondents.

The results showed that the age of menarche in both groups was almost entirely normal, namely

52 (87%) respondents in the case group and 54 (90%) respondents in the control group. The results showed no significant influence between the age of menarche and the incidence of dysmenorrhea in Muzamzamah Chosyi'ah Dormitory with p value = 0.570 (p> 0.05) (Table 2).

Table 2 I Factors Affecting the Incidence of Dysmenorrhea

Variables	Dysmenorrhea				P value	OR (95% CI)
	Yes		No			
	N	%	N	%		
Age of Menarche						
a. Abnormal (< 11 years and > 14 years)	8	13	6	10	0,570	0,722 (0,234 - 2,224)
b. Normal (11 - 13 years)	52	87	54	90		
Menstrual Cycle						
a. Irregular (< 21 days and > 35 days)	11	18	2	3.33	0,008	0,154 (0,032 – 0,727)
b. Regular (21 - 35 days)	49	82	58	96,66		
Duration of Menstruation						
a. Abnormal (>7 days)	24	40	9	15	0,002	0,265 (0,110 - 0,636)
b. Normal (3 - 7 days)	36	60	51	85		
Family History						
a. None	12	20	58	97	0,000	116,000 (24,743-543 - 820)
b. Available	48	80	2	3		
Amount of Menstrual Flow						
a. Abnormal (> 4 pad changes/day)	21	35	13	22	0,105	1,947 (0,865 - 4,383)
b. Normal (2-3 pad changes/day)	39	65	47	78		
BMI (Body Mass Index)						
a. Abnormal (< 18.4 and > 25.0)	21	35	6	10	0,001	4,846 (1,789 - 13,126)
b. Normal (18.5 - 25.0)	39	65	54	90		

The menstrual cycle in both groups was almost entirely regular, namely 49 (82%) respondents in the case group and 58 (96.99%) respondents in the control group. Duration of menstruation in the case group, most of them were normal as many as 36 (60%) respondents and in the control group, almost all of them were normal, namely 51 (85%) respondents. Almost all respondents in the case group had a family history of dysmenorrhea, namely 48 (80%) respondents and in the control group, almost all respondents had no family history of dysmenorrhea, namely 58 (97%) respondents. The results showed that there was a significant influence between menstrual cycle, length of menstruation and family history with the incidence of dysmenorrhea in Muzamzamah Chosyi'ah Dormitory with a significance value of p<0.05.

In the case group, there were 39 (65%) respondents with normal menstrual flow, and the control group was almost entirely normal, namely 47 (78%) respondents. The results showed that there was no significant influence between the amount of menstrual flow and the incidence of dysmenorrhea with a significance value of p = 0.105 (p>0.05).

BMI in the case group, namely 39 (65%) respondents were normal, and the control group was almost entirely normal, namely 54 (90%) respondents. The results showed that there was a significant influence between BMI and the incidence of dysmenorrhea with a significance value of p = 0.001 (p <0.05).

Table 3.I Dominant Factors Affecting the Incidence of Dysmenorrhea

Variables	B	P Value	OR	CI 95%
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Menstrual cycle	-2,476	0,018	0,084	(0,011 - 0,650)
Duration of menstruation	-1,432	0,044	0,239	(0,059 - 0,962)
Family history	4,867	0,000	129,977	(24,582 - 687,252)
BMI	1,604	0,048	4,973	(1,014 - 24,405)

### Logistic Regression Test

Based on table 3.1, family history is the dominant factor in the incidence of dysmenorrhea (p-value = 0,000; OR/Exp(B) = 129,977).

