

The Effect of Turmeric-Tamarind Administration on the Reduction of Dysmenorrhea in Adolescents at Posyandu Ciseureuh Purwakarta

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KEYWORDS

Turmeric-Tamarind;
Dysmenorrhea; Adolescents,
Intervention; Non-
Pharmacological Treatment;
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ABSTRACT

This quasi-experimental study aimed to determine the effect of turmeric-tamarind administration on reducing dysmenorrhea in adolescent girls at Posyandu Ciseureuh Purwakarta. A total of 40 adolescent girls who met the inclusion criteria were randomly selected and divided into two groups: the intervention group, which received turmeric-tamarind administration, and the control group, which did not receive the intervention. Pre-test and post-test assessments were conducted using the Numerical Rating Scale (NRS) to measure pain levels before and after the intervention. The results indicated a significant reduction in dysmenorrhea pain in the intervention group compared to the control group. This study suggests that turmeric-tamarind administration can effectively reduce dysmenorrhea pain in adolescents, offering a non-pharmacological alternative for pain management during menstruation. These results have important practical implications for adolescent healthcare. First, they provide evidence supporting the integration of this affordable, culturally acceptable traditional remedy into community health programs. Second, the study offers a viable non-pharmacological alternative to pain management that avoids side effects associated with conventional analgesics. For healthcare providers, these findings suggest the potential for developing standardized protocols for turmeric-tamarind administration in managing primary dysmenorrhea. Future research should explore optimal dosage and long-term effects to facilitate wider implementation of this intervention in public health settings.

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INTRODUCTION

Dysmenorrhea is a very common health problem in women, especially in adolescents. Based on data from the WHO in 2021, around 90% of women have *dysmenorrhea*, and 10–15% of them have severe *dysmenorrhea* that can interfere with their activities. In the United States, nearly 90% of women experience *dysmenorrhea*, which leads to a decreased quality of life. In Indonesia, the prevalence of *dysmenorrhea* reaches 64.25%, with the majority of cases being primary *dysmenorrhea*, which often occurs after the first menstrual period or *menarche*. This condition causes abdominal cramps that vary from mild discomfort to pain that severely interferes with daily activities. In West Java, the prevalence of *dysmenorrhea* is quite high, with around 54.9% of women experiencing this complaint, including in the Cianjur area, where 43.3% experience severe *dysmenorrhea* (Herlina, 2020).

Adolescence is a transitional period characterized by rapid physical and biological changes, one of which is *menarche*, marking the beginning of menstruation. During this time, many adolescent girls develop *dysmenorrhea*, which is related to an imbalance of hormones,

especially progesterone. This affects their daily lives, including their education, where they have difficulty concentrating when facing menstrual pain. In addition to biological factors, an unhealthy lifestyle such as lack of exercise, smoking, alcohol consumption, and excess weight also plays a role in worsening the condition of *dysmenorrhea* (Qomarasari, 2021).

Dysmenorrhea in adolescent girls needs to be handled appropriately so that it does not impact their learning activities and physical well-being. One method to overcome menstrual pain is a non-pharmacological approach, which is safer and does not cause side effects like those from analgesic drugs. One such therapy is the administration of sour turmeric. The administration of sour turmeric has many benefits, including helping reduce *dysmenorrhea* pain by relaxing abdominal muscles, improving blood circulation, and warming the body, which has been proven to reduce the intensity of pain (Masruhah, 2021).

Previous research has shown that the administration of sour turmeric can be effective in reducing *dysmenorrhea* pain. A study at IAI Agus Salim Metro Lampung showed a decrease in the pain scale of *dysmenorrhea* after sour turmeric administration, with the average pain intensity decreasing from 3.81 to 1.76 (P-value = 0.000), indicating a significant effect of this therapy on reducing *dysmenorrhea* pain in adolescent girls (Saputri et al., 2023). This suggests that sour turmeric therapy can be an effective and easy alternative to reduce the discomfort experienced by adolescent girls during menstruation.

The study also shows that many adolescents are not yet aware of the benefits of non-pharmacological therapies for managing *dysmenorrhea*. Based on interviews with 10 students at *Posyandu Ciseureuh Purwakarta*, most of them had *dysmenorrhea*, but only a small number tried treatments such as warm water compresses. This indicates a lack of knowledge about non-pharmacological therapies that can be done independently at home. Therefore, it is important to educate adolescents about safer and more natural ways to overcome *dysmenorrhea*, one of which is by giving sour turmeric.

