International Journal of Health Literacy and Science 2 (2) (2024)
International Journal of Health Literacy and Science
https://ihelis.com

The Difference In Menstrual Pain (Dysmenorrhea) Levels Before And After Pineapple (Ananas Comosus L.) Consumption In Early Adolescents At Mts Muhammadiyah 09 Purbalingga

Mutiarani Nur Filanti[1*], Ima Syamrotul Muflihah[2]

[1,2]Universitas Muhammadiyah Purwokerto, Indonesia

Article Info

Article History

Submitted: October 4, 2023

Revised: September 18, 2024

Accepted: November 13, 2024

Keywords:
Menstrual Pain;
Pineapple;
Early Adolescents

Abstract

Adolescence is a transitional phase, and during this period, young girls experience menstruation. Menstruation is often accompanied by menstrual pain (dysmenorrhea), which is characterized by lower abdominal pain that can radiate to the lower back and thighs. The World Health Organization (WHO) reported in 2018, as cited by Ariyanti et al. (2020), that dysmenorrhea affects more than 50% of women in each country worldwide. In Indonesia, the prevalence of dysmenorrhea is 64.25%, comprising primary dysmenorrhea at 54.89% and secondary dysmenorrhea at 9.36%. According to the Central Java Health Department's profile data, there are 2,899,120 female adolescents aged 10 to 19 years, and 1,465,876 of them experience dysmenorrhea. Pineapple (Ananas Comosus L.) is one of the non-pharmacological therapies used to alleviate menstrual pain. This study aimed to analyze the difference in menstrual pain (dysmenorrhea) levels before and after consuming pineapple (Ananas Comosus L.) among early adolescents at MTs (Islamic Junior High School) Muhammadiyah 09 Purbalingga. Pre-Experiment using a one-group pretest-posttest research design. The purposive Sampling Technique was used to select 50 respondents. The research instruments included a questionnaire and the Numeric Rating Scale (NRS). Respondents were in the early adolescent phase (11-14 years). The level of menstrual pain before consuming pineapple showed that a majority experienced mild menstrual pain, with 27 respondents (54%), while after consuming pineapple, a majority reported being pain-free, with 37 respondents (74%). The paired t-test analysis resulted in a P value of 0.001, indicating a significance level of 0.05, which means that H1 is accepted, signifying a difference in menstrual pain levels before and after pineapple consumption among early adolescents at the school.

*Correspondence Address:
Universitas Muhammadiyah Purwokerto
Jl. KH. Ahmad Dahlan, Kembaran, Banyumas Indonesia
E-mail:
mutiaraninurfilanti2001@gmail.com

pISSN 2964-2035
eISSN 3025-9258

Introduction

The human change from childhood to adulthood is called the adolescent phase (Zuliawati, 2021). Menstruation in young women is usually accompanied by menstrual pain or dysmenorrhea. The average incidence of dysmenorrhea globally is more than 50% of women who experience dysmenorrhea in any country in the world according to the World Health Organization (WHO) in 2018 (Ariyanti et al., 2020). Dysmenorrhea in the United States is around 60% (Yuria R.A. et al., 2022, Sari. et al., 2022). In Thailand, the incidence of dysmenorrhea in young women is 84.2%. In Malaysia, 62.3% of young women experience menstrual pain (Zuliawati, 2021). In Indonesia, 64.25% of women experience menstrual pain, consisting of 54.89% primary dysmenorrhea and 9.36% secondary dysmenorrhea. In Central Java, as many as 2,899,120 young women aged 10-19 years and 1,465,876 people experienced dysmenorrhea (Central Java Health Service Profile; Husna, 2019). The results of a preliminary study at Muhammadiyah 09 Purbalingga in 90 female students and 72 students had experienced menstruation. As many as 66 (91.6%) students who had experienced menstruation experienced menstrual pain in the lower abdomen which caused them to miss some subjects. The introduction should briefly place the study in a broad context and highlight why it is important. It should define the purpose of the work and its significance. The current state of the research field should be carefully reviewed and key publications cited. Please highlight controversial and diverging hypotheses when necessary. Finally, briefly mention the main aim of the work and highlight the principal conclusions. As far as possible, please keep the introduction comprehensible to scientists outside your particular field of research.