### Discussion

The results showed that the age of menarche did not affect the incidence of dysmenorrhea. Early menarche results in longer exposure of women to prostaglandins. The correlation between early menarche and hormonal patterns is one of the important risk factors for the incidence of dysmenorrhea (Manuaba, 2010). Early menarche results in the function of the reproductive organs not yet maximized and not ready for changes that result in pain during menstruation (Nurwana, Sabilu and Fachlevy, 2017). The age of menarche correlates with dysmenorrhea (Abu Helwa et al., 2018). Dysmenorrhea experienced by respondents with early menarche is more than respondents with normal menarche age. This condition is in line with the results of previous studies, namely women with early menarche tend to have severe dysmenorrhea (Loto, Adewumi and Adewuya, 2008; S.M. et al., 2009). The absence of the effect of menarche age on the incidence of dysmenorrhea in this study, may be due to the fact that most of the respondents were in the normal menarche age range (11-13 years) and a small proportion were in the abnormal menarche age (< 11 years and > 13 years).

Some adolescent girls with menarche age (11 - 13 years old) but also experience dysmenorrhea, this condition occurs due to unhealthy lifestyles such as eating junk food, never exercising, and other conditions that can stimulate increased pain during menstruation. A number of adolescent girls with abnormal menarche age who experience dysmenorrhea, occurs due to menarche earlier than the average age resulting in pain during menstruation. This condition occurs in reproductive organs that are not ready to undergo changes. The results of this study are in line with research (Fatmawati and Aliyah, 2020) at STIKes Madani Yogyakarta, with the results that there was no significant relationship between menarche age and the incidence of dysmenorrhea. The results of research by Kural et al. (2015) also showed that there was no significant influence between the age of menarche and the incidence of dysmenorrhea (Kural et al., 2015).

The results showed that there was an influence between the menstrual cycle and the incidence of dysmenorrhea. The normal length of the menstrual cycle is 21-35 days. Various studies have shown that dysmenorrhea is more common in women with longer menstrual cycles (Kural et al., 2015). The risk of dysmenorrhea increases in women with irregular menstrual cycles (Chiou & Wang, 2008). The results of

this study are in accordance with research (Wardani, Fitriana and Casmi, 2021) at SMA Negeri 15 Bandar Lampung in 2020, with the results obtained a correlation between the menstrual cycle and the occurrence of dysmenorrhea. Other studies have also shown that there is a significant influence between the menstrual cycle and the occurrence of dysmenorrhea (Juliana, Rompas and Onibala, 2019; Hikma, Yunus and Hapsari, 2021).

The results of this study indicate that the length of menstruation affects the incidence of dysmenorrhea. Normal menstrual duration is usually between 3-7 days. Factors that can affect the length of menstruation are psychological factors and physiological factors. The unstable emotional level in adolescent girls when menstruation starts correlates with psychological factors. While physiological factors occur due to increased uterine contractions or those who are very sensitive to prostaglandin hormones in the secretion phase. Prostaglandins are produced from unsaturated fatty acids that are secreted by all cells in the body (Anurogo and Wulandari, 2011). Some previous studies have shown that the length of menstruation affects the incidence of dysmenorrhea (Nurwana, Sabilu and Fachlevy, 2017; Indarna, A. A., & Lediawati, 2021; Handayani, 2022; Mulyani et al., 2022).

In this study, almost all respondents who experienced dysmenorrhea were found in families with a history of dysmenorrhea. Respondents who did not experience dysmenorrhea, almost entirely family history without dysmenorrhea. The results of the analysis test found that there was an influence between family history on the incidence of dysmenorrhea. A family history of dysmenorrhea is at risk for the occurrence of dysmenorrhea. Some researchers previously reported that daughters of mothers who feel complaints during menstruation will also experience discomfort during menstruation, this is related to the behavior learned from the mother (Polat et al., 2009). Previous studies have also shown a significant correlation between family history and the occurrence of dysmenorrhea (Charu et al., 2012; Kural et al., 2015; Duman, Yıldırım and Vural, 2022; Handayani, 2022).

The results showed that the amount of menstrual flow had no effect on the incidence of dysmenorrhea. Heavier menstrual flow is determined by prostaglandins (Habibi et al., 2015; Ibrahim et al., 2015). Prostaglandins can interfere with endometrial homeostatic mechanisms thereby increasing blood flow. In the study, there was no influence between the amount of menstrual flow on the incidence of dysmenorrhea, because most of the respondents with dysmenorrhea were found in respondents with normal menstrual flow. In addition, there were several respondents in the normal menstrual flow group but also experienced dysmenorrhea, due to unhealthy lifestyles such as rarely exercising, stress so that it can stimulate increased pain during menstruation.