Taking this background into account, this study aims to determine the effect of giving sour turmeric on the reduction of *dysmenorrhea* in adolescents at *Posyandu Ciseureuh Purwakarta*. This study will also examine whether *menarche* age and menstrual length affect the effectiveness of giving sour turmeric in reducing *dysmenorrhea* pain. It is hoped that the results of this study will contribute to the development of more effective non-pharmacological treatment methods to overcome *dysmenorrhea*, as well as provide useful information for adolescents and the general public on ways to reduce menstrual discomfort.

The objectives of this study are to determine the effect of *turmeric-tamarind* administration on *dysmenorrhea* pain reduction and to assess how factors like *menarche* age and menstrual duration influence the intervention's effectiveness. In addition to the practical benefits for adolescents with *dysmenorrhea*, this study also makes an important contribution to educational institutions, particularly in obstetrics, as a reference for developing knowledge about treating *dysmenorrhea* with a more natural and safe approach. Thus, it is hoped that this research can improve the quality of life of adolescent girls, especially in terms of overcoming menstrual problems that often interfere with daily activities.

METHOD

This research used a quasi-experimental design with a two-group pre-test and post-test format. Subjects were divided into an intervention group that received sour turmeric and a control group that did not. The study aimed to measure the effect of sour turmeric administration on reducing dysmenorrhea pain in adolescents. Pain levels were measured using pain scales before and after the intervention in both groups. The study was conducted at the Posyandu Ciseureuh Purwakarta from September to December 2024. The population consisted of all adolescent girls in the Bhakti Asih Purwakarta Polytechnic area who experienced dysmenorrhea. A sample of 40 young women meeting the inclusion and exclusion criteria was selected using total sampling, giving each member an equal chance to participate.

The inclusion criteria were adolescent girls at Posyandu Ciseureuh Purwakarta with dysmenorrhea who consented to sour turmeric therapy. Exclusion criteria included those who refused the intervention or were male. Dropout criteria applied to participants who did not complete the intervention process properly. Primary data were collected directly from respondents through observation of pain levels, using questionnaires and observation sheets containing participant identities, characteristics, and pain scales before and after the intervention. Pain was measured on the Numerical Rating Scale (NRS), where 0 indicated no pain and 7–10 indicated severe pain.

Data collection began after obtaining research permission from Bhakti Asih Purwakarta Polytechnic and securing informed consent from participants. The intervention group was given sour turmeric daily during menstruation, while the control group was only observed for changes in dysmenorrhea pain.

Collected data were edited, coded, processed, and cleaned to ensure accuracy. Coding converted qualitative data into numerical values, with 1 representing the control group and 2 the intervention group. Statistical analysis included univariate analysis to examine each variable individually and bivariate analysis to assess relationships between variables. This analysis aimed to provide insight into the effect of sour turmeric on reducing dysmenorrhea pain in adolescents at Posyandu Ciseureuh Purwakarta.

RESULTS AND DISCUSSIONS

Univariate Analysis

The results of the study based on the administration of sour turmeric from 40 people in adolescent women found that the administration of sour turmeric was carried out in 2 groups, namely intervention and control with the number of respondents each of 20 people (50.0%).

a. Distribution of Dysmenorrhea Reduction

The results of the study based on the Reduction of Dysmenorrhea from 40 respondents found that most of the respondents with a Severe pain scale amounted to 29 respondents (72.5%) and with mild pain as many as 11 respondents (27.5%).

Distribution of Menarche Age Characteristics

The results of the research at the Bhakti Asih Purwakarta Polytechnic in 2024 found that out of 40 respondents, the most respondents aged 12-14 years were 29 respondents (72.5%).

Distribution of Menstrual Length Characteristics

The results of research at the Bhakti Asih Purwakarta Polytechnic in 2024 found that out of 40 respondents, the most respondents with a menstrual period of 4-7 days were 36 respondents (90%).

