SYSTEMATIC REVIEW

Comparison of the potencies of ginger (*Zingiber officinale*) and fennel (*Foeniculum vulgare*) in ameliorating dysmenorrhea pain: A systematic review

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ABSTRACT

Objective: We aimed to compare the effect of ginger and fennel herbs treatment in reducing dysmenorrhea pain intensity.
Materials and Methods: We used a systematic review method employing the PRISMA chart. PubMed, Science Direct, Scopus, and EBSCO were searched which resulted in 418 compatible literature. Among the studies found, 13 works of literature that met the PICO inclusion criteria were included in this study. The study subjects involved women aged 15 to 25 years old who experienced dysmenorrhea, had normal or high BMI levels, consumed or did not consume oral contraceptive pills (OCP), and had normal menstrual cycles.
Results: The results presented significant decreases in pain intensity in 11 studies, while the two others have shown otherwise. The two studies, with insignificant results, failed to determine the optimum dose to produce the desired analgesic effects.
Conclusion: The administration of herbal ginger is considered more effective in reducing the intensity of dysmenorrhea pain.

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Highlights

1. Dysmenorrhea pain could be reduced through various non-pharmacological treatments, including administration of ginger (*Zingiber officinale*) and Fennel (*Foeniculum vulgare*) which had been shown to significantly reduce the dysmenorrhea pain intensity.
2. The dysmenorrhea pain intensity reduction due to the administration of the natural herbs was not as significant as compared to the ibuprofen or mefenamic acid administration.

INTRODUCTION

The most notable change in puberty is menstruation. Menstruation frequently causes pain or tenderness in the lower abdomen that extends to the waist, lower back, and thighs, known as dysmenorrhea.[1] Dysmenorrhea is a gynecological problem commonly experienced by women during adolescence and adulthood.[2] Dysmenorrhea occurs through the imbalance of the low progesterone hormone and high prostaglandins (PGF2 and PGE2) in the luteinized endometrium. Prostaglandin levels increase, with a PGF2 predomination, triggering uterine hyperactivity, which amplifies the nerve terminal sensitization to prostaglandins and endoperoxides.[3] In addition to uterine hyperactivity, uterine ischemia emerges during menstruation, causing hypertonus and excessive vasoconstriction in the myometrium. Thus, dysmenorrhea occurred.[4]

Dysmenorrhea is quite common in Indonesia, with 60 to 70% of women suffering from this condition. Based on the etiology, dysmenorrhea comprises primary and secondary dysmenorrhea. Primary dysmenorrhea is generated merely by uterine hypercontractions without the presence of any gynecological disorders. On the other hand, secondary dysmenorrhea is more likely to be pathologically originated by abnormalities in the uterus and other reproductive organs.[3] Primary dysmenorrhea has a higher incidence rate than secondary dysmenorrhea, comprising 54.89% of all dysmenorrhea incidence. Dysmenorrhea has significant influences on adolescents' quality of life and social activities due to the pain and the sequels, such as headaches, weakness, vomiting, and seizures.[5]

Treatment of dysmenorrhea has been done through pharmacological and non-pharmacological treatment. Pharmacological agents, including analgesics, hormonal contraceptives, and non-steroidal anti-inflammatory drugs (NSAIDs), such as mefenamic acid, are commonly prescribed.[6] However, prolonged use of NSAIDs can give rise to disturbances in metabolism and the digestive system, as well as the emergence of allergic reactions and organ damage. Therefore, non-pharmacological therapy has been considered a better approach to dysmenorrhea with a much lower adverse effect than NSAIDs.[7] Non-pharmacological treatments, including herbal substances, acupuncture, aromatherapy, heat therapy, and physiotherapies, such as stretching, muscle relaxation, and exercise, could be applied for dysmenorrhea. Herbal products and phytopharmaceuticals have been extensively implemented in Indonesia. Treatments using herbal substances are considered effective in reducing dysmenorrhea pain.[8] In this systematic review, we observe the potency of ginger (*Zingiber officinale*) and fennel (*Foeniculum vulgare*) in reducing dysmenorrhea pain. Ginger (*Zingiber officinale*) contains gingerols, free fatty acids, proteins, and carbohydrates, which have anti-inflammatory and analgesic effects, while fennel (*Foeniculum vulgare*) contains phytoestrogens (fenchone, estragole, and trans-anethole), which have antispasmodic effects against the PGE2 and oxytocin-induced uterus hypercontraction.[9]