BMI results show there is an influence between BMI on the incidence of dysmenorrhea. Normal reproductive development and menarche require sufficient body fat mass. A body fat percentage of at least



17% must be maintained for the onset of menarche and a minimum of 22% is required for regular menstruation (Warren and Goodman, 2003). In addition, low available energy, which is associated with low BMI, leads to disruption of the hypothalamic-pituitary system (Warren and Goodman, 2003; Manore, Kam and Loucks, 2007). Disruption of the hypothalamic-pituitary system causes amenorrhea and abnormal menstruation by inhibiting the secretion of LH and FSH hormones from the pituitary gland and blocking stimulation of the ovaries (Warren and Goodman, 2003; Manore, Kam and Loucks, 2007). There is an association between body fat percentage and the prevalence of primary dysmenorrhea. The risk of dysmenorrhea is higher in underweight and obese women (Ju, Jones and Mishra, 2015). High BMI has been reported to cause early menarche, irregular menstrual cycles, infrequent menstruation, amenorrhea, and chronic anovulation (Pasquali et al., 2003). This suggests that, in addition to low BMI, high BMI may also increase the prevalence and severity of primary dysmenorrhea. Therefore, maintaining an appropriate BMI may decrease the prevalence and severity of primary dysmenorrhea. The results of this study are in line with research (Oktorika, Indrawati and Sudiarti, 2020) at SMAN 2 Kampar with the results there is a significant correlation between BMI and the incidence of dysmenorrhea. Several other studies have also shown that BMI affects the incidence of dysmenorrhea (Larasati, T. A. and Alatas, 2016; Handayani, 2022).

The results of the analysis found that family history is the most dominant variable with the largest OR of 129.977, meaning that adolescent girls with a family history of dysmenorrhea have a 130 times chance of experiencing dysmenorrhea compared to adolescents with a family history without dysmenorrhea. After controlling for the variables of menstrual cycle, length of menstruation and BMI. Adolescents who have a family history of dysmenorrhea are more likely to experience dysmenorrhea, this condition occurs due to genetic factors that pass on traits to their children. Genetic traits are able to duplicate themselves during cell division, so that the mother's traits can be passed on to her child. This is also the same for the incidence of dysmenorrhea inherited by the mother..

## CONCLUSION

The results showed that the age of menarche and the amount of menstrual flow had no effect on the incidence of dysmenorrhea. There is an influence of menstrual cycle, family history, length of menstruation, and BMI with the incidence of dysmenorrhea. The dominant factor affecting the incidence of dysmenorrhea is family history. A family history of dysmenorrhea has a higher potential for the incidence of dysmenorrhea, this occurs due to genetic factors that pass on these traits to their offspring.

## SUGGESTION

Adolescent girls should adopt a healthy lifestyle with regular exercise, balanced nutrition, and

maintain an ideal weight.