Pharmacological and non-pharmacological therapy is a method to reduce menstrual pain or dysmenorrhea. Pharmacological therapy includes administering analgesic drugs or non-steroidal prostaglandin drugs (Anggraini, et al., 2022). Non-pharmacological therapies include physical activity, exercise, warm compresses on painful parts, listening to music, relaxation, and drinking herbal drinks (Zuliawati, 2021). One type of fruit is pineapple (Ananas Comosus L.). This fruit can be used by consuming it to reduce menstrual pain, namely pineapple (Ananas Comosus. L) (Yuria R.A. et al., 2022; Agustiani et al., 2019).

The nutritional value of pineapple is in the form of protein, fat, carbohydrates, minerals, and vitamins. Pineapple fruit (Ananas comosus L.) contains bromelain enzyme. Bromelin is an anti-inflammatory agent, also has analgesic and anti-edema benefits, and is said to have anticoagulant, anticoagulant, and fibrinolytic effects. (Agustiani, et al., 2019; Zuliawati, 2021).

Research (Agustiani, et al., 2019) states that the dose of using pineapple as a therapy for dysmenorrhea is 3.75 g/kg BW in a day. Pineapple is consumed for 3 days before menstruation. Pineapple fruit is safe to consume as much as 2 x 100 grams or the equivalent of 200 grams per day (Octadiani & Hermayanti, 2013). In a study conducted by (Agustiani, et al., 2019) on 30 female students, the results showed that pineapple juice can reduce menstrual pain. This is also supported by research conducted by (Wrisnijati, et al., 2019) which says that pineapple juice can reduce menstrual pain or dysmenorrhea. Based on the background and problems above, the researcher is interested in conducting research with the title "Differences in Menstrual Pain Levels (Dismorrhea) Before and After Giving Pineapple Fruit (Ananas Comosus L.) to Early Adolescents at Mts Muhammadiyah 09 Purbalingga".

Methods

The type of research used is quantitative. This study used an experimental method with a quasi-experimental design (Sugiyono, 2014). The research design was a one-group pretest-posttest design. The independent variable in this research is "Pineapple (Ananas comosus L.)". The dependent variable in this study is "differences in menstrual pain levels".In this study, the population was all female students at MTs. Muhammadiyah 09 Purbalingga with a total of 90 students. The research sample consisted of 50 respondents, namely purposive sampling. The instruments used were Standard Operational Procedures and measuring menstrual pain with the Numeric Recting Score (RSC). Data analysis used univariate analysis and bivariate analysis with the Paired t-test.

Results

Univariate analysis

Table 1. Table Of Characteristics Of Respondents (n=50)

Characteristics	Frequency	(%)
Age		
11	1	2.0
12	5	10.0
13	17	34.0
14	27	54.0
Total	50	100.0
Class		
7	14	28.0
8	22	44.0
9	14	28.0
Total	50	100.0
Menarche		
10	2	4.0
11	22	44.0
12	17	34.0
13	7	14.0
14	2	4.0
Total	50	100.0

The results showed that most of the respondents were in grade 8, namely 22 respondents (44%). Most respondents were at the age of 14 years 27 respondents (54%). Most adolescents experienced menarche at the age of 11, namely 22 respondents (44%), and at this age it was found that most of the respondents experienced mild pain before intervention as many as 15 respondents at MTs Muhammadiyah 09 Purbalingga

Menstrual Pain Levels Before and After Giving Pineapple

The results of research that has been conducted on early adolescents in MTs. Muhammadiyah 09 Purbalingga showed that before being given pineapple there was mild pain intensity (1-3) in 26 respondents (52%), moderate pain (4-6) in 20 respondents (40%) and severe pain (7-10) 4 respondents (8%). Menstrual pain after being given pineapple fruit has a scale that tends to decrease. The results showed that the intensity of menstrual pain after being given pineapple fruit became painless (0) 37 respondents (74%), mild pain (1-3) 12 respondents (24%), and moderate pain (4-6) 1 respondent (2%). These results showed that there was a reduction in the intensity of menstrual pain before the intervention was carried out by respondents experiencing menstrual pain 4 respondents (8%) and after being given the intervention one experienced severe menstrual pain, respondents who experienced moderate menstrual pain before the intervention were 20 respondents (40%) and after the intervention was 1 respondent (2%), respondents who experienced mild menstrual pain before the intervention was carried out 26 respondents (52%) became 12 respondents (24%) and after the intervention there were 37 respondents (74%) did not experience menstrual pain.

