



LITERATURE REVIEW: REDUCING DYSMENORRHEA IN TEENAGER BY DRINKING TAMARIND TURMERIC WATER

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Literature Review

ABSTRACT

Introduction: Menstruation is a sign of sexual development in adolescent girls. Abdominal cramps are one of the most common problems experienced by teenage girls during menstruation. Abdominal cramps occur due to the pulling of smooth muscles in the uterus which is usually followed by migraines, abdominal pain, weakness and excruciating pain. The average incidence of menstrual pain or dysmenorrhea in the world shows that more than 50% percent of women experience primary dysmenorrhea in Indonesia reaching 64. 25% with the category of 89% primary dysmenorrhea and 9.36% secondary dysmenorrhea. The purpose of this study is to examine scientific articles which discusses the reduction of menstrual pain in adolescents.

Methods: The method used in this study is a literature review with data collection techniques using the Google Scholar, Pubmed, and e-resources database based on inclusion criteria, among others, the intervention in the form of giving sour turmeric stew, using the quasi experiment or pre experimental design or literature review method, using indonesian and english, published within 10 years (2011-2021). Respondents are teenagers who experience dysmenorrhea. Journals are accessible to the public.

Results: The results showed that based on the study conducted, it can be seen that turmeric acid drink can reduce menstrual pain levels in adolescent girls because sour turmeric drinks contain curcumin and anthocyanins which are analgesics and antipyretics that function as pain relievers. **Conclusions:** So it is expected that young women consume traditional drinks, namely sour turmeric drinks when experiencing menstrual pain to reduce the pain they feel.

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INTRODUCTION

The National Population and Family Planning Agency or BKKBN categorizes the age category of teenagers are ranging from 10 to 24 years with unmarried specifications (Ellysa, 2017). Adolescence is marked by various physical and psychological changes (Eswi et al., 2012). Teenagers period is a period that individuals go through by experiencing puberty and hormonal changes that affect sexual maturation which will stimulate the acceleration of physical and secondary growth and development (Sharma, 2013). The stage of life which passed during teenager period is a stage that marks the achievement of the process of emotional, psychosocial, and sexual maturity which is identified through the function of the reproductive organs and all the things that arise. Thus, menstruation is a sign of sexual development in teenage girls and "wet

dreams" are a sign of sexual development in teenage boys (Yusuf, 2012).

When experiencing menstruation, there is an uncommon discomforts and extraordinary pain which feel by teenage girls. This is an example of disorders that occur during menstruation. Abdominal cramps are one of the most common problems experienced by teenage girls during menstruation. Abdominal cramps occur due to the pulling of smooth muscles in the uterus which is usually followed by migraines, abdominal pain, weakness and excruciating pain (Anurogo & Wulandari, 2011). Pain in the lower abdomen that is excessive during the menstrual period is commonly referred to as dysmenorrhea (Suciani et al., 2004). Dysmenorrhea is divided into two classifications, the first one is primary dysmenorrhea and the another one is secondary dysmenorrhea. Primary

dysmenorrhea does not show any relationship with gynecological problems, but secondary dysmenorrhea can be the early identification of gynecological problems (Purwaningsih & fatmawati, 2010).

The average incidence of menstrual pain or dysmenorrhea in the world shows that more than 50% percent of women experience primary dysmenorrhea (Nurwana et al., 2017). This also happened in Southeast Asian countries with several examples of countries including the incidence in Malaysia reaching 69%, Thailand reaching 84.2%, and in Indonesia reaching 64.25% with the category of 89% primary dysmenorrhea and 9.36% for secondary dysmenorrhea (Sari, 2017).

Based on the risk factors of dysmenorrhea, it can be seen that primary dysmenorrhea has several ways to solve this situation. Generally, people consume some medicine to handle the pain, with suggestions that if these drugs are not consumed, they will experience pain (Anurogo & Wulandari, 2011). However, on the other hand, many teenage girls who try to solve the pain during menstruation by using herbal medicines which are therapies using herbal ingredients with natural ingredients from plants.

