JOURNAL MEDICAL INFORMATICS TECHNOLOGY
medinftech.org ISSN 2988-7003 (online)

Effectiveness of Sardine Consumption in Managing Dysmenorrhea and Anemia in Adolescent Girls

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ARTICLE HISTORY
Received: 17 December 24
Final Revision: 28 March 25
Accepted: 27 April 25
Online Publication: 30 June 25

KEYWORDS
Adolescent Health, Anemia, Dysmenorrhea, Omega-3, Sardine Consumption

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DOI
10.37034/medinftech.v3i2.96

A B S T R A C T

Dysmenorrhea and anemia are common issues affecting adolescent girls, often requiring effective yet accessible non-pharmacological interventions. This study aimed to evaluate the effectiveness of omega-3 and iron (Fe) content in canned sardines in reducing menstrual pain and improving hemoglobin levels. A quasi-experimental design with a non-randomized pre-test and post-test control group was employed. The participants were 34 adolescent girls from SMK Bhakti Kencana Tasikmalaya experiencing dysmenorrhea, divided equally into intervention and control groups. Pain levels were measured using the Numeric Rating Scale (NRS), and hemoglobin levels were assessed using the Quick Check Set Hemoglobin Testing System. The intervention group consumed canned sardines for three consecutive days prior to the onset of dysmenorrhea, while the control group received conventional health education without any dietary intervention. The results showed no significant changes in pain or hemoglobin levels in the control group, while the intervention group demonstrated significant improvements in both outcomes. These findings suggest that the omega-3 and iron content in canned sardines is effective in reducing dysmenorrhea pain and increasing hemoglobin levels, thereby helping to prevent anemia in adolescent girls.

1. Introduction

Menstrual pain, or primary dysmenorrhea, and anemia remain significant health problems among adolescent girls, often causing severe discomfort that disrupts daily activities, including school routines. Epidemiologically, dysmenorrhea is commonly experienced between the ages of 17–24 but tends to decrease with age [1]. Dysmenorrhea affects a significant proportion of menstruating women globally, with prevalence estimates ranging from 15.8% to 89.5%, and 2% to 29% experiencing it as severe pain. Studies indicate that over half of women across various age groups report experiencing dysmenorrhea, with prevalence differing by region. Reported rates include 15.8% in Japan, 79.7% in India, 85.0% in the United States, 88.0% in Australia, 83.1% in Nigeria, and 85.1% in Ethiopia [2]. In Italy, the prevalence was found to be 84.1%, highlighting significant variation across countries [3].

In Indonesia, while precise prevalence data for dysmenorrhea is unavailable, anemia is well-documented. A 2019 study in Indonesia reported a dysmenorrhea prevalence of 74.42%, with the highest rates in the 14–16 age group [4]. A 2023 study among female college students found that 27% experienced severe pain, 42% moderate pain, and 31% mild pain [5]. Additionally, anemia prevalence among adolescent girls was 32%, meaning 3–4 out of 10 adolescents suffered from anemia.

The omega-3 and Fe content in canned sardines effectively controls dysmenorrhea pain and improves hemoglobin levels, preventing anemia in adolescent girls. The Asymp. Sig. values for pain reduction and hemoglobin improvement were both < 0.005, specifically 0.005 and 0.014, respectively. These findings highlight the potential of incorporating omega-3 and iron-rich foods, such as canned sardines, into school nutrition programs and public health initiatives aimed at improving adolescent health. Healthcare providers should consider recommending

this non-pharmacological approach to manage dysmenorrhea and prevent anemia in young girls.

Given the high global prevalence of dysmenorrhea and anemia in adolescents, it is essential to explore non-pharmacological interventions that can simultaneously address both conditions. Studies show that dysmenorrhea affects up to 90% of adolescent girls worldwide [6], while anemia, particularly iron-deficiency anemia, remains a leading cause of morbidity in young females, with the World Health Organization reporting that approximately 20% of adolescents are affected by anemia globally [7].

This research underlines the need for nutritional interventions to effectively manage both conditions. Sardine consumption, with its unique combination of omega-3 fatty acids and iron, offers a promising non-pharmacological option to address both dysmenorrhea and anemia, filling an important gap in adolescent healthcare. Further studies are needed to better understand the impact of such nutritional interventions and explore other non-pharmacological therapies or combinations that could improve adolescent health outcomes globally.