Bivariate Analysis

Bivariate analysis is an analysis of the influence between two variables to find out whether there is a significant influence between the dependent variable and the confounding variable,

Normality Test

After analyzing the frequency distribution of the general characteristics of the study respondents, the next step is to conduct a normality test on the independent variable, namely Dysmenorrhea after being given Acid Turmeric. The normality test uses the Shapiro-wilk test.

Dysmenorrhea pain before and after being given counseling on how to give Sour Turmeric with Dysmenorrhea pain before and after Sour Turmeric Pain shows a P value of < 0.05 which indicates that the variables are distributed normally and abnormally. Because the data is distributed abnormally, the Wilcoxon Test is performed.

Wilcoxon Test

1. Effect of Acid Turmeric Administration on the Dysmenorrhea Reduction Process in Adolescents in the Intervention Group and Control Group. 20 respondents in the intervention group and in the control group 20 respondents p-value $0.000 < 0.05$, thus it can be concluded that there is an effect between the administration of sour turmeric and the reduction of dysmenorrhea in the intervention group and the control group. This means that H_0 is rejected and H_a is accepted.
2. Influence Between the Age of Menarche and Dysmenorrhea in Adolescents
The results of the test on the effect of reducing Dysmenorrhea based on Menarche Age and Menstruation Length showed that the p-value was < 0.05 which means that there was an effect on the decrease in Dysmenorrhea in adolescents.

Univariate Analysis

Based on the results of the research on the Effect of Sour Turmeric Administration on the Reduction of Dysmenorrhea in Adolescents Bhakti Asih Polytechnic Purwakarta in 2024. The results were obtained An overview of the characteristics of respondents who experienced Dysmenorrhea.

Based on the results of research at the Bhakti Asih Purwakarta Polytechnic in 2024 research on the administration of sour turmeric on the reduction of dysmenorrhea in adolescents, it was found that the administration of sour turmeric was carried out in 2 groups, namely intervention and control of 20 people (50.0%) each.

Based on the distribution of dysmenorrhea reduction from 40 respondents, it was found that most of the respondents with a severe pain scale amounted to 29 respondents (72.5%), respondents with moderate pain scales amounted to 11 respondents (27.5%) and respondents with no pain and mild pain scales were found to be respondents (0.00%).

Based on the distribution of menarche age characteristics from the results of research at Bhakti Asih Purwakarta Polytechnic 2024, it was found that out of 40 respondents, the most respondents were 12-14 with a total of 29 respondents (75.5%). This is in accordance with the theory (Wardani et al., 2021) The association between the age of menarche 12 years and dysmenorrhea in women who experience their first menstruation is often disturbing

due to poor mental preparedness and hormonal changes. One of them is influenced by age. Menarche can cause various problems, one of which is pain complaints during menstruation or what is commonly called dysmenorrhea. Generally, women feel dysmenorrhea. As many as 90% of women in the world experience dysmenorrhea, more than 50% of them experience discomfort during menstruation and 10-20% experience severe discomfort.

Based on the Characteristics of Menstruation Length as a result of research at Bhakti Asih Purwakarta Polytechnic in 2024, it was found that out of 40 respondents, the most respondents with a menstrual period of 4-7 days were 36 respondents (90.0%), This is in accordance with the theory (Qomarasari, 2021) the longer menstruation occurs, the more often the uterus contracts, as a result the more prostaglandins are released. As a result of excessive production of prostaglandins, pain occurs. In addition, persistent uterine contractions also cause the blood supply to the uterus to stop temporarily, resulting in dysmenorrhea. This study was carried out on adolescent girls who experienced dysmenorrhea with the administration of Turmeric Hope. Giving sour turmeric can help speed up the pain recovery process to have a relaxing effect. This study showed that there was a change in the decrease in Dysmenorrhea in respondents after the administration of Turmeric acid was carried out on the first day of menstruation 2 times for 10 minutes. Dysmenorrhoe is a complaint that women often experience when menstruation. Pain is felt in the lower abdomen, sometimes accompanied by dizziness, weakness, nausea and vomiting, usually occurring during menstruation or before menstruation. Pain during menstruation is caused by uterine muscle spasms (Dhita, 2014)

Bivariate Analysis

Dysmenorrhea pain is actually the most common gynecological problem in adolescent and adult women, but it is a detrimental condition for many women that affects health-related quality of life. Dysmenorrhea pain sometimes causes women to be unable to carry out normal activities and can have an economic impact, because it is related to the costs incurred for the purchase of drugs and medical treatment. For young women who are still in school, it is an obstacle because it can cause learning concentration and motivation to learn to decrease due to the pain of dysmenorrhea that is felt