Bivariate analysis

Table 2. Table Of Characteristics Of Respondents (n=50)

Variable	Mean	SD	t(df)	*p-value*	*CI* 95%	
					Lower	**Upper**
Menstrual Pain Before and after being given pineapple	1.28000	0.57286	15.800	<0.001	1,11720	1.44280

This research was conducted on 50 respondents so that the normality test was not carried out and the paired t-test was carried out. The results of the paired t-test, the p-value of 0.001 mean the p-value <0.05, so Ha is accepted. Ha is accepted, meaning that there is a significant difference in the level of menstrual pain before and after being given pineapple (Ananas comosus L.) in early adolescents at MTs. Muhammadiyah 09 Purbalingga. These results are consistent with research (Wrisnijati, et al., 2019) that

giving 3.75 grams/KgBB of pineapple can reduce the level of menstrual pain. It is known that the lower value is 1.11720 and the upper value is 1.44280 on the statistical test results with a slight difference, namely 0.3256. The correlation between the p-value and the lower-upper value shows that there is a significant difference between menstrual pain before and after being given the pineapple fruit intervention of 3.75 grams/KgBB.

Discussion

The results of research on 50 early adolescents in MTs. Muhammadiyah 09 Purbalingga is given pineapple fruit as much as 3.75 gr/KgBB starting 3 days before menstruation to find out the difference in the level of menstrual pain before and after being given pineapple fruit as follows:

Characteristics of Respondents

Most respondents were at the age of 14 years 27 respondents at MTs Muhammadiyah 09 Purbalingga. The results of the research on the age characteristics of the respondents were included in the early adolescent category, namely at the age of 11-14 years. This categorization is based on the theory that early youth is someone aged 11-14 years (Yunalia et al., 2022).

During adolescence, there are changes in the physical, psychological, social, and intellectual aspects of puberty, including the development of the genitals. (Marlia, 2020). Because the reproductive organs are still experiencing growth, the reproductive organs are not ready to experience changes, and the cervix is still narrow and causes menstrual pain (Gunawati & Nisman, 2021). In addition, menstrual pain in young women is caused by uterine muscle contractions during the menstrual cycle, which reduces blood flow, increases the movement of the uterus to meet the needs of soft blood circulation, and increases blood muscles and stimulates nerve endings so that it hurts. (Marlia, 2020) .

The results of the study most of the respondents experienced mild menstrual pain that occurred in respondents who were 14 years old. Apart from that most of the respondents were at the age of 14 years because the secretion of the hormone prostaglandin was not yet perfect (Gunawati & Nisman, 2021). Another thing that can affect menstrual pain in adolescents is related to the etiology of menstrual pain, namely psychological factors that are not yet stable, including frequent emotional changes. (Kusmiati, 2022).

Another factor that causes menstrual pain is the age of menarche <12 years. The results of the study most of the respondents experienced menarche aged 11 years, 22 respondents (44%) which could be a risk factor for primary dysmenorrhea (Sari, et al., 2022). Menstrual pain occurs because the concentration of the hormone estradiol in the serum is higher but the hormones testosterone and dehydroepiandosterone are in lower concentrations in women with early menarche causing an increase in the hormones estrogen and progesterone (Gunawati & Nisman, 2021). It was stated in research (Marlia, 2020) that the first menstrual pain occurs two to three years after starting menstruation. This is related to the fact that the first menstrual pain occurs at the age of 14, even though the ideal age for menstruation is 12 and 13 years. Reproductive organs that are not ready and the cervix is still narrow are the causes of menstrual pain. In addition, there is an increase in the hormones estrogen and progesterone. High progesterone hormone can increase prostaglandin synthesis in the endometrium. High prostaglandin levels make menstrual cramps worse (Gunawati & Nisman, 2021)

Menstrual Pain Levels Before and After Giving Pineapple

Menstrual pain begins when fertilization or implantation has not occurred, and levels of estrogen and progesterone fall, produced by the circulating hypothalamus, which stimulates prostaglandins in the uterus. Prostaglandins are compounds derived from phospholipids. Phospholipids are converted to arachidonic acid by the enzyme phospholipase. This acid is recycled into cyclic prostaglandin endoperoxide from the PGG2 form with the help of endoperoxyisomerase and peroxidase enzymes. PGH2 turns into PGF2a which is formed by PGF2a reductase and peroxidase enzymes. The prostaglandins produced stimulate uterine contractions (Ningsih, 2019). The decrease in menstrual pain after consuming pineapple is in line with research (Agustiani, et al., 2019), (Wrisnijati, et al., 2019) and (Yuria R.A. et al., 2022) because pineapple contains the enzyme bromelain, which works by slowing uterine contractions and reducing bradykinin and prekallikrein levels resulting in reduced arachidonic acid release and inhibition of prostaglandin PGE2 production which is the body's pain stimulus receptor so that pain is reduced.