Some plants can be used as herbal medicinal ingredients which are believed to reduce pain during menstruation, including turmeric, tamarind, cinnamon, cloves and ginger (Anurogo & Wulandari, 2011). From the several examples of herbal plants above, turmeric and tamarind are herbal ingredients which are often chosen as medicine to treat menstrual pain. The sour turmeric is then processed into a stew. A decoction of tamarind turmeric is accepted to provide many medical benefits and is regularly used in traditional restorative creations. When examined, turmeric is known to contain phenolic substances that are useful as cell boosters and have benefits as analgesics, fever reducers, antimicrobials, and blood purifiers which also contain compounds that function, especially curcumin. (Sina, 2012)

This is supported by a research study (Kasim, 2017) entitled The Effectiveness of Turmeric Acid Drink Against Menstrual Pain Reduction in Students at SMA Negeri 3 Gorontalo Utara which used 30 samples of class X and XI students who experienced menstrual pain. The results showed that there was an effect of giving tamarind drink to decrease menstrual pain with a p-value of $0.000 < \alpha (0.05)$. Another study belonging to (Suciani et al., 2004) entitled The Effectiveness of Giving Turmeric Acid Decoction Against Dysmenorrhea which was conducted on 30 respondents from SMAN 9 Pekanbaru showed

the results of a fairly intense pain management in the group studied after being given an intervention in the form of sour turmeric decoction with p value $< \alpha 0.05$, so it can be concluded that sour turmeric decoction is effective in reducing menstrual pain. Another study belonging to (Sugiharti, 2013) entitled The Effect of Turmeric Acid Drink on Decreasing Primary Menstrual Pain Scale conducted on a D3 Midwifery student at STIKES Harapan Bangsa Purwokerto showed that there was an effect of sour turmeric drink on primary pain in adolescents as indicated by a p value of 0, 0001, meaning there is a difference in the effectiveness of ginger warm compresses and the consumption of tamarind turmeric on reducing the primary menstrual pain scale.

MATERIALS AND METHODS

The design used in this study is the Literature Review research design, which is a research activity that appears to conduct a literature review based on the fact that the practice or action taken is evidence-based (Pursell & N. McRae, 2020). The data collection method used in this research is literature study or documentation study. This method is carried out by collecting various scientific articles related to the current research title. The scientific article is a scientific article both nationally and internationally. In finding for these articles, researchers used the databases of Google Scholar, Pubmed, and e-Resources. In order to facilitate the search process, the researcher used Indonesian keywords and also English keywords, namely "Turmeric Acid Dysmenorrhea" / Turmeric Acid Dysmenorrhea. Articles that matched the inclusion and exclusion criteria were taken for analysis. The selected articles are scientific articles published in the last 10 years. There is some point which included as Inclusion Criteria are: International-scale journals and national-scale journals that come from different databases but relate to research variables, namely the effect of sour turmeric and menstrual pain, articles obtained from primary sources, there is an intervention in the form of giving sour turmeric stew, using quasi experiment method or pre experimental design or literature review, using Indonesian and English, published within 10 years (2011-2021), respondents are teenager girls who experience dysmenorrhea, also an open access journal.

After determine the inclusion criteria's, writer also identify the xclusion criteria which are: journals published before 2011, have different variables, using methods other than those listed in the inclusion criteria, not

accessible to the public. This research has been through an ethical test and has been

declared passed by the STIKES YATSI Tangerang Ethics Committee.

RESULTS

Table 1. Summary of articles regarding reducing dysmenorrhea in teenager by drinking tamarind turmeric water