The results of the study showed that there were 20 respondents in the intervention group and in the control group of 20 respondents, the p-value result was $0.000 < 0.05$, thus it can be concluded that there is an influence between the administration of sour turmeric and the reduction of dysmenorrhea in the intervention group and the control group. This means that H_0 is rejected and H_a is accepted. This research is in line with research conducted by Hapsari (2017), dysminorea complaints are usually experienced by adolescent girls estimated at 40-50% with moderate dysminorea and complain

Disrupted activities, therefore some of them consume drugs, but some leave it because it is considered that dysmenorrhea pain is a natural thing, it's just that they will rest and leave their

usual activities. The results of a study conducted in Canada found that 60% of women experienced moderate dysmenorrhea pain. The prevention of dysmenorrhea pain decreases with age.

In addition to using medicines to reduce pain, traditional herbs can also reduce dysmenorrhea. Sour turmeric, which is usually one of the ingredients for food recipes, turns out to have good nutritional benefits and content for health. Sour turmeric drink is a drink that is processed with the main ingredients turmeric and acid, Naturally turmeric is believed to have active ingredients that can function as analgesics, antipyretics, and anti-inflammatory (Norton, 2008). Turmeric is rich in essential oil content that can prevent excessive stomach acid and reduce bowel movements too strongly. Likewise, tamarind (tamarind) has active ingredients as anti-inflammatory, antipyretic, and sedative (Nair et al., 2009)

This study is in accordance with the theory (Proverawati, 2014) that tamarind contains anthocyanins and tannins which have an effect that is not much different from non-steroidal anti-prostaglandin drugs in reducing pain by reducing muscle tension so that it can reduce muscle cramps in the myometrium during menstruation. Naturally, the phenolic compound content in turmeric is believed to be used as an antioxidant, useful as, analgesic, anti-microbial, anti-inflammatory, and can cleanse the blood. The active compound contained in turmeric is curcumin (Sina, 2012).

Based on the results of the Wilcoxon test, it showed that in the intervention group and the control group for the reduction of dysmenorrhea, a p-value of $0.000 < 0.05$ was obtained, so that there was a significant change in the process of reducing dysmenorrhea in adolescents. This can be seen from the average decrease in dysmenorrhea in the intervention group of 10.50 and the control group of 9.00.

This study showed that there was a change in the decrease in dysmenorrhea with a difference of 5.75 after the administration of sour turmeric on the influence of respondents after menarche age and menstruation duration in a way during the student experience dysmenorrhea. The administration of sour turmeric is a non-pharmacological action that is carried out quite easily, namely by drinking it directly (cold/warm). Giving Sour Turmeric can reduce the scale of menstrual pain because it can improve blood circulation, relax the body and reduce pain (Andria et al., 2019). This is in line with the results of the research of Fidatul J and Salis Q (2018) respondents were given a 200 cc sour turmeric drink containing (turmeric 10 gr, tamarind 6 gr, brown sugar 0.25 ounces, 300 cc boiled water made into 200 cc by boiling, when cold given a pinch of salt) drunk 1x1 on the first day of menstruation.

The results of the study are in accordance with the theory expressed by Hatcher (2008) who said that sour turmeric drinks have basic properties as analgesics and anti-inflammatory. Active agents in turmeric that Functioning as an anti-inflammatory and antipyretic is curcumine, while as an analgetic is curcumenol. The added strength of tamarind fruit in sour turmeric drinks has a natural active agent of anthocyanins as an anti-inflammatory and antipyretic. Tamarind fruit also contains tannins, saponins, sesquiterpenes, alkaloids, and phlobotamines to reduce the activity of the nervous system.

CONCLUSION

The study found that turmeric-tamarind administration significantly reduced dysmenorrhea pain in adolescents, with the intervention group experiencing an average pain reduction of 5.75 on the pain scale compared to the control group ($p < 0.05$). Factors such as menarche age and menstrual duration influenced the intervention's effectiveness, supporting turmeric-tamarind as a safe, natural, and accessible method for managing menstrual pain. To maximize the impact of these findings, it is suggested that healthcare providers in community health programs like Posyandu incorporate turmeric-tamarind therapy into health education, highlighting its preparation and benefits. Future research should involve larger sample sizes and longer intervention periods to confirm these results and assess long-term effects. Additionally, partnerships with local schools and youth organizations could promote awareness of non-pharmacological dysmenorrhea management, empowering adolescents with practical, culturally relevant solutions to improve their quality of life.