Women with dysmenorrhea in various countries manage symptoms through pharmacological and non-pharmacological approaches, with 21%–96% opting for self-management [1]. Although anemia is mentioned in prevalence, the biological mechanism of anemia is not explained before discussing treatment methods. Anemia in adolescent girls typically occurs due to insufficient iron intake, heavy menstrual bleeding, or poor absorption of nutrients, leading to a decrease in hemoglobin levels. A similar trend is observed in Indonesia, where 69% use non-pharmacological methods, 9% rely on pharmacological treatments, and 22% use a combination of both [8]. Primary dysmenorrhea results from an imbalance of prostaglandin levels in the bloodstream before menstruation, causing uterine muscle contractions. Excessive contractions can compress blood vessels, limiting oxygen supply and leading to pain and cramps in the lower abdomen [9].

Previous treatment methods focused more on the use of medications. However, in addition to medical treatment, consuming foods that help regulate prostaglandin production is a non-pharmacological alternative for managing these symptoms. Sardines, rich in omega-3, inhibit COX-1 enzyme activity, which converts omega-6 to prostaglandins, thereby controlling prostaglandin production. Additionally, sardines' Fe content supports hemoglobin production, preventing anemia [6].

This study aimed to assess the effectiveness of sardine consumption, specifically focusing on omega-3 fatty acids and iron, in managing dysmenorrhea and preventing anemia among adolescent girls. The primary objectives were to evaluate how sardine consumption influences prostaglandin production, which is associated with dysmenorrhea pain, and hemoglobin levels, which are crucial for addressing anemia. By focusing on these biological markers, the study sought to explore the potential of sardines as a non-pharmacological intervention for these common health concerns in adolescent girls.

To achieve this, a quasi-experimental design was used, where participants from SMK Bhakti Kencana Tasikmalaya were divided into an intervention group and a control group. The intervention group consumed sardines as part of their diet for a specific period, while the control group did not receive any dietary intervention. Data was collected on dysmenorrhea pain levels and hemoglobin concentrations before and after the intervention. Statistical analysis using the Wilcoxon test was employed to determine the significance of any changes observed in the two groups.

2. Research Method

This quasi-experimental study employed a non-randomized pre-test and post-test control group design to assess the effectiveness of sardine consumption in managing dysmenorrhea and preventing anemia [10]. The intervention's impact was evaluated based on changes in dysmenorrhea pain, measured using the Numeric Rating Scale (NRS), and hemoglobin levels, assessed through the Quick Check Set Hemoglobin Testing System. The complete sequence of the research procedure is visually presented in Figure 1, which outlines the key stages of this study design.

A random sampling method was used to select participants from SMK Bhakti Kencana Tasikmalaya. A total of 34 adolescent girls with dysmenorrhea were selected, with 16 students placed in the intervention group and 16 in the control group. One reserve student was assigned to each group, ensuring that participant numbers remained consistent throughout the study.

The intervention group received one can of sardines daily for three consecutive days before menstruation. Each can provided approximately 1.4 grams of omega-3 fatty acids, meeting the daily requirement of 1.1 grams, and 2.92 mg of iron per 100 grams, contributing toward the recommended daily intake of 15 mg. The duration of three days was chosen based on previous studies that suggest a short-term dietary intervention can have measurable effects on both pain reduction and nutritional status, especially for conditions like dysmenorrhea and mild anemia. However, future studies should further explore the optimal duration of such interventions [11].

While the study mentions the amount of omega-3 and iron in the sardines, it does not confirm whether participants met their daily iron intake requirements. Future studies could benefit from a more detailed assessment of participants' overall diet to ensure that

sardine consumption is the primary contributor to meeting daily nutritional needs, particularly for iron and omega-3 intake [12].

For analysis, univariate techniques were used to describe the frequency distribution of participant characteristics [13]. Data normality was tested using the Kolmogorov–Smirnov test, appropriate for samples below 100. Depending on the distribution, either a paired sample t-test (parametric) or a Wilcoxon test (non-parametric) was used to compare pre- and post-test results [14].