The results of this study showed a decrease in pain levels after being given pineapple fruit as much as 3.75 g/kg BW, agreeing with research (Wrisnijati et al., 2019) that giving pineapple at a dose of 3.75 g/Kg BW is effective in reducing primary menstrual pain in female adolescents. Pineapple fruit given 3 days before menstruation shows that pineapple fruit (Ananas Comosus L.) can reduce menstrual pain in MTs students. Muhammadiyah 09 Purbalingga is due to the bromelain enzyme content found in pineapples. According to (Astuti, et al., 2022) menstrual pain begins 2-3 days before menstruation or 1-2 days during

menstruation so pineapple fruit is given 3 days before menstruation until the first day of menstruation. The result was that there was a decrease in menstrual pain on the first day of menstruation given intervention for 3 days. This research is in line with (Wrisnijati et al., 2019) which gives pineapple fruit for three days and can reduce the level of menstrual pain in young women. In addition (Setianingsih & Widyawati, 2018) said giving pineapple juice 3.75 g/KgBB and honey at a dose of 230 ml can reduce menstrual pain.

Bivariate analysis

The results of this study are following research (Agustiani et al., 2019) that giving pineapple juice affects the level of menstrual pain before and after being given pineapple juice. Giving pineapple gives a different difference in decreasing pain scale because each respondent has his subjective feeling of pain. Research (Zuliawati, 2021) is in line with the results of this study, which stated that pineapples were able to reduce the level of menstrual pain in young women. Research (Nineu et al., 2023) is following the results of this study that buying pineapple juice can reduce menstrual pain levels.

The bromelain enzyme in pineapple can reduce prostaglandin secretion and slow down continuous uterine contractions. The causes of menstrual pain are increased prostaglandin hormones and continuous uterine contractions. In addition, bromelain can reduce levels of bradykinin and prekallikrein in serum, inhibit the production of prostaglandin PGE2, and reduce the release of arachidonic acid so that pain is reduced. (Zuliawati, 2021).

Apart from reducing menstrual pain, according to (Damanik, 2019) the bromelain enzyme in pineapple fruit is effective in reducing tonsillitis pain, accelerating wound healing, suppressing streptococcus bacteria, and increasing the absorption of antibiotics and postoperative healing. The bromelain enzyme in pineapple fruit has anti-inflammatory, and fibrinolytic activity, prevents platelet aggregation, and can reduce pain that occurs due to bacterial inflammation that causes pain.

Bromelain effectively plays an important role in reducing most of the inflammatory mediators in various conditions and if given Bromelain before surgery can reduce the average amount of postoperative pain and wound inflammation. Bromelain in pineapples is effective in reducing swelling, bruising, and episiotomy pain, treating acute inflammation and sports injuries (Putri & Anita, 2017).

Inhibition of the production of prostaglandins and pain-stimulating receptors by vitamin E in pineapple can reduce the level of menstrual pain. Vitamin E is a vasodilator that relaxes the smooth muscle of the uterus by increasing the production of prostacyclin and PGE2. (Setianingsih & Widyawati, 2018).

Research Limitations

Research on early adolescents at MTs. Muhammadiyah 09 Purbalingga has limitations, namely the research permit letter from the department is delayed. Apart from that, respondents were less interactive so they needed more monitoring and some respondents experienced menstruation at night or during school holidays so researchers had difficulty visiting the respondent's house or meeting the school. So researchers monitor research interventions through video calls.

Conclusion

Contain conclusions and recommendations. Conclusions contain answers to the research questions. Recommendations refer to the results of research and practical forms of action, specifying to whom and for what recommendation is intended. Written in essay form, not in numerical form The conclusions of this study are as follows. The percentage of menstrual pain before being given pineapple fruit was mostly 14 years old, with as many as 27 respondents (54%). The percentage of menstrual pain after being given pineapple fruit is mostly without menstrual pain as many as 37 respondents (74%). The results of the paired t-test show a P value of <0.001, which means a significance value of <0.05. There was a significant difference in the level of menstrual pain before and after being given pineapple (Ananas Comosus. L) in early adolescents at Mts. Muhammadiyah 09 Purbalingga.