REFERENCES

- A'yun, S. Q. (2018). Pengaruh Pemberian Minuman Kunyit Asam Terhadap Penurunan Tingkat Nyeri Menstruasi (Disminorea) Primer Pada Remaja Putri Di Mts Nurul Hikmah Kota Surabaya Tahun 2018. *Infokes*, 8(02), 1-7. Hapsari,
- A. (2019). Buku Ajar Kesehatan Reproduksi Modul Kesehatan Reproduksi Remaja. In UPT UNDIP Press Semarang.
http://eprints.undip.ac.id/38840/1/Kesehatan_Mental.pdf
- Anurogo & Wulandari. (2011). Cara Jitu Mengatasi Nyeri haid. Yogyakarta: C.V Andi Offset.
- Asroyo, T., Nugraheni, T. P., & Masfiroh, M. A. (2020). Pengaruh Pemberian Minuman Kunyit Asam Sebagai Terapi Disminore Terhadap Penurunan Skala Nyeri. *Indonesia Jurnal Farmasi*, 4(1), 24-28.
- Atika & Siti. (2014). Disminorea. Jakarta: Salemb Medika.
- Dhita, Abdul. (2014). Perbandingan efektifitas pemberian kunyit asam dan minuman jahe terhadap penurunan nyeri haid pada siswi di SMA 3 gorontalo, juli 2014.
- Dyawapur, A., Patil, N. G., & Metri, L. Effectiveness of Cinnamon Tea and Turmeric Water for Reducing Dysmenorrhoea among Degree Girls.
- Kemendes R1. (2019). Profil kesehatan Indonesia 2019. In Kementrian Kesehatan Republik Indonesia. <https://pusdatin.kemkes.go.id/resources/download/pusdatin/profil-kesehatan-indonesia/Profil-Kesehatan-indonesia-2019.pdf>
- Masruhah, G. (2021). Pengaruh Pemberian Kunyit Asam Terhadap Penurunan Nyeri Disminore Primer Pada Remaja Putr. Universitas dr. Soebandi Jember.
- Manalu, A. B., Siagian, N. A., Ariescha, P. A. Y., Yanti, M. D., & Melinda, N. (2020). Pengaruh Pemberian Jamu Temulawak (Curcuma Zanthorrhiza) Terhadap Penurunan Nyeri Menstruasi (Disminorea) Pada Remaja Putri Di Sma Negeri 1 Selesai Tahun 2019. *Jurnal Kebidanan Kestra (Jkk)*, 2(2), 151-158.
- Marsaid, M., Nurjayanti, D., & Rimbaga, Y. A. (2017). Efektifitas Pemberian Ekstrak Kunyit Asam Terhadap Penurunan Disminore Pada Remaja Putri. *Global Health Science (GHS)*, 2(2).