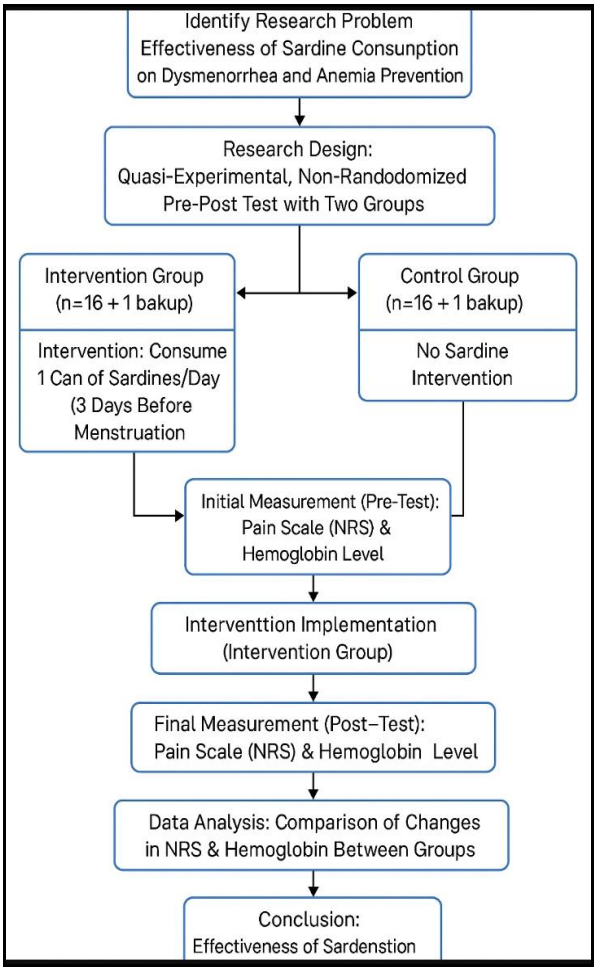

Figure 1. Research Stage

3. Result and Discussion

3.1. Univariate Analysis

Univariate analysis was conducted to describe the characteristics of the research participants and the distribution of key study variables before and after the intervention. This analysis includes the respondents' age distribution, dysmenorrhea pain levels in both control and intervention groups, and hemoglobin status as an indicator of anemia. The purpose of this analysis is to provide an overview of the baseline and post-intervention conditions of both groups, which is essential for understanding the effects of sardine consumption on pain reduction and hemoglobin improvement.

Table 1. Respondents' Characteristics Based on Age

Age	Frequency	Percentage (%)
16	21	65.6
17	7	21.9
18	4	12.5
Total	32	100.0

Table 1 presents the age distribution of respondents experiencing dysmenorrhea at SMK Bhakti Kencana Tasikmalaya. The majority were 16 years old (21 students or 65.6%), followed by 17 years old (7 students or 21.9%) and 18 years old (4 students or 12.5%).

Table 2. Dysmenorrhea Pain Scale in the Control Group Before and After Intervention

Pain Scale	Pre-Test Frequency (%)	Post-Test Frequency (%)
Mild Pain	8 (50.0 %)	9 (56.3 %)
Moderate Pain	8 (50.0 %)	7 (43.8 %)
Total	16 (100.0 %)	16 (100.0 %)

Table 2 shows the dysmenorrhea pain scale among female students in the control group before and after intervention without consuming sardines. Before the intervention, 8 students (50.0%) experienced mild pain, which increased to 9 students (56.3%). Meanwhile, those with moderate pain decreased from 8 students (50.0%) to 7 students (43.8%). No respondents experienced severe pain.

Table 3. Dysmenorrhea Pain Scale in the Intervention Group Before and After Intervention

Pain Scale	Pre-Test Frequency (%)	Post-Test Frequency (%)
Mild Pain	4 (25.0 %)	8 (50.0 %)
Moderate Pain	8 (50.0 %)	8 (50.0 %)
Severe Pain	4 (25.0 %)	0 (0.0 %)
Total	16 (100.0 %)	16 (100.0 %)

Table 3 illustrates the dysmenorrhea pain scale in the intervention group after consuming sardines for three consecutive days. Before the intervention, 4 students (25.0%) experienced mild pain, which increased to 8 students (50.0%). Students with moderate pain remained unchanged at 8 (50.0%), while those with severe pain decreased from 4 (25.0%) to none (0%).