Non-pharmacological therapy is considered to have minimal side effects compared to therapy using NSAID drugs. Herbal therapy also does not cause dependence on sufferers, so it is considered more effective and a more economical treatment solution. In consideration of the high prevalence of dysmenorrhea among young women, along with its burden on their career, education, economy, and overall quality of life, this study aims to compare the efficacy of ginger and fennel in relieving and reducing dysmenorrhea pain. This study compared two herbal plants to assess their effectiveness against dysmenorrhea and so far no studies have discussed or compared the effectiveness of ginger and fennel together. This study compared two herbal plants to assess their effectiveness against dysmenorrhea and so far no studies have discussed or compared the effectiveness of ginger and fennel together.This study can be a reference for further research to discuss the effects of the two herbs in depth.

MATERIALS AND METHODS

We conducted a systematic review using secondary data to determine the potential of ginger (*Zingiber officinale*) and fennel (*Foeniculum vulgare*) in reducing dysmenorrhea pain intensity. The PRISMA checklist and flow diagram were employed in searching, selecting, and adjusting the found literature according to the PICO, inclusion, and exclusion criteria.[11]

We searched through four databases, including PubMed, Scopus, Science Direct, and EBSCO, for studies exploring the potencies of ginger (*Zingiber officinale*) or fennel (*Foeniculum vulgare*) in reducing the dysmenorrhea pain intensity. Quasi-experimental, randomized control trials (RCT), and case-control studies were selected. The keywords used in the search were ("Dysmenorrhea" OR "Menstrual Pain" OR "Painful Menstruation" OR "Cramping" OR "Period Pain" OR "Primary Dysmenorrhea") AND ("*Zingiber officinale*" OR "Zingiber" OR "Ginger") AND ("*Foeniculum vulgare*" OR "fennel").

Table 1. PICO Table

Population (P)	Women with dysmenorrhea (menstruation pain)
Intervention (I)	Administration of ginger (*Zingiber officinale*) or fennel (*Foeniculum vulgare*)
Comparison (C)	No intervention
Outcome (O)	Decrease in dysmenorrhea pain intensity via VAS and NRS measurement

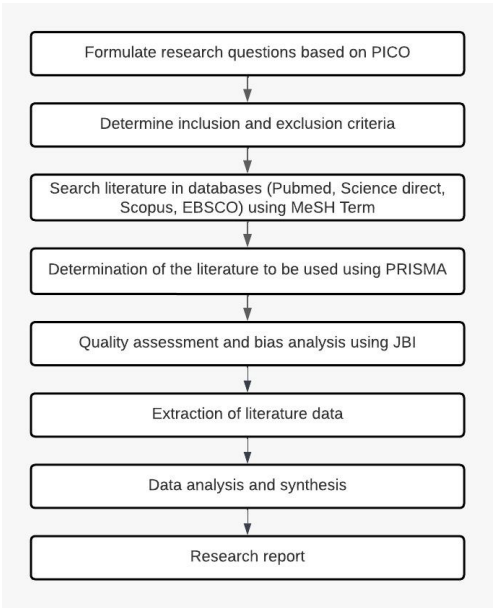

Figure 1. The systematic review workflow

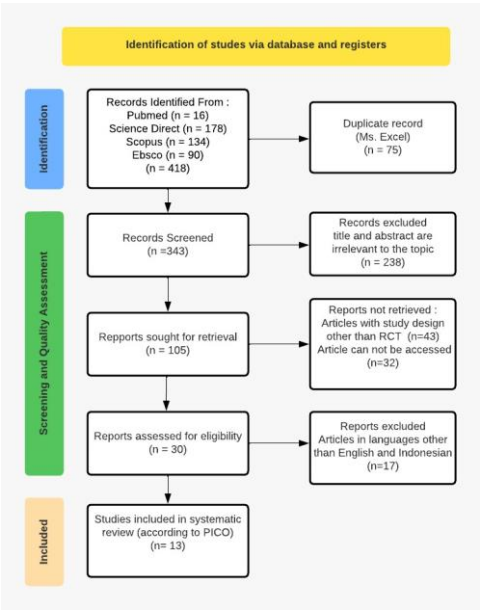

Figure 2. The PRISMA flow diagram

The systematic workflow of this study is shown in Figure 1. Details of the literature search, screening, and selection are shown in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram (Figure 2). We compared the dysmenorrhea pain intensity pre- and post-administration of ginger and fennel.