Funding

This research received no external funding.

Institutional Review Board Statement

The study was conducted following the Declaration of Helsinki, and approved by the Institutional Review Board (or Ethics Committee) of Faculty Health And Saincs Universitas Muhammadiyah Purwokerto.

Conflicts of Interest

The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decisionto publish the results".

References

Agustiani, I. N., Ekawati, H., & Kartikasari, R. I. (2019). *Pengaruh Pemberian Jus Nanas (Ananas Comosus L.) Terhadap Penururnan Nyeri Menstruasi (Dismenore) Pada Mahasiswi Keperawatan Semester VII Universitas Muhammadiyah Lamongan*.

Ahyar, H., Maret, U. S., Andriani, H., Sukmana, D. J., Mada, U. G., Hardani, S.Pd., M. S., Nur Hikmatul Auliya, G. C. B., Helmina Andriani, M. S., Fardani, R. A., Ustiawaty, J., Utami, E. F., Sukmana, D. J., & Istiqomah, R. R. (2020). *Buku Metode Penelitian Kualitatif & Kuantitatif* (Issue March).

Ammar, U. R. (2016). Faktor Risiko Dismenore Primer pada Wanita Usia Subur di Kelurahan Ploso Kecamatan Tambaksari Surabaya. *Jurnal Berkala Epidemiologi*, *4*(1), 37–49. https://doi.org/10.20473/jbe.v4i1.37-49

Anggraeni, K. F., Fitriani, N., & Indriyanti, N. (2020). Efektivitas Asam Mefenamat terhadap Penurunan Nyeri Dismenore Berdasarkan Numeric Rating Scale Proceeding of Mulawarman Pharmaceuticals Conferences. *Proceeding of Mulawarman Pharmaceuticals Conferences*, *12*, 58–81.

Anggraini, M. A., Lasiaprillianty, I. W., & Danianto, A. (2022). Diagnosis dan Tata Laksana Dismenore Primer. *Cermin Dunia Kedokteran*, *49*(4), 201. https://doi.org/10.55175/cdk.v49i4.1821

Ariyanti, V. D., Veronica, S. Y., & Kameliawati, F. (2020). Pengaruh pemberian jus wortel terhadap penurunan skala nyeri dismenore primer pada remaja putri. *Wellness And Healthy Magazine*, *2*(2), 277–282. https://doi.org/10.30604/well.022.82000114

Astuti, Y. F., Munawaroh, S., Mashudi, S., Isro'in, L., & Nurhidayat, S. (2022). Hubungan Aktivitas Fisik Harian Dengan Kejadian Dismenorea Pada Remaja Siswi Kelas Viii Smpn 3 Ponorogo. *Health Sciences Journal*, *6*(1), 58. https://doi.org/10.24269/hsj.v6i1.1158

Damanik, C. (2019). Pengaruh Pemberian Jus Babas Muda (Ananas Comosus) Dalam Menurunkan IIntensitas Nyeri Pada Luka Radang Amandel (Tonsilitis). *Jurnal Medika : Karya Ilmiah Kesehatan*, *4*(Vol 4 No 2 (2019): Jurnal Medika : Karya Ilmiah Kesehatan Vol 4 No 2 Tahun 2019). http://jurnal.stikeswhs.ac.id/index.php/medika/article/view/100

Dzulqaidah, I., Zanuba, R. B., Alwi, A. S. F., Salsabila, A. R. P., Mursidi, S., & Muliasari, H. (2021). Ekstraksi dan Uji Aktivitas Enzim Bromelin Kasar dari Buah Nanas. *Journal of Agritechnology and Food Processing*, *1*(2), 80. https://doi.org/10.31764/jafp.v1i2.6974

Farid Hossain, M. (2015). Nutritional Value and Medicinal Benefits of Pineapple. *International Journal of Nutrition and Food Sciences*, *4*(1), 84. https://doi.org/10.11648/j.ijnfs.20150401.22

Fauziyah Rahman, S., Wisnu Hardi, G., Artha Jabatsudewa Maras, M., & Rachmia Riva, Y. (2020). Influence of Curcumin and Ginger in Primary Dysmenorrhea: A Review. *International Journal of Applied Engineering Research*, *15*(7), 634–638. http://www.ripublication.com