## REFERENCES

- Abu Helwa, H.A. et al. (2018) 'Prevalence of dysmenorrhea and predictors of its pain intensity among Palestinian female university students', *BMC Women's Health*, 18(18), pp. 1–11. Available at: <https://doi.org/10.1186/s12905-018-0516-1>.
- Aditiara, B.E. (2018) Hubungan antara usia menarche dengan dysmenorrhea primer. Universitas Muhammadiyah Surakarta. UNIVERSITAS MUHAMMADIYAH SURAKARTA. Available at: [https://eprints.ums.ac.id/56384/2/HALAMAN\\_DEPAN.pdf](https://eprints.ums.ac.id/56384/2/HALAMAN_DEPAN.pdf).
- Anurogo, D. and Wulandari, A. (2011) Cara jitu mengatasi nyeri haid. Yogyakarta: CV. Andi Offset.
- Azizah, N. (2014) 'Aplikasi Relaksasi Nafas Dalam Sebagai Upaya Penurunan Skala Nyeri Menstruasi (Dysmenorrhea) Pada Siswi MTS. Ibtidaul Falah Samirejo Dawe Kudus Tahun 2013', *Jurnal Ilmu Keperawatan dan Kebidanan*, 5(1), pp. 14–22.
- BPSProvinsiJawaTimur (2015) Jawa Timur Dalam Angka 2015. Surabaya: BPS Provinsi Jawa Timur.
- Charu, S. et al. (2012) "Menstrual characteristics" and "prevalence and effects of dysmenorrhea" on quality of life of medical students', *International Journal of Collaborative Research on Internal Medicine and Public Health*, 4(4), pp. 276–294.
- Chayati & Na'mah (2019) 'Penerapan Kombinasi Pijat Effleurage dan Pemberian Air Kelapa Hijau Terhadap Penurunan Nyeri Dismenore Pada Remaja Putri Usia 13-15 Tahun', in *Proceeding of The 10th University Research Colloquium 2019: Bidang MIPA dan Kesehatan*, pp. 14–21.
- Chen, M.-N., Chien, L.-W. and Liu, C.-F. (2013) 'Acupuncture or Acupressure at the Sanyinjiao (SP6) Acupoint for the Treatment of Primary Dysmenorrhea: A Meta-Analysis', *Evid Based Complement Alternat Med*, 2013, p. 493038.
- Duman, N.B., Yildirim, F. and Vural, G. (2022) 'Risk factors for primary dysmenorrhea and the effect of complementary and alternative treatment methods: Sample from Corum, Turkey.', *International journal of health sciences*, 16(3), pp. 35–43. Available at: <http://www.ncbi.nlm.nih.gov/pubmed/35599944%0Ahttp://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=PMC9092532>.
- Fahimah, Margawati, A. and Fitranti, D.Y. (2017) 'Hubungan Konsumsi Asam Lemak Omega-3, Aktivitas Fisik Dan Persen Lemak Tubuh Dengan Tingkat Dismenore Pada Remaja', *Journal of Nutrition College*, 6(4), pp. 268–276. Available at: <https://doi.org/10.14710/jnc.v6i4.18249>.
- Fatmawati, E. and Aliyah, A.H. (2020) 'Hubungan Menarche dan Riwayat Keluarga dengan Dismenore (Nyeri Haid)', *Jurnal Kesehatan Madani Medika*, 11(01), pp. 12–20.