- Mustikawati, A. (2020). Pengaruh Konsumsi Kunyit Asam Terhadap Dysmenorrhoea. *Jurnal Bidan Pintar*, 1(1), 21-28
- Notoatmodjo. (2018). *Metode Penelitian Kesehatan* (Edisi Revi). Rineka Cipta.
- Notoatmodjo. (2019). *Metode Penelitian Etika Penelitian*. Jurnal UMPRI.
- Puspita, I. M., Anifah, F., & Meidiawati, F. (2020). Pengaruh Pemberian Kunyit asam Untuk Mengurangi Nyeri Disminore Pada Remaja. *Jurnal Keperawatan Muhammadiyah*, 5(2541–2390), 81.
- Putri Alya, S., Khayati, N., & Rejeki, S. (2022). Manipulative Body Therapies Widiatami, T., Widyawati, M. N., & Admini, A. (2018). Study Literature Tentang Pemberian Minuman Kunyit Asam Terhadap Tingkat Nyeri Menstruasi Pada Remaja Putri. *Jurnal Kebidanan*, 8(2), 139-145.
- Wiknjosastro S. (2012). *Ilmu Kebidanan*. Indonesia: Balai Pustaka. Yogyakarta : Nuha Medika.
- Wiknjosastro, H. (2010). *Ilmu Kebidanan*. Jakarta : Yayasan Bina Pustaka Sarwono Prawirohardjo
- Wulandari, A., Supiati, S., & Handayani, R. (2019). Pengaruh Pemberian Jamu Kunyit Asam Untuk Mengurangi Nyeri Haid (Studi Kasus Pada Siswi Smk Bhakti Nusantara Sidoharjo). *Inisiasi*, 8(1)
- Qomarasari, D. (2021). Hubungan Usia Menarche, Makanan Cepat Saji (Fast Food), Stress Dan Olahraga Dengan Kejadian Disminorea Pada Remaja Putri Di Man 2 Lebak Banten. *Bunda Edu-Midwifery Journal (BEMJ)*, 4(2), 30–38. <https://doi.org/10.54100/bemj.v4i2.53>
- Saputri, I. N., Lubis, R. A. V., Nurianti, I., & Munthe, N. B. G. (2023). Pengaruh Pijat Eflourage Terhadap Penurunan Nyeri Disminore Pada Remaja Putri. *Jurnal Bidan Mandiri*, 1(1), 35–38. <https://doi.org/10.33761/jbm.v1i1.884>
- Veronica, S. Y., & Oliana, F. (2022). Pengaruh Pemberian Kunyit asam Terhadap Penurunan Nyeri Disminore Primer pada Remaja Putri di IAI Agus Salim Metro Lampung. *Journal of Current Health Sciences*, 2(1), 19–24. <https://doi.org/10.47679/jchs.202232>
- Wardani, P. K., Fitriana, F., & Casmi, S. C. (2021). Hubungan Siklus Menstruasi dan Usia Menarche dengan Disminor Primer pada Siswi Kelas X. *Jurnal Ilmu Kesehatan Indonesia (JIKSI)*, 2(1), 1–10. <https://doi.org/10.57084/jiksi.v2i1.414>
- Zuraida, & Aslim, M. (2020). Pengaruh Pemberian Kunyit asam Terhadap Penurunan Nyeri Disminore Primer Pada Remaja Putri Di SMAN 1 Sutera Kabupaten. *Menara Ilmu*, XIV(01), 144–149.
- Literature Review. *Jurnal Ilmu Keperawatan Maternitas*, 5(2). <https://doi.org/10.32584/jikm.v5i2.1759>
- Qomarasari, D. (2021). Hubungan Usia Menarche, Makanan Cepat Saji (Fast Food), Stress Dan Olahraga Dengan Kejadian Disminorea Pada Remaja Putri Di Man 2 Lebak Banten. *Bunda Edu-Midwifery Journal (BEMJ)*, 4(2), 30–38. <https://doi.org/10.54100/bemj.v4i2.53>
- Saputri, I. N., Lubis, R. A. V., Nurianti, I., & Munthe, N. B. G. (2023). Pengaruh Pijat Eflourage Terhadap Penurunan Nyeri Disminore Pada Remaja Putri. *Jurnal Bidan Mandiri*, 1(1), 35–38. <https://doi.org/10.33761/jbm.v1i1.884>

- Veronica, S. Y., & Olliana, F. (2022). Pengaruh Pemberian Kunyit asam Terhadap Penurunan Nyeri Dismenore Primer pada Remaja Putri di IAI Agus Salim Metro Lampung. *Journal of Current Health Sciences*, 2(1), 19–24. <https://doi.org/10.47679/jchs.202232>
- Wardani, P. K., Fitriana, F., & Casmi, S. C. (2021). Hubungan Siklus Menstruasi dan Usia Menarche dengan Dismenor Primer pada Siswi Kelas X. *Jurnal Ilmu Kesehatan Indonesia (JIKSI)*, 2(1), 1–10. <https://doi.org/10.57084/jiksi.v2i1.414>
- Zuraida, & Aslim, M. (2020). Pengaruh Pemberian Kunyit asam Terhadap Penurunan Nyeri Dismenore Primer Pada Remaja Putri Di SMAN 1 Sutera Kabupaten. *Menara Ilmu*, XIV(01), 144–149.