No	Author	Title	Advantages	Disadvantages
1.	Raudhatun Nuzul ZA, Ulfa Farrah Lisa	Comparison of Turmeric Acid Decoction and Warm Compresses on Decreasing Dysmenorrhea in Students of SMK Negeri 03 Banda Aceh	The sample is no more than 30 respondents	Have other interventions besides giving sour turmeric drinks, namely giving warm compresses
2	Lilis Fatmawati, Yuanita Syaiful, Kusrotin Nikmah, ,	Turmeric Acid (Curcuma Doemstica Val) Reduces Menstrual Pain Intensity	Intensity Sample 30 respondents	Data collection only uses SOP for making turmeric acid
3.	Claudia Anggie Anugrahhayyu, Ninik Darsini, Ashon Sa'adi	Soybean Drink (Glycine max) and Combination of Tamarind (Tamarindus indica) with Turmeric (Curcuma domestica) in Reducing Menstrual Pain	Conduct interviews with respondents	There are other interventions besides giving sour turmeric, namely giving soy milk
4.	Vivien Novarina A. Kasim,	The Effectiveness of Sour Turmeric Drinks Against Pain Reduction Menstruation in female students at SMA Negeri 3 Gorontalo Utara	The sample is 30 respondents.	Measurements only use a pain measurement sheet which is <i>Numeric Rating Scale</i> without giving turmeric acid directly to the sample
5.	Maya Safitri, Tin Utami, dan Wilis Sukmaningtyas	The Effect of Turmeric Acid Drink on Scale Reduction Primary Menstrual Pain in DIII Midwifery Students	The outcomes produced in this study in the form of scientific publications, leaflets and textbooks	Sample less than 30 respondents
6.	Ns.Delvi Hamdayani,M.Kep,	The Effect of Giving Turmeric Acid Drinks on Decreasing Primary Dysmenorrhea in Level II Students of Undergraduate Study Programs Nursing STIKes Mercubaktijaya Padang	Shows a significant effect between giving turmeric acid drink to reducing pain	Sample only 10 respondents
7.	Cut Nur Baiti, Astriana, Nita Evrianasari, Dewi Yuliasari	Turmeric Acid Reduces Menstrual Pain in Young Women	Samples were treated by consuming 1 . turmeric acid glasses/day during menstruation, and pain measurements were taken before and after consuming tamarind.	Preliminary study only 15 people
8.	Shinta Amelia, Fitra Juwita, dan Anidaul Fajriyah	The Effect of Giving Turmeric Acid on Reducing Menstrual Pain Intensity	Focus on giving sour turmeric drink	Samples of less than 30 respondents
9.	Sri Wahyu dan Lilik Nur Indahsari	The Effectiveness of Abdominal Exercise and Beverage Combination Therapy Turmeric Acid Against Dysmenorrhea in Young Women in Pondok Manba'u Chafidhil Qur'an Islamic Boarding School in Tambakselo Village Wirosari Grobogan	Sample more than 30 respondents	There were other interventions besides giving turmeric acid
10.	Matilda Bupu Ria, Clara Yunita Ina	Difference in Effectiveness of Warm Ginger Water Compress and Sour	Respondents were 30 people	There were other interventions besides

Ola, Damita Palalangan,	Turmeric on Reducing Menstrual Pain in Midwifery Students at Maranatha School Kupang, East Nusa Tenggara	Primary per group so that it was balanced.	giving sour turmeric drink, namely giving ginger compresses.
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DISCUSSION

Primary dysmenorrhea is a pain condition during the feminine cycle and there is no reason for indication and is not identified with gynecological problems (Hamdayani, 2018). Women with primary dysmenorrhea had higher levels of prostaglandins than women without dysmenorrhea. As shown by (Anurogo & Wulandari, 2011) in (Hamdayani, 2018), the number of cases of dysmenorrhea in the world is very large with an average of half of women in each country experiencing dysmenorrhea. In general, young women in Indonesia experience dysmenorrhea. As it is known that adolescence is a phase where dynamic development occurs in a person's life and is a transition period from childhood to adulthood (Sebayang, 2018). So that in this development there are many changes both physically, psychologically, and also biologically. One of them is the maturation of the reproductive organs which is marked by the appearance of blood from the vagina periodically called menstruation. Dysmenorrhea occurs when teenagers are on their menstrual schedule which is characterized by painful abdominal cramps. The pain can occur for 48-72 hours before or at the same time as menstruation come (ZA & Lisa, 2019). So there is a need for non-medical measures that must be taken as a way to reduce the pain of dysmenorrhea. One of the non-pharmacological ways is by consuming sour turmeric drink. Tamarind drink is proven to reduce the intensity of pain due to dysmenorrhea in adolescents.