- French, L. (2005) 'Dysmenorrhea', *American family physician*, 71(2), pp. 285–291. Available at: [https://doi.org/10.5005/jp/books/12515\\_3](https://doi.org/10.5005/jp/books/12515_3).
- Grandi, G. et al. (2012) 'Prevalence of menstrual pain in young women: What is dysmenorrhea?', *Journal of Pain Research*, 5, pp. 169–174. Available at: <https://doi.org/10.2147/JPR.S30602>.
- Habibi, N. et al. (2015) 'Prevalence of Primary Dysmenorrhea and Factors Associated with Its Intensity Among Undergraduate Students: A Cross-Sectional Study', *Pain Management Nursing*, 16(6), pp. 855–861. Available at: <https://doi.org/10.1016/j.pmn.2015.07.001>.
- Handayani, R. (2022) 'Faktor Yang Mempengaruhi Kejadian Dismenorea Pada Remaja Putri Kelas X Di SMA Swasta Muhammadiyah 10 Rantauprapat Tahun 2020', *Journal Gentle Birth*, 5(1), pp. 50–59. Available at: <http://midwifery.jurnalsenior.com/index.php/ms/article/view/57>.
- Harel, Z. (2012) 'Dysmenorrhea in Adolescents and Young Adults: An Update on Pharmacological Treatments and Management Strategies', *Expert Opin Pharmacother*, 13(15), pp. 2157–2170.
- Hikma, Y.A., Yunus, M. and Hapsari, A. (2021) 'Hubungan Siklus Menstruasi, Kualitas Tidur, dan Status Gizi, Terhadap Dismenore Primer pada Remaja Putri', *Sport Science and Health*, 3(8), pp. 630–641. Available at: <https://doi.org/10.17977/um062v3i82021p630-641>.
- Ibrahim, N.K. et al. (2015) 'Dysmenorrhea among female medical students in King Abdulaziz University: Prevalence, Predictors and outcome', *J Med Sci.*, 31(6), pp. 1312–1317. Available at: <https://doi.org/10.12669/pjms.316.8752>.
- Indarna, A. A., & Lediawati, L. (2021) 'Usia Menarche dan Lamanya Menstruasi dengan Kejadian Dismenore Primer pada Siswi Kelas X Di SMK Kesehatan Bhakti Kencana Subang', *Journal of Nursing and Public Health*, Vol. 9(Oktober), pp. 1–7.
- Ju, H., Jones, M. and Mishra, G.D. (2015) 'A U-shaped relationship between body mass index and dysmenorrhea: A longitudinal study', *PLoS ONE*, 10(7), pp. 1–12. Available at: <https://doi.org/10.1371/journal.pone.0134187>.
- Juliana, I., Rompas, S. and Onibala, F. (2019) 'Hubungan Dismenore Dengan Gangguan Siklus Haid Pada Remaja Di Sma N 1 Manado', *Jurnal Keperawatan*, 7(1), pp. 1–8. Available at: <https://doi.org/10.35790/jkp.v7i1.22895>.
- Kashefi, F. et al. (2010) 'Effect of acupressure at the Sanyinjiao point on primary dysmenorrhea: a randomized controlled trial', *Complement Ther Clin Pract*, 16(4), pp. 198–202. Available at: <https://doi.org/10.1016/j.ctcp.2010.04.003>.
- Kural, M. et al. (2015) 'Menstrual characteristics and prevalence of dysmenorrhea in college going girls', *Journal of Family Medicine and Primary Care*, 4(3), p. 426. Available at: <https://doi.org/10.4103/2249-4863.161345>.

- Larasati, T. A., A. and Alatas, F. (2016) 'Dismenore Primer dan Faktor Risiko Dismenore Primer pada Remaja', *Majority*, 5(3), pp. 79–84.
- Loto, O.M., Adewumi, T.A. and Adewuya, A.O. (2008) 'Prevalence and correlates of dysmenorrhea among Nigerian college women', *Aust N Z J Obstet Gynaecol*, 48(4), pp. 442–444. Available at: <https://doi.org/10.1111/j.1479-828X.2008.00869.x>.
- Manore, M.M., Kam, L.C. and Loucks, A.B. (2007) 'The female athlete triad: components, nutrition issues, and health consequences', *J Sports Sci*, 25(1), pp. 561–571. Available at: <https://doi.org/10.1080/02640410701607320>.
- Manuaba, I.B.G. (2010) *Ilmu Kebidanan, Penyakit Kandungan dan Keluarga Berencana untuk Pendidikan Bidan*. 2nd edn. Jakarta: EGC.
- Mukhoirotin, M. and Fatmawati, D.A. (2016) 'Pengaruh Akupresur pada Titik Sanyinjiao dan Slow Stroke Back Massage terhadap Penurunan Intensitas Nyeri Haid (Dismenorrhea)', in *Prosiding Seminar Nasional dan Muswil Kedua Ikatan Perawat Maternitas Indonesia (IPEMI) Provinsi Jawa Tengah “Membangun Etos Kerja Profesional Keperawatan Maternitas dalam Mengisi Era Masyarakat Ekonomi ASEAN*.
- Mulyani et al. (2022) 'Hubungan usia menarche dan lama menstruasi dengan kejadian dismenorea primer', *Journal Of Health, Education and Literacy*, e-issn : 2621-9301, p-issn : 2714-7827, 4(2), pp. 104–110.
- Nasehi, M. et al. (2013) 'Comparison of the effectiveness of combination of fennel extract/vitamin E with ibuprofen on the pain intensity in students with primary dysmenorrhea', *Iran J Nurs Midwifery Res*, 18(5), pp. 355–9.
- Navvabi Rigi, S. et al. (2012) 'Comparing the analgesic effect of heat patch containing iron chip and ibuprofen for primary dysmenorrhea: a randomized controlled trial', *BMC Women's Health*, 12(1), p. 1. Available at: <https://doi.org/10.1186/1472-6874-12-25>.
- Novita, R. (2018) 'Hubungan Status Gizi dengan Gangguan Menstruasi pada Remaja Putri di SMA Al-Azhar Surabaya', *Amerta Nutrition*, 2(2), p. 172. Available at: <https://doi.org/10.20473/amnt.v2i2.2018.172-181>.
- Nursalam (2016) *Metodologi Penelitian Ilmu Keperawatan*. Jakarta: Salemba Medika.
- Nurwana, Sabilu, Y. and Fachlevy, A.F. (2017) 'Analisis Faktor Yang Berhubungan dengan Kejadian Dismenorea Pada Remaja Putri di SMA Negeri 8 Kendari Tahun 2016', *Jurnal Ilmiah Mahasiswa Kesehatan Masyarakat*, 2(6), pp. 1–14.
- Oktorika, P., Indrawati and Sudiarti, P.E. (2020) 'Hubungan Index Masa Tubuh (Imt) Dengan Skala Nyeri Dismenorea Pada Remaja Putri Di SMA Negeri 2 Kampar', *Jurnal Ners*, 4(23), pp. 122–129. Available at: <http://journal.universitaspahlawan.ac.id/index.php/ners>.