Table 4. Hemoglobin Levels in the Control Group Before and After Intervention

Hemoglobin/Anemia Status	Pre-Test Frequency (%)	Post-Test Frequency (%)
Non-Anemia	11 (68.8 %)	11 (68.8 %)
Mild Anemia	4 (25.0 %)	4 (25.0 %)
Moderate Anemia	1 (6.3 %)	1 (6.3 %)
Total	16 (100.0 %)	16 (100.0 %)

Based on Table 4, the hemoglobin levels of students in the control group showed no significant changes before and after intervention without sardine consumption. Non-anemic students remained at 11 (68.8%), mild anemia cases stayed at 4 (25.0%), and moderate

anemia cases remained at 1 (6.3%). No students experienced severe anemia.

Table 5. Hemoglobin Levels in the Intervention Group Before and After Intervention

Hemoglobin/Anemia Status	Pre-Test Frequency (%)	Post-Test Frequency (%)
Non-Anemia	10 (62.5 %)	15 (93.8 %)
Mild Anemia	5 (31.3 %)	1 (6.3 %)
Moderate Anemia	1 (6.3 %)	0 (0.0 %)
Total	16 (100.0 %)	16 (100.0 %)

Table 5 reveals that the hemoglobin levels in the intervention group significantly improved after consuming sardines for three consecutive days. Non-anemic students increased from 10 (62.5%) to 15 (93.8%). Mild anemia cases decreased from 5 (31.3%) to 1 (6.3%), and moderate anemia cases were reduced to none (0%).

3.2. Bivariate Analysis

Bivariate analysis was conducted to examine the effect of sardine consumption on dysmenorrhea pain and hemoglobin levels among adolescent girls. This analysis involved testing the normality of the data using the Shapiro-Wilk test, followed by the Wilcoxon signed-rank test to compare pre- and post-intervention values within each group, as the data were not normally distributed. The results are presented in Tables 6 through 8.

Table 6. Shapiro-Wilk Normality Test in the Control Group

	Shapiro-Wilk Statistic
Pre-Pain	0.649
Post-Pain	0.625
Pre-Hemoglobin	0.649
Post-Hemoglobin	0.625

Table 6 shows the Shapiro-Wilk normality test results for the control group. The pain and hemoglobin levels before and after the intervention without sardine consumption were not normally distributed, with significance values less than 0.05.

Table 7. Shapiro-Wilk Normality Test in the Intervention Group

	Shapiro-Wilk Statistic
Pre-Pain	0.665
Post-Pain	0.665
Pre-Hemoglobin	0.823
Post-Hemoglobin	0.603

Table 7 shows that the intervention group data was not normally distributed before and after sardine consumption, as indicated by significance values less than 0.05.

Table 8. Effectiveness of Sardine Consumption in Managing Dysmenorrhea and Anemia Based on the Wilcoxon Test

Group	n	Z	Sig.
Control			
Pain	16	-1	0.317
Hemoglobin	16	0	1
Intervention			
Pain	16	-2.828	0.005
Hemoglobin	16	-2.449	0.014

The Wilcoxon test results indicate significant improvements in the intervention group for pain ($p = 0.005$) and hemoglobin levels ($p = 0.014$). In contrast, the control group showed no significant changes in either parameter.

Based on Table 8, the effectiveness of sardines in managing dysmenorrhea pain and hemoglobin levels among female students at SMK Bhakti Kencana Tasikmalaya was analyzed using the Wilcoxon test. For the control group (16 respondents), the pain scale Z value was -1.000, with an Asymp. Sig. value of 0.317 (> 0.05). The Z value for hemoglobin improvement was 0.000, with an Asymp. Sig. value of 1.000 (> 0.05). Since the Asymp. Sig. values for both variables were greater than 0.05, it can be concluded that there were no significant reductions in dysmenorrhea pain or improvements in hemoglobin levels in the control group after interventions other than sardine consumption.