Guimarães, I., & Póvoa, A. M. (2020). Primary Dysmenorrhea: Assessment and Treatment. *Revista Brasileira de Ginecologia e Obstetricia*, *42*(8), 501–507. https://doi.org/10.1055/s-0040-1712131

Gunawati, A., & Nisman, W. A. (2021). Faktor-Faktor yang Berhubungan dengan Tingkat Dismenorea di SMP Negeri di Yogyakarta. *Jurnal Kesehatan Reproduksi*, *8*(1), 8. https://doi.org/10.22146/jkr.56294

Hardani, Nur Hikmatul Auliyah, Helmina Andriani, Roushandy Asri Fardani, Jumari Ustiawaty, Evi Fatmi Utami, D. J. S. & R. R. I. (2020). Buku Metode Penelitian Kualitatif dan Kualitatif. In *Repository.Uinsu.Ac.Id* (Issue April).

Husna, N. (2019). Gambaran Aktivitas Olahraga Pada Penderita Dismenorea Di Pondok Pesantren Al-Mas'udiyyah Putri 2 Blater Kabupaten Semarang Tahun 2019. In *Αγαη* (Vol. 8, Issue 5).

Indra P, I. M., & Cahyaningrum, I. (2019). *Cara Mudah Memahami Metodologi Penelitian* (Cetakan Pe). Deepublish.

Joni, A., & Melia Akrinisa, SP .MP, M. A. M. S. (2019). Keragaman Morfologi Tanaman Nanas(Ananas Comosus (L) Merr) Di Kabupaten Indragiri Hilir. *Jurnal Agro Indragiri*, *4*(1), 34–38. https://doi.org/10.32520/jai.v4i1.1052

Kurnia Dewi, M. U., Mustika, D. N., & Indrawati, N. D. (2022). Penyuluhan Tentang Dysmenorrhoe Di Panti Asuhan Ning Amriyah Supardo Kendal. *Jurnal Pengabdian Masyarakat Kebidanan*, *4*(1), 1. https://doi.org/10.26714/jpmk.v4i1.8892

Kusmiati. (2022). Nyeri Hiad, Penyebab dan Penanggulanganya. *J. Pijar MIPA*, *VI*(1), 367–372.

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

Marlia, T. (2020). Hubungan Antara Usia Dan Tingkat Pengetahuan Dengan Penanganan Dismenore Pada Remaja Putri Di Smk Widya Utama Indramayu Tahun 2019. *Afiasi : Jurnal Kesehatan Masyarakat*, *5*(1), 41–50. https://doi.org/10.31943/afiasi.v5i1.92

Nineu, Eka Sugiatini, T., & Oktiarina, V. (2023). The Effect Of Giving Pineapple Juice And Honey On Reducing Menstrual Pain (Dysmenorrhea) In Adolescent Women At SMPN 1 Rangkasbitung Lebak Banten. *International Journal Of Health Science*, *3*(1), 104–108.

Ningsih, A. R. (2019). Aplikasi Aromaterapi Lemon (Cytrus) pada Nn. s dengan Nyeri Akut. In *Karya Tulis Ilmiah (Gelar Ahli Madya Keperawatan)*.

Nurfadilah, A. (2020). Penatalaksanaan Non Farmakologi Untuk Mengurangi Nyeri Dismenorea Pada Remaja. In *Kaos GL Dergisi* (Vol. 8, Issue 75). https://doi.org/10.1016/j.jnc.2020.125798%0Ahttps://doi.org/10.1016/j.smr.2020.02.002%0Ahttp://www.ncbi.nlm.nih.gov/pubmed/810049%0Ahttp://doi.wiley.com/10.1002/anie.197505391%0Ahttp://www.sciencedirect.com/science/article/pii/B9780857090409500205%0Ahttp:

Nuryadi, Astuti, T. D., Utami, E. S., & Budiantara, M. (2017). *Buku ajar dasar-dasar statistik penelitian* (1st ed.). Sibuku Media.

Putri, Latifa Octadiani. Diah Hermayanti, F. S. (2013). Pengaruh Pemberian Ekstrak Buah Nanas (Ananas comosus L . Merr). *Saintika Medika*, *9*(1), 25–32.