A report (Kasim, 2017) which done to 30 female students at SMA Negeri 3 Gorontalo Utara showed there was an effect of giving sour turmeric drink on pain reduction with p -worth $0.000 < \alpha 0.05$. So it can be concluded that there is an effect of giving tamarind drink to female students at SMA Negeri 3 Gorontalo Utara. Another review conducted by (Fatmawati, Syaiful, Nimah, 2020) who conducted research to 32 young women in Kedungsoko Village, Mantup District, Lamongan Regency, did not pay attention to the acid content of turmeric 1 time a day as much as 150 ml for 4 days before the women's cycle and 2 days during the period. feminine cycle. The results showed that the measured using Wilcoxon Test showed that the normal value before being given herbal medicine was 3.2188 and the standard deviation value was 1.03906 while the normal value after being

given herbal medicine was 1.4062 and the standard deviation value was 0.66524. With a value of 0.000 which means $p < 0.05$, then at that time H1 was recognized, which means that there is potential for natural turmeric to affect female pain in adolescent girls. This shows that the herbal medicine turmeric acid can reduce the strength of female pain so that women can apply it if they experience female pain.

Another study belonging to (Anugrahayyu et al., 2019) conducted an experiment to 27 teenage girls aged 15-18 years who were students of the Sekesal Pharmacy Vocational School in Surabaya by dividing them into a group that was given soy milk and a group that was given sour turmeric. The results of this review indicate that there is a very large difference in the composition of soybean (*Glycine max*) and a mixture of tamarind (*Tamarindus indica*) with turmeric (*Curcuma domestica*) on the size of the dysmenorrhea pain of female students at SMK Sekesal Surabaya. So it can be assumed that the mixture of tamarind drink (*Tamarindus indica*) with turmeric (*Curcuma domestica*) further reduces the severity of dysmenorrhea compared to soy drink (*Glycine max*) in female students at SMK Farmasi Sekesal Surabaya.

Based on research (Safitri et al., 2014) with the title "The Effect of Turmeric Acid Drink on Decreasing Primary Menstrual Pain Scale in Midwifery DIII Students". The method used is quasi-experimental and the research sample technique uses purposive sampling as many as 20 female students majoring in midwifery at STIKES Harapan Bangsa Purwokerto. This study used unpaired t test analysis with a significance level of $p = 0.05$. The results showed that p value = 0.456, which means $< \alpha 0.05$, thus indicating the effect of giving sour turmeric drink on reducing primary dysmenorrhea.

The results of this study are in line with the research of (Hamdayani, 2018) which conducted a study of 10 samples who were STIKes Mercubaktijaya female students which resulted in the conclusion that the effect of giving turmeric acid drinks was a non-medical way of dealing with primary dysmenorrhea. These results are also supported by proprietary research (Baiti et al., 2021) which explains that turmeric acid drink has minimal side effects as a way of treating primary dysmenorrhea. Another study belonging to Amelia et al., 2020 stated that the current trend in teenager girls is

to consume pain-reducing drinks because of few or no side effects. Furthermore (Amelia et al., 2020) explained that turmeric contains active ingredients that function as analgesic, antipyretic, and anti-inflammatory, and tamarind is believed to increase heart rate so that blood circulation is smoother.

Based on research of (Wahyuni & Indahsari, 2014) entitled "The Effectiveness of Combination Therapy of Abdominal Exercise and Turmeric Acid Drink Against Dysmenorrhea in Young Women at the Manba'u Chafidhil Qur'an Islamic Boarding School, Tambakselo Wirosari Grobogan Village", using a pre-experimental research type with One -Group Pretest-posttest Design conducted on 38 samples selected using purposive sampling technique and analyzed using Ulcoxon test. The results showed that most of the respondents were of medium age (15-18 years old), had junior high school education and were dynamic in doing stomach activities and drinking tamarind water. Most of the respondents before being intercessioned were in moderate pain and after the mediation was not too painful, it can be said that the combination of abdominal exercises and turmeric drink was efficacious to overcome dysmenorrhea at a young age. young adult women (p esteem < 0.05). The effectiveness of giving sour turmeric drink in overcoming primary dysmenorrhea pain is also supported by proprietary research (Ria et al., 2020) showing the results that the intervention given to the experimental group and control group by giving sour turmeric drink and warm ginger compresses showed that sour turmeric drink was more effective. effective compared to giving warm ginger compresses in relieving the pain of dysmenorrhea. The effect of sour turmeric drink that succeeded in reducing pain when experiencing primary dysmenorrhea was motivated by the content contained in turmeric and the acid itself.