The lack of significant changes in the control group suggests that factors other than the sardine intervention did not have a noticeable effect on pain reduction or hemoglobin levels. This finding emphasizes the importance of considering dietary interventions as a potential solution to health concerns such as dysmenorrhea and anemia. Without the dietary addition of sardines, which are rich in nutrients like omega-3 fatty acids and iron, no observable improvements were made in these areas [15].

In contrast, previous research indicates that omega-3 fatty acids, found in sardines, can help reduce inflammation, which is often associated with dysmenorrhea pain. Additionally, the iron content in sardines plays a vital role in addressing anemia by increasing hemoglobin levels. This could explain why the intervention group, who consumed sardines, may have experienced more significant changes in both pain levels and hemoglobin levels, as sardines help address the underlying causes of dysmenorrhea and anemia [16].

It is also important to consider potential confounding variables that could influence these results. Factors such as dietary habits, stress levels, and physical activity might have played a role in the control group's lack of improvement. If these variables were not adequately controlled, they may have masked any potential changes that could have occurred from other interventions. Future studies should aim to account for these confounding factors to better isolate the effects of sardines as a dietary intervention [14].

Overall, these findings suggest that incorporating sardines into the diet could be a promising non-pharmacological approach to managing dysmenorrhea and improving hemoglobin levels in adolescent girls. Given that the control group showed no significant improvement, the sardine intervention appears to be a

critical factor in these positive outcomes. Further research is necessary to confirm these results and explore the long-term benefits of sardine consumption in improving reproductive health and anemia among adolescents.

In the intervention group, the Z value for pain scale was -2.828, with an Asymp. Sig. value of 0.005 (< 0.05). For hemoglobin improvement, the Z value was -2.449, with an Asymp. Sig. value of 0.014 (< 0.05). Since the Asymp. Sig. values for both variables were less than 0.005, it can be concluded that there were significant reductions in dysmenorrhea pain and improvements in hemoglobin levels in the intervention group after consuming sardines.

This study, conducted at SMK Bhakti Kencana Tasikmalaya, involved 34 female students experiencing dysmenorrhea, divided into two groups: 16 in the intervention group and 16 in the control group. All participants met the inclusion criteria and provided informed consent. The researchers measured pain levels before the intervention using a Google Form questionnaire and the Numeric Rating Scale (NRS), where participants rated their pain intensity from 1 to 10. Measurements were repeated after the participants consumed sardines for three consecutive days.

The results showed significant differences in dysmenorrhea pain levels before and after the sardine consumption intervention. Pain severity decreased as follows:

1. Severe pain reduced from 13 participants (27.66%) to 2 participants (4.26%).
2. Moderate pain reduced from 23 participants (48.94%) to 11 participants (23.40%).
3. Mild pain increased from 11 participants (23.40%) to 21 participants (44.68%).
4. No pain cases increased from 0 participants (0.00%) to 13 participants (27.66%).

Similarly, hemoglobin levels improved:

1. Severe anemia reduced from 13 participants (27.66%) to 2 participants (4.26%).
2. Moderate anemia reduced from 13 participants (27.66%) to 2 participants (4.26%).
3. Mild anemia reduced from 13 participants (27.66%) to 2 participants (4.26%).
4. Non-anemia cases increased from 0 participants (0.00%) to 2 participants (4.26%).

After performing a normality test using the Kolmogorov-Smirnov method and analyzing the data with the Wilcoxon Signed Rank Test, the results indicated that the Asymp. Sig. values for the control group were greater than 0.005, meaning no significant changes occurred. In contrast, the intervention group showed Asymp. Sig. values less than 0.005, demonstrating significant reductions in dysmenorrhea pain and improvements in hemoglobin levels after sardine consumption.

According to the researchers, the results indicate that consuming sardines can reduce dysmenorrhea pain and improve hemoglobin levels in adolescent girls. This effectiveness is attributed to the role of omega-3 content in sardines, which inhibits prostaglandin production by affecting the COX-1 enzyme's interaction with omega-6. Additionally, the Fe content, although not substantial, contributes to hemoglobin production, supporting the formation of red blood cells.