- Pasquali, R. et al. (2003) 'Obesity and reproductive disorders in women', *Human Reproduction Update*, 9(4), pp. 359–372. Available at: <https://doi.org/10.1093/humupd/dmg024>.
- Polat, A. et al. (2009) 'Prevalence of primary dysmenorrhea in young adult female university students', *Arch Gynecol Obstet*, 279(4), pp. 527–532. Available at: <https://doi.org/10.1007/s00404-008-0750-0>.
- S.M., Z. et al. (2009) 'Primary dysmenorrhea among medical and dental university students in Kelantan: Prevalence and associated factors', *International Medical Journal*, 16(2), pp. 93–99. Available at: <http://www.embase.com/search/results?subaction=viewrecord&from=export&id=L354995102%5Cnhttp://resolver.ebscohost.com/openurl?custid=s3733374&authtype=ip&&sid=EMBASE&issn=13412051&id=doi:&atitle=Primary+dysmenorrhea+among+medical+and+dental+university+stud>.
- Saifuddin, A.B., Rachimhadhi, T. and Wiknjosastro, G.H. (2018) *Ilmu Kebidanan Sarwono Prawirohardjo*. 4th edn. Jakarta: PT Bina Pustaka Sarwono Prawirohardjo.
- Shahla Gharloghi et al. (2012) 'The effects of acupressure on severity of primary dysmenorrhea', *Patient Prefer Adherence*, 6, pp. 137–42. Available at: <https://doi.org/10.2147/PPA.S27127>.
- Wang, Y.-J. et al. (2013) 'Auricular acupressure to improve menstrual pain and menstrual distress and heart rate variability for primary dysmenorrhea in youth with stress', *Evid Based Complement Alternat Med*, 2013, p. 138537. Available at: <https://doi.org/1155/2013/138537>.
- Wardani, P.K., Fitriana, F. and Casmi, S.C. (2021) 'Hubungan Siklus Menstruasi dan Usia Menarche dengan Dismenor Primer pada Siswi Kelas X', *Jurnal Ilmu Kesehatan Indonesia (JIKSI)*, 2(1), pp. 1–10. Available at: <https://doi.org/10.57084/jiksi.v2i1.414>.
- Warren, M.P. and Goodman, L.R. (2003) 'Exercise-induced endocrine pathologies', *J Endocrinol Invest*, 26(9), pp. 873–878. Available at: <https://doi.org/10.1007/BF03345238>.