RESULTS AND DISCUSSION

From the literature search, we obtained 13 studies matching the PICO and the inclusion criteria. Two independent reviewers carried out the articles' assessment. The RCT articles were assessed using the RCT questionnaire. The risk of bias in each article was appraised using the Joana Briggs Institute (JBI) Critical Appraisal Tool. We present the risk analysis assessment in Table 3.

The study subjects' age ranged from 13 to 25 years old. The demographic characteristics of the study subjects represented an educational background of high school diploma or higher degree of education, except for the Sultan et al. (2021) and Kashefi et al. (2013) study which had a high school diploma as their highest degree of education.[12,13]

Dysmenorrheal patients in this study predominantly had menarche at the age of 12 to 13 years, except in the Nasehi et al. (2013) study at 16.1 ± 1.7 years, with respondents' mean age of 21.8 ± 2.5 years,[14] and in the Ghodsi et al. (2014) study at 14.7 years for the intervention group and 14.4 years for the control group. Overall there were no significant differences in mean age, menarche age, and dysmenorrhea initiation between the intervention and the control groups. The mean menstrual cycle duration of the study subjects is 28 days.[6] The characteristics and intensity of dysmenorrhea pain among the study subjects are relatively diverse, ranging from mild, to moderate, to severe dysmenorrhea.

Not all articles presented the body mass index (BMI) of the study subjects. Most of the study subjects had a normal BMI average, except for the Abadi et al. (2020) study with a BMI average of 26.83 ± 12.34 kg/m^2 for the intervention group.[14] Jenabi et al. (2013) reported a BMI average of 21.33 ± 1.3 kg/m^2, Shirvani et al. (2015) 21.65 ± 3.08 kg/m^2, Adib et al. (2018) 22.06 ±

3.37 kg/m^2, and Pakniat et al. (2019) 21.62 ± 3.15 kg/m^2.[16-18]

In Adib et al. (2018) study, the pre-intervention dysmenorrhea pain intensity of the ginger (*Zingiber officinale*) group was 7.60 ± 1.84, which decreased to 2.97 ± 2.69 in 48 hours post-intervention.[19] These findings indicate a significant reduction in pain intensity following the ginger treatment. At a one-time observation, no significant difference was shown between the ginger and the control group ($p > 0.05$). However, the difference became significant ($p < 0.001$) in multiple times observations. In Jenabi et al. (2013) study, the pain intensity decreased significantly in the group receiving ginger at a 500 mg dose three times a day for three days, with the average pain intensity decreasing from 7.08 ± 1.02 to 4.81 ± 1.20. Jenabi et al. (2013) study also reported that the nausea symptoms in the ginger group improved by 82% compared to the control group.[17]

A study by Kashefi et al. (2013) showed that ginger and zinc sulfate had similar therapeutic effects in lowering pain intensity and could only show maximum effect for two months. The pain intensity mean was reduced from 7.97 ± 1.4 to 3.08 ± 1.52 in the ginger group, and 8.01 ± 1.12 to 3.12 ± 1.2 in the zinc sulfate group.[13] The study of Shirvani et al. (2015), which compared ginger and mefenamic acid, found that ginger only lowered the pain intensity in the first and second months of the observed cycle, therefore there was no significant difference between the ginger and the mefenamic acid interventions. Nonetheless, ginger was only administered in low doses in that study.[18]

Rahnama et al. (2012) reported that the dysmenorrhea duration was significantly shorter in the ginger group.[20] Pakniat et al. (2019) found that the maximum decrease in dysmenorrheal pain intensity was observed in the ginger group, with a significant decline in the first and second month of observations, from 7.08 ± 0.8 to 3, 72 ± 1.39 in the first month and to 3.20 ± 1.28 in the second month.[18] Sultan et al. (2021) also showed a significant decrease in pain intensity in the ginger group, with the pain intensity average reduced from 4.13 ± 0.63 to 2.10 ± 1.52. Ginger was considered more effective than peppermint in relieving menstrual pain and symptoms associated with primary dysmenorrhea. Sultan et al. (2021) also proved ginger's capability to maintain normal blood pressure.[12]