Putri, A. B., & Anita, A. (2017). Efek Anti Inflamasi Enzim Bromelin Nanas Terhadap Osteoartritis. *Jurnal Kesehatan*, *8*(3), 489. https://doi.org/10.26630/jk.v8i3.681

Roflin, E., Liberty, I. A., & Pariyana. (2021). *Populasi. Sampel, Variabel dalam Penelitian Keddokteran* (Moh.Nasrudin (ed.); Cetakan Ke). PT. Nasya Expanding Management.

Setianingsih, Y. A., & Widyawati, N. (2018). Pengaruh Pemberian Jus Nanas dan Madu terhadap Penurunan Nyeri Menstruasi (Dismenore) pada Remaja Putri di SMP Tri Tunggal II Surabaya. *IIfokes : Info Kesehatan*, *8*(2), 34–38.

Sinaga, E., Saribanon, N., Suprihatin, Sa'adah, Ummu, S., Murti, Y. A., Agusniar, T., & Lorita, S. (2017). *Menejem Kesehatan Menstruasi*. Universitas Nasional. https://www.ptonline.com/articles/how-to-get-better-mfi-results

Sugiyono. (2014). *Metode Penelitian Kombinasi (Mixed Method)* (Sutopo (ed.); 6th ed.). ALFABETA.

Sumantri, A. (2015). *Metodologi Penelitian Kesehatan* (Murodi & F. Ekayanti (eds.); Cetakan ke). Kencana Prenada Media Group.

Sun, G. M., Zhang, X. M., Soler, A., & Marie-Alphonsine, P. A. (2015). Nutritional Composition of Pineapple (Ananas comosus (L.) Merr.). In *Nutritional Composition of Fruit Cultivars*. Elsevier Inc. https://doi.org/10.1016/B978-0-12-408117-8.00025-8

Suryana, E., Wulandari, S., Sagita, E., & Harto, K. (2022). Perkembangan Masa Remaja Akhir (Tugas, Fisik, Intelektual, Emosi, Sosial dan Agama) dan Implikasinya pada Pendidikan. *JIIP - Jurnal Ilmiah Ilmu Pendidikan*, *5*(6), 1956–1963. https://doi.org/10.54371/jiip.v5i6.664

Tiara Mayang Sari, Suprida, Rizki Amalia, S. Y. (2022). Faktor-Faktor yang Berhubungan Dengan Dismenorea Pada Remaja Putri di MAN 1 Ogan Komering Ulu. *Jurnal Ilmu Kesehatan UMC*, *11*(1), 42.

Todorov, S. D., & Ivanova, I. V. (2015). Tropical fruits - from cultivation to consumption and health benefits: Papaya. In *Tropical Fruits - From Cultivation to Consumption and Health Benefits: Papaya*.

Wibowo, A. E. (2021). *Metode Penelitian Pegangan untuk Menulis Karya Ilmiah* (A. Kurniawan, N. Hery, & L. Forsia (eds.)). Penerbit Insania.

Wrisnijati, D., Wiboworini, B., & Sugiarto, S. (2019). Effects of Pineapple Juice and Ginger Drink for Relieving Primary Dysmenorrhea Pain among Adolescents. *Indonesian Journal of Medicine*, *4*(2), 96–104. https://doi.org/10.26911/theijmed.2019.04.02.03

Yonkers, K. A., O'Brien, P. M. S., & Eriksson, E. (2008). Premenstrual syndrome Seminer Lancet. *Lancet*, *371*, 1200–10. papers2://publication/uuid/ F873CFF2-88E6-431A-B349-DE480FE583FF

Yunalia, E. M., Suharto, I. P. S., & Pakili, I. A. (2022). Analisis Status Mental Emosional Remaja Tahap Akhir. *Jurnal Keperawatan Jiwa*, *10*(2), 355. https://doi.org/10.26714/jkj.10.2.2022.355-362

Yuria R.A., M., Binawan, U., & Education, J. (2022). Efektivitas jus wortel dan nanas untuk menurunkan dismenore primer pada remaja putri smp. *Jurnal Education and Development Institut Pendidikan Tapanuli Selatan*, *10*(2), 109–112. http://journal.ipts.ac.id/index.php/ED/article/view/3522/2377

Zuliawati, Z. (2021). Pengaruh Pemberian Jus Nenas Dan Madu Terhadap Penurunan Nyeri Menstruasi Remaja Putri Di Smp Yp Singosari Delitua Tahun 2020. *Jurnal Penelitian Kebidanan & Kespro*, *3*(1), 19–26. https://doi.org/10.36656/jpk2r.v3i1.349