The contents include curcumine and Anthocyanin. According to (Sina, 2012) turmeric contains an active compound, namely curcumin. Curcumin contained in turmeric is a compound that is safe for human consumption and non-toxic, but the recommended amount to consume curcumine in one day is 100 mg (Marlina, 2012). Curcumin in turmeric has an effect that can reduce bad moods and also pain during menstruation and behavior or commonly known as Pre Menstrual Syndrome (Fanaei et al., 2016). This explanation is in accordance with the results of a proprietary study (Wahyuni & Indahsari, 2014) that curcumin in turmeric functions as an analgesic. On the other hand, the research of (ZA & Lisa, 2019) explains that

curcumine in turmeric works as an inhibitor of the cyclooxygenase (COX2) reaction so that it can inhibit uterine contractions. This is supported by the clarification in the restrictive report (Safitri et al., 2014) which explains that the most significant bicomonic component retained by curcumin is inundation of calcium particles into uterine epithelial cells. If this blockage of particle convergence is carried out into the uterine epithelial cells, uterine constriction can be reduced or even eliminated so that primary dysmenorrhea does not occur.

According to (Sina, 2012) explained that tamarind has functional substances, especially anthocyanins that can be used as antipyretics and mitigation. This is in accordance with the results of limited exploration (Wahyuni & Indahsari, 2014) that the benefits of acid as a sedative and also antipyretic contained in anthocyanins act to inhibit compounds (COX) that can suppress excess prostaglandins and reduce cramps in the stomach. abdomen during the female cycle. In addition the research (ZA & Lisa, 2019) explains that acid is abortive or stimulates miscarriage and is also a pain reliever (ZA & Lisa, 2019) also explains that having polysaccharide compounds (complex starch) from natural products of acid has a strong organic action. adequate. Hypertension, affects the immune system (resistance), improves blood flow, and helps the body's metabolic system to reduce female pain or dysmenorrhea (Hamdayani, 2018) explained that curcumin and anthocyanins are a mixture that has a more important movement of cancer-preventing agents.

CONCLUSIONS

Based on the results of a scientific study, it was concluded that the sour turmeric drink can reduce the level of menstrual pain in adolescent girls because the sour turmeric drink contains curcumin and anthocyanins which are analgesics and antipyretics that function as pain relievers.

REFERENCES

- Amelia, S., Juwita, F., & Fajriyah, A. (2020). Pengaruh Pemberian Kunyit Asam terhadap Intensitas Nyeri Haid. *Indonesian Journal of Midwifery (IJM)*, 3(2), 143–150.
- Anugrahhayu, C. A., Darsini, N., & Sa'adi, A. (2019). Minuman Kedelai (Glycine max) dan Kombinasi Asam Jawa (Tamarindus indica) dengan Kunyit (Curcuma domestica) dalam Mengurangi Nyeri Haid. *Jurnal Farmasi Dan Ilmu Kefarmasian Indonesia*, 5(1), 1.