These findings align with previous studies. Famimah (2017) found a significant relationship between omega-3 consumption and dysmenorrhea reduction in adolescents ($p = 0.015$). Omega-3 supplements (300 mg capsules containing 180 mg EPA and 120 mg DHA) were shown to be highly effective in relieving dysmenorrhea compared to placebo[13], [17]. A review of omega-3 fatty acids confirmed their ability to reduce prostaglandin production, alleviating dysmenorrhea during menstruation [18].

Foods rich in omega-3 fatty acids, such as fish oil, act as anti-inflammatory agents in endometriosis and dysmenorrhea. Increasing omega-3 intake facilitates its integration into uterine tissues, reducing prostaglandin production and subsequently alleviating uterine muscle contractions, vasoconstriction, and ischemia [4], [12].

Similarly, Fe supplementation has been proven effective in preventing anemia. Astuti (2023) demonstrated that 200 mg elemental iron with 0.25 mg folic acid effectively addressed anemia in adolescent girls aged 14–20 years. Fe supplementation increased hemoglobin levels from 14.00 g/dL to 14.59 g/dL ($p < 0.05$) [17], [18]. Similar findings, where tamban fish sticks improved hemoglobin levels in anemic adolescent girls due to their protein and Fe content ($p = 0.001$) [5].

Dysmenorrhea often recurs monthly in adolescent girls, particularly if accompanied by anemia. Therefore, schools and healthcare facilities, such as school health units (UKS) and affiliated community health centers (Puskesmas), should prioritize effective management strategies. Consuming canned sardines, which are practical, economical, and readily available, is an accessible solution for adolescents.

4. Conclusion

The omega-3 and Fe content in canned sardines effectively controls dysmenorrhea pain and improves hemoglobin levels, preventing anemia in adolescent girls. The Asymp. Sig. values for pain reduction and hemoglobin improvement were both < 0.005, specifically 0.005 and 0.014, respectively. These findings highlight the potential of incorporating

omega-3 and iron-rich foods, such as canned sardines, into school nutrition programs and public health initiatives aimed at improving adolescent health. Healthcare providers should consider recommending this non-pharmacological approach to manage dysmenorrhea and prevent anemia in young girls. Further research should explore other non-pharmacological therapies or combinations that effectively manage dysmenorrhea and improve hemoglobin levels in adolescent girls, ensuring better control of these conditions

Acknowledgments

This study would not have been possible without the support of various parties, including the Rector of Bhakti Kencana University through the Directorate of Research and Community Service for providing internal grants, the Principal and students of SMK Bhakti Kencana Tasikmalaya for granting permission and participation, and the research team for their dedication in completing this study.

References

[1] A. Kumari, M. M. Zahanat, M. Ghorbarpour, V. Singh, J. Madan, V. K. Gauttam, and A. Baldi, "*Nutraceuticals: Perspectives and Prospects*," in *Indigenous Medicinal Plants and Formulation*, Iterative International Publishers, Feb. 2025, pp. 72–155.

[2] A. Wuni, B. Abena Nyarko, M. Mohammed Ibrahim, I. Abdulai Baako, I. S. Mohammed, and C. Buunaaisie, "Prevalence, Management, and Impact of Dysmenorrhea on the Lives of Nurse and Midwife Trainees in Northern Ghana," *Obstetrics and Gynecology International*, vol. 2023, pp. 1–11, Aug. 2023, doi: 10.1155/2023/8823525.

[3] B. Jakše, "Placing a well-designed vegan diet for slovenes," *Nutrients*, vol. 13, no. 12, 2021, doi: 10.3390/nu13124545.

[4] J. Rani, "Health and Nutritional Benefits Provided by Superfoods : A Review Health and Nutritional Benefits Provided by Superfoods : A Review," no. July, 2024, doi: 10.20546/ijcmas.2024.1307.013.

[5] F. C. Rahmawati, "Hubungan Asupan Zat Besi dan Usia Menarche dengan Kejadian Dismenore pada Remaja Putri," *J. Penelit. Inov.*, vol. 2, no. 3, pp. 469–476, 2023, doi: 10.54082/jupin.105.