Abadi et al. (2020) study failed to illustrate the expected analgesic effect of ginger due to the incorrect dosing. No significant difference was found in the pain duration between the intervention and control groups. However, the pain duration was shorter during the second month for the ginger group compared to the other groups.[15] Shirvani et al. (2017) indicated that stretching exercises have a more significant effect in reducing pain duration than ginger administration in a two-month observation. However, the overall pain reduction was remained more advantageous in the ginger group and not the over-exercise therapy. Shirvani et al. (2017) study also reported a decrease in bleeding quantity and menstrual duration in the ginger group.[18]

In this review, ten studies explored ginger's impact on dysmenorrhea. Eight studies showed a significant reduction in pain intensity, while the remaining two were not. Thus, ginger could have substantial potential for dysmenorrhea pain relief, including reductions in pain intensity, duration, symptoms, and problems experienced by women with primary pain. Ginger is considered effective in the treatment of dysmenorrhea. The complex active compound contained in ginger could regulate prostaglandin excess and inhibit pro-inflammatory enzymatic processes. Based on these findings, ginger herbal therapy may produce better pain-relieving properties when combined with proper physical exercise.

Modares et al. (2006) found that fennel and mefenamic acid were equally effective in elevating pain and activity limitations in adolescent girls with primary dysmenorrhea.[21] 73% of the study subjects taking fennel extract reported a lowered pain intensity or even no pain at all. A study by Nasehi et al. (2013) showed that the average maximum pain intensity in the fennel and vitamin E combination group was lower than the ibuprofen group in observations at 1, 2, 3, 6, 12, 24, and 48 hours, and a significant difference was achieved in the first and second hours of observation ($p < 0.03$ and $p < 0.04$). The pain intensity average was 3.9 ± 2.6 at 1 hour following the treatment and further decreased to 1.2 ± 1.6 at 48 hours of observation. The study of Ghodsi et al. (2014) showed that the pain quality and quantity in dysmenorrheal women changed further after several months of daily fennel soft capsules consumption. In this study, three months of use of fennel capsules could elevate the pain drastically.[6] Among the studies observing fennel, only three studies met the inclusion criteria. Fennel (*Foeniculum vulgare*) has the potential as a dysmenorrhea pain reliever. However, it was often found that the differences between the fennel herbal therapy and standard drugs were not quite significant. Fennel could help lower dysmenorrhea pain intensity with regular use. The combination of fennel and vitamin E intervention should be evaluated in more in-depth research in future studies to produce a maximum therapeutic effect compared to a single intervention only.

Table 2. Studies on the characteristics of fennel (*Foeniculum vulgare*) and ginger (*Zingiber officinale*) in a review