- <https://doi.org/10.20473/jfiki.v5i12018.1-5>
Anurogo, S., & Wulandari, A. (2011). *Cara Jitu Mengatasi Nyeri Haid*. Penerbit Andi.
- Baiti, C. N., Astriana, A., Evrianasari, N., & (2021). Kunyit Asam Mengurangi Nyeri Haid Pada Remaja Putri. *JKM (Jurnal Kebidanan Malahayati)*, 7(2), 222-228. Doi : 10.33024/jkm.v7i2.1785
- Eswi, A., Helal, H., & Elarousy, W. (2012). Menstrual Attitude and Knowledge among Egyptian Female Adolescents. *Journal of American Science*, 8(6).
- Fanaei, H., Khayat, S., Kasaean, A., & Javadimehr, M. (2016). Effect of curcumin on serum brain-derived neurotrophic factor levels in women with premenstrual syndrome: A randomized, doubleblind, placebo-controlled trial. *Neuropeptides*, 56, 5–31.
- Hamdayani, D. (2018). Pengaruh Pemberian Minuman Kunyit Asam Terhadap Penurunan Dismenore Primer Pada Mahasiswi Tingkat Ii Prodi S1 Keperawatan Stikes Mercubaktijaya Padang. *Menara Ilmu*, XII(80), 24–29. <https://doi.org/10.33559/mi.v12i80.619>
- Kasim, V. N. A. (2017). Haid Pada Siswi Di Sma Negeri 3 Gorontalo Utara. *Jurnal Health and Sport*, 8(2), 1–15.
- Marlina, E. (2012). Pengaruh MinumanKunyit Asam Terhadap TingkatNyeri Dismenorea Primer Padaremaja Putri di SMA Negeri 1 Tanjung Mutiara Kabupaten Agam. Retrieved Oktober 10, 2021, from <http://repo.unand.ac.id/id/eprint/166>
- Nurwana, N., Sabilu, Y., & Fachlevy, A. (2017). Analisis Faktor Yang Berhubungan Dengan Kejadian Disminorea Pada Remaja Putri Di Sma Negeri 8 Kendari Tahun 2016. *Jurnal Ilmiah Mahasiswa Kesehatan Masyarakat Unsyiah*, 2(6), 185630.
- Pursell, E., & N. McRae. (2020). How to Perform a Systematic Literature Review: A Guide for Healthcare Researchers, Practitioners and Students. Springer Berlin Heidelberg.
- Purwaningsih, wahyu, & fatmawati, siti. (2010). *Asuhan keperawatan maternitas*. Nuha Medika.
- Ria, M. B., Ola, C. Y. I., & Palalangan, D. (2020). Difference in Effectiveness of Warm Ginger Water Compress and Sour Turmeric on Reducing Primary Menstrual Pain in Midwifery Students at Maranatha School Kupang, East Nusa Tenggara. *The 7th International Conference on Public Health*, 8552971. <https://doi.org/10.26911/the7thicph.03.35>
- Safitri, M., Utami, T., & Sukmaningtyas, W. (2009). Pengaruh Minuman Kunyit Asam terhadap Penurunan Skala Nyeri Haid Primer pada Mahasiswi D3 Kebidanan. *D3 Kebidanan*, 3–8. <http://jurnal.unimus.ac.id/index.php/psn12012010/article/view/1216/1269>
- Sari, D. P. (2017). Pengaruh Aroma Terapi Jasmine Terhadap Penurunan Skala Nyeri Pada Remaja Putri Yang Mengalami Dismenore Di Sman 2 Pontianak Tahun 2015. *Jurnal Proners*, 3(1).
- Sharma, N. (2013). A Cross ectional Study Of Knowledge, Attitude And Practices Of Menstrual Hygiene Among Medical Students In North India. *The Journal of Phytopharmacology*, 2(5), 28–37.
- Sina, M. Y. (2012). *Khasiat super minuman alami tradisional beras kencur & kunyit asam menyehatkan dan menyegarkan tubuh tanpa efek samping*. Diandra Pustaka Indonesia.
- Suciani, S. R., Utami, S., & Dewi, A. P. (2004). Efektivitas Pemberian Rebusan Kunyit Asam Terhadap Penurunan Dismenore. *Efektivitas Pemberian Rebusan Kunyit Asam Terhadap Penurunan Dismenorea*, 1–8.
- Sugiharti, R. K. (2013). Pengaruh Minuman Kunyit Asam Terhadap Skala Nyeri Haid Primer. *Journal of Chemical Information and Modeling*, 53(9), 1689–1699.
- Wahyuni, S., & Indahsari, L. N. (2014). Efektifitas Terapi Kombinasi Abdominal Exercise Dan Minuman Kunyit Asam Terhadap Dismenore Pada Remaja Putri Di Pondok Pesantren Manbaa€™TMU Chafidhil Qurâ€™TMan Desa Tambakselo Wirosari Grobogan. *Prosiding Seminar Nasional & Internasional*, 2(1).
- Yusuf, S. (2012). *Psikologi Perkembangan Anak dan Remaja*. Rosdakarya.
- ZA, R. N., & Lisa, U. F. (2019). Perbandingan Rebusan Kunyit Asam dan Kompres Hangat terhadap Penurunan Dismenorea pada Siswi SMK Negeri 03 Banda Aceh. *Journal of Healthcare Technology and Medicine Vol. 5 No. 1 April 2019 Universitas Ubudiyah Indonesia*, 5(1), 24–33.