[6] Yuli Zuhkrina and M. Martina, "Determinan Faktor Penyebab Dismenore pada Remaja Putri di Desa Lubuk Sukon Kecamatan Ingin Jaya Kabupaten Aceh Besar Tahun 2022," *Sehat Rakyat J. Kesehat. Masy.*, vol. 2, no. 1, pp. 123–130, 2023, doi: 10.54259/sehatrakyat.v2i1.1504.

[7] K. JASMINE, "Penambahan Natrium Benzoat Dan Kalium Sorbat (Antiinversi) Dan Kecepatan Pengadukan Sebagai Upaya Penghambatan Reaksi Inversi Pada Nira Tebu," *Indones. Midwifery Heal. Sci. J.*, vol. 6, no. 1, 2022.

[8] P. E. Apriliani, F. M. Wathan, R. Dhamayanti, and A. Arif, "Faktor Yang Berhubungan Dengan Kejadian Dismenore Pada Remaja Putri Di Smp Negeri 4 Banyuasin Iii Factors Associated With the Incidence of Dysmenorrhea in Young Women At Smp Negeri 4 Banyuasin Iii," *J. Kesehat. Saintika Meditory*, vol. 7, no. 1, pp. 45–53, 2024, [Online]. Available: https://jurnal.syedzasaintika.ac.id

[9] A. Cindy, "Hubungan Asupan Zat Besi Dengan Derajat Dismenorea Pada Remaja Putri Di Smk N 1 Jenar Kabupaten Sragen," p. 20, 2022.

[10] O. Women and C. S. Hospital, *SAHASRA : A THOUSAND PATHS TO WOMEN ' S HEALTH IN INDIA*, no. September. 2024.

[11] J. Salsabilla, "Hubungan Kebiasaan Konsumsi Fast Food, Tingkat Stres Dan Status Gizi Terhadap Kejadian Dyshmenorrhea Primer Pada Siswi Di Sman 12 Kota Bekasi," *Jihan Salsabilla*, 2022, [Online]. Available: https://repository.binawan.ac.id/2096/1/GIZI-2022-JIHAN SABILLA.pdf

[12] D. Rika Widianita, "Hubungan Tingkat Kecukupan Protein Dan Status Anemia Terhadap Kejadian Dismenore Pada Remaja Putri Smp Islam Plus Al-Azhar Mojokerto," *AT-TAWASSUTH J. Ekon. Islam*, vol. VIII, no. I, pp. 1–19, 2023.

[13] Syamsurati, "Pengaruh Kadar Hemaglobin terhadap Kejadian Dismenore pada Mahasiswi Ke-bidanan Universitas Megarezky Makassar," *GHIZAI J. Gizi dan Kel.*, vol. 1, no. 2, pp. 2809–3011, 2022, [Online]. Available: https://journal.unimerz.com/index.php/ghizai

[14] D. K. Sari *et al.*, "Latihan Isometrik Sebagai Upaya Penanganan Nyeri Dismenore Primer Pada Remaja Putri Di Sekolah Berasrama," vol. 8, no. 1, pp. 257–264, 2025.

[15] N. Djimbula, J. J. Kristiarini, and Y. Ananti, "Efektivitas Senam Dismenore dan Musik Klasik Terhadap Penurunan Dismenore Pada Remaja," *J. Ilm. Kesehat. Sandi Husada*, vol. 11, no. 1, pp. 288–296, 2022, doi: 10.35816/jiskh.v11i1.754.

[16] P. Kebidanan, "Mini Seminar Kesehatan Reproduksi " Kupas Tuntas Masalah Anemia , Dismenorea , SADARI & Strategi Penanganan," vol. 5, no. December, pp. 38–45, 2024.

[17] P. Putri, D. Mediarti, and D. Della Noprika, "Hubungan Tingkat Stres Terhadap Kejadian Dismenore Pada Remaja Putri," *JKM J. Keperawatan Merdeka*, vol. 1, no. 1, pp. 102–107, 2021, doi: 10.36086/jkm.v1i1.989.

[18] H. G. Pratiwi, D. Tamalsir, and N. Riyanti, "Hubungan anemia dengan derajat dismenore pada mahasiswa tingkat pertama fakultas kedokteran universitas pattimura tahun akademik 2022/2023," *Pameri (Pattimura Med. Rev.*, vol. 6, no. 1, p. 44, 2024.