Author, Year Study Design	Study Characteristics	Sample Size		Treatment Method		Outcome Indicator	Research Result	Side Effect	Cycle Observation
		I	C	I	C				
Modaress *et al*., 2006 RCT	120 high school students in Kerman City with 1-year history of regular menstruation; no history of epilepsy, GI disturbance, or other diseases; and had dysmenorrhea begins 1-3 months after menarche	60	60	30 drops of fennel extract at the beginning of menstruation, then every 6 hours for 3 days of menstruation	250 mg of mefenamic acid every 6 hours for 3 days	Multidimensional verbal evaluation, including analgesic dosing, activity limitation, need for rest	80% of the fennel group vs 73% of the mefenamic group experienced a reduction in pain, 80% vs 62% reduced activity limitations, and 83% vs 71% did not need rest.	No report	2 menstruation cycle
Nasehi M, *et al*., 2013 Quasi double-blind experiment	68 Tabriz students with a history of primary dysmenorrhea; regular menstruation in the last 3 months; and no history of gynecological disease or allergy to NSAIDs	34	34	No description	No description	VAS	Fennel extract/vitamin E group showed a significant decrease in maximum pain intensity compared to the ibuprofen group at 1-2 hours	No report	No report
Ghodsi Z, *et al*., 2014 Clinical trial	80 female students in Toyserkan, Iran, suffer from primary dysmenorrhea	40	38	1 soft capsule of 30 mg fennel every 4 hours for 3 days before until day 5 of menstruation	No description	VAS McGill Pain Questionnaire VASA	The severity of pain and nausea decreased significantly in the existing group after 1-3 months	No report	3 month
Ozgoli *et al*., 2009 Double-blind comparative clinical trial	150 boarding students in Iran with primary dysmenorrhea; aged above 18 years old; and BMI between 19 to 36 kg/m^2	50	100	250 mg capsules of powdered ginger rhizome, 4 times a day for 3 days from the beginning of menstruation	250 mg mefenamic acid or 400 mg ibuprofen capsule 4 times a day	Multidimensional verbal score, including illness severity, 5-point scale pain relief, and treatment satisfaction	Ginger is as effective as mefenamic acid and ibuprofen, with 80% efficiency	No side effect	1 menstruation cycle
Rahnama *et al*., 2012 RCT	120 boarding students in Iran with moderate or severe primary dysmenorrhea; aged above 18 years old; BMI between 19 to 25 kg/m^2; and no previous OCP use	56	46	500 mg of ginger root powder capsules 3 times a day for a month on the first month 500 mg of ginger root powder capsules 3 times a day for only the first 3 days of menstruation on the second month	Placebo 3 times a day for a month on the first month Placebo 3 times a day only the first 3 days of menstruation on the second month	Multidimensional verbal score VAS	Pain severity significantly lowered with ginger compared to placebo for protocol one and protocol 2 Pain duration significantly lowered with ginger compared to placebo	GI side effects have been reported Heartburn in 5,1% of the ginger group Nausea in 8,7% of the placebo group	2 menstruation cycle
Kashefi, *et al*., 2014	High school students in Iran with moderate to severe primary dysmenorrhea; aged 15 to 18 years old; and no previous OCP, hormonal drugs, or analgesic use	47	45 placebo 54 zinc	250 mg of ginger powder capsule, 3 times a day for 4 days in two-cycles	Zinc and placebo 3 times a day for 4 days	VAS	The ginger and zinc groups experienced more symptom improvement compared to the placebo group for either cycle one or two.	Headache and heartburn	2 menstruation cycle
Shirvani, *et al*., 2015	Boarding students in Iran with primary or secondary dysmenorrhea; aged above 18 years old; no previous IUD or OCP use	61	61	250 mg of ginger powder capsule, four times a day until the pain relieves	250 mg of mefenamic acid, three days until the pain relieves	VAS Pain duration	The difference in the painseverity and duration between ginger and mefenamic acid are not significant.	No report	
Shirvani *et al*., 2017	Mild to severe primary dysmenorrhea	61	61	250 mg of ginger capsule	Physical exercise for 10 minutes 3	VAS	Pain reduction was significantly lower in the	No report	2 menstruation cycle

RCT					times per week		exercise group		
Adib *et al*., 2018 Crossover clinical trial	168 students in Iran; aged 18-26 years old, single; with primary dysmenorrhea in the first three days of menstruation; and had a regular menstruation	84	84	200 mg of ginger powder capsule	200 mg of Novafen capsule	VAS Verbal multidimensional score (MVRS)	Ginger and Novafen are effective in relieving pain, both of which show no significant difference	No report	2 menstruation cycle
Pakniat, *et al*., 2019 Single-blind clinical trial	Students aged 18-25 years old with mild to severe dysmenorrhea; regular menstruation cycle and duration, 21-35 days and 3-7 days	50	50	500 mg of ginger capsule	250 mg of mefenamic acid 2 times per day and 100 vitamin E capsules	VAS Pain duration	Ginger has a greater effect in reducing the severity of dysmenorrhea, as well as vitamin D and vitamin E	Nausea, vomiting, allergy, headache	2 menstruation cycle
Abadi, M.D, *et al*., 2020 Triple-blind RCT	210 students; aged 20-30 years old, single; with regular menstruation cycle, 21-35 days; and no menstruation clotting	70	70 valerian 70 placebo	250 mg of ginger every 8 hours in the first three days of menstruation	350 mg of valerian and 250 mg of sugar-containing-placebo	Pain duration	Dosage in the study did not produce an analgesic effect	No report	2 menstruation cycle
Sultan *et al*., 2021 RCT	150 teenagers with primary severe dysmenorrhea; aged 13-22 years old	50	50 peppermint 50 control	15 ginger capsules 250 mg in one month, 3 capsules per day in 5 days	15 placebo capsules 250 mg in one month, 3 capsules per day in 5 days	VAS	A significant pain and symptoms reduction in the ginger group	Associated with blood pressure, serum calcium, hemoglobin	No report
Jenabi, *et al*., 2013 Clinical trial	70 students in Iran with severe dysmenorrhea	35	35	3 ginger capsules 500 mg per day in 3 days	Placebo	VAS Likert scale	Significant VAS scores decrease in the ginger group	No report	1 menstruation cycle

Table 3. Bias quality assessment using JBI for ginger studies

Description: +: yes -: no ?: uncertain ×: can't be applied	Modares, 2006	Nasehi, 2013	Ghodsi, 2014	Ozgoli, 2009	Rahnama, 2012	Jenabi, 2013	Kahefi, 2014	Shirvani, 2015	Shirvani, 2017	Adib, 2018
Were clinical trial participants really randomized?	+	+	+	+	+	+	+	+	+	+
What is the classification of participants?	+	+	?	+	?	+	+	?	+	+
Is the nature of the groups the same?	+	+	+	+	+	+	+	+	+	+
Does the participant not know which group he is in?	+	+	?	+	?	?	+	?	+	+
Does the therapist not know what treatment they are giving?	+	+	?	?	?	?	+	?	?	+
Does the outcome rater not know which group they are assessing?	+	+	?	?	?	?	+	?	?	+
Did the groups get the same treatment as the ones being tested?	+	+	+	+	+	?	+	+	+	+
Was the follow-up done?	+	?	+	?	?	?	?	+	?	?
Were participants analyzed in their groups?	+	+	+	+	+	+	+	+	+	+
Is the measured output the same?	+	+	+	+	+	+	+	+	+	+
Is the output well measured?	+	+	+	+	+	+	+	+	+	+
Is good statistical analysis used?	+	+	+	+	+	+	+	+	+	+
Is the research design appropriate?	+	+	+	+	+	+	+	+	+	+

Table 4. Bias quality assessment using JBI for fennel studies

Description: +: yes -: no ?: uncertain ×: can't be applied	Pakniat, 2019	Abadi, M.D., 2020	Sultan, 2021
Were clinical trial participants really randomized?	+	+	+
What is the classification of participants?	+	+	+
Is the nature of the groups the same?	+	+	+
Does the participant not know which group he is in?	+	+	+
Does the therapist not know what treatment they are giving?	+	?	?
Does the outcome rater not know which group they are assessing?	?	?	?
Did the groups get the same treatment as the ones being tested?	+	+	+
Was the follow-up done?	?	?	?
Were participants analyzed in their groups?	+	+	+
Is the measured output the same?	+	+	+
Is the output well measured?	+	+	+
Is good statistical analysis used?	+	+	+
Is the research design appropriate?	+	+	+

CONCLUSION

The administration of ginger (*Zingiber officinale*) and fennel (*Foeniculum vulgare*) reduces the dysmenorrhea pain intensity. Both herbs have the same potential in reducing the intensity of dysmenorrhea. However, compared to fennel, ginger can reduce pain in a shorter time.

DISCLOSURES

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Conflict of interest

The authors declare there is no conflict of interest.

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Author Contribution

All authors have contributed to all processes in this research, including preparation, data gathering, analysis, drafting, and approval for publication of this manuscript.

REFERENCES

1. Melin UN, Soleha TU. Manfaat kunyit asam (*Curcuma domestica Val*) terhadap Dismenore. Majority. 2016;5(1):129-133.
2. Larasati TA, Alatas F. Dismenore primer dan faktor risiko dismenore primer pada remaja. Majority. 2016;5(3): 79-84.
3. Dewi NP, Solehati T, Hidayati NO. Kualitas hidup remaja yang mengalami dismenore di SMK Negeri 2 Sumedang. Jurnal Ilmiah Manuntung. 2018;4(2): 129-42. doi: 10.51352/jim.v4i2.192.
4. Sanjiwani IA. Dismenore primer dan penata-laksanaan non farmakologi pada remaja. Literature Review. Denpasar; Program Studi Ilmu Keperawatan Fakultas Kedokteran Universitas Udayana. 2017.
5. Ghodsi Z, Asltoghiri M. The effect of fennel on pain quality, symptoms, and menstrual duration in primary dysmenorrhea. J Pediatr Adolesc Gynecol. 2014(5):283-6. doi: 10.1016/j.jpag.2013.12.003. Epub 2014 Jul 30. PMID: 25085020.
6. Smith R, Kaunitz A. 2015. Primary dysmenorrhea in adult women : clinical features and diagnosis. [Internet] Walter Kluwers. Up To Date [updated 2015]. Available from: https://www.uptodate.com/contents/dysmenorrhea-in-adult-females-clinical-features-and-diagnosis
7. American College of Obstetricians and Gynecologists. Management of preterm labor. [Internet] [updated 2016; cited 2021 May 15]. Available from: http://emedicine.medscape.com/article/975909-treatment#showall.
8. Morehead A, McInnis LA. Herbal supplements for common women's health issues. Nurs Clin North Am. 2021;56(1):69-78. doi: 10.1016/j.cnur.2020.10.006. Epub 2020 Dec 29. PMID: 33549287.
9. Xu Y, Yang Q, Wang X. Efficacy of herbal medicine (cinnamon/fennel/ginger) for primary dysmenorrhea: a systematic review and meta-analysis of randomized controlled trials. J Int Med Res. 2020;48(6):300060520936179. doi: 10.1177/0300060520936179. PMID: 32603204; PMCID: PMC7328489.
10. Trachtenberg F, Maserejian NN, Soncini JA, et al. Does fluoride in compomers prevent future caries in children? J Dent Res. 2009;88(3):276-9. doi: 10.1177/0022034508330884. PMID: 19329464; PMCID: PMC2762208.
11. Nursalam. Sosialisasi panduan penyusunan skripsi bentuk literature review dan systematic review [How to arrange thesis using literature review and systematic review]. Surabaya: Fakultas Keperawat-an Universitas Airlangga; 2020.
12. Sultan S, Ahmed Z, Afreen A, et al. Analgesic effect of ginger and peppermint on adolescent girls with primary dysmenorrhea. Food Science and Technology. 2021:41(4);833-9. doi: 10.1590/fst.24820
13. Kashefi F, Khajehei M, Tabatabaeichehr M, et al. Comparison of the effect of ginger and zinc sulfate on primary dysmenorrhea: a placebo-controlled randomized trial. Pain Manag Nurs. 2014;15(4): 826-33. doi: 10.1016/j.pmn.2013.09.001. Epub 2014 Feb 20. PMID: 24559600.
14. Nasehi M, Sehhatie F, Zamanzadeh V, et al. Comparison of the effectiveness of combination of fennel extract/vitamin E with ibuprofen on the pain intensity in students with primary dysmenorrhea. Iran J Nurs Midwifery Res. 2013;18(5):355-9. PMID: 24403936; PMCID: PMC3877456.
15. Abadi MD, Vakilian K, Aghdam NSZ, et al. The Effect of Valerian and Ginger on Dysmenorrhea: A Randomized Clinical Trial. International Journal of Women's Health and Reproduction Sciences. 2018;8(1):101-5. doi: 10.15296/ijwhr.2020.15.
16. Jenabi E. The effect of ginger for relieving of primary dysmenorrhoea. J Pak Med Assoc. 2013 Jan;63(1):8-10. PMID: 23865123.
17. Shirvani MA, Motahari-Tabari N, Alipour A. The effect of mefenamic acid and ginger on pain relief in primary dysmenorrhea: a randomized clinical trial. Arch Gynecol Obstet. 2015;291(6):1277-81. doi: 10.1007/s00404-014-3548-2. Epub 2014 Nov 16. PMID: 25399316.
18. Pakniat H, Chegini V, Ranjkesh F, et al. Comparison of the effect of vitamin E, vitamin D and ginger on the severity of primary dysmenor-rhea: a single-blind clinical trial. Obstet Gynecol Sci. 2019;62(6):462-468. doi: 10.5468/ogs.2019.62.6.462. Epub 2019 Oct 15. PMID: 31777743; PMCID: PMC6856484.
19. Adib Rad H, Basirat Z, Bakouei F, et al. Effect of Ginger and Novafen on menstrual pain: A cross-over trial. Taiwan J Obstet Gynecol. 2018;57(6): 806-809. doi: 10.1016/j.tjog.2018.10.006. PMID: 30545531.
20. Rahnama P, Montazeri A, Huseini HF, et al. Effect of Zingiber officinale R. rhizomes (ginger) on pain relief in primary dysmenorrhea: a placebo

randomized trial. BMC Complement Altern Med. 2012;12:92. doi: 10.1186/1472-6882-12-92. PMID: 22781186; PMCID: PMC3518208.

21. Modaress Nejad V, Asadipour M. Comparison of the effectiveness of fennel and mefenamic acid on pain intensity in dysmenorrhoea. East Mediterr Health J. 2006;12(3-4):423-7. PMID: 17037712.