

ANALYSIS OF CLINICAL STUDIES AND QUASI-EXPERIMENTAL STUDIES IN THE MANAGEMENT OF PRIMARY DYSMENORRHEA: REVIEW ON EFFICACY OF GINGER

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ABSTRACT

Introduction: Primary dysmenorrhea, which induces suffering in young women, is often accompanied by several other symptoms that can disrupt their life. It is one of the most well-known gynecological issues, impairing women's productivity and leading in 34 percent to 50 percent of school and job absences. Ginger is a very well herb which has traditionally been used to relieve inflammatory illnesses' symptoms. Ginger powder has proven to be effective in lowering menstruation discomfort when taken during the first three to four days of the menstruation. **Materials and methods:** Following the PRISMA methodology, extensive search methods for ginger and pain with or without length of menstruation symptoms together with a trial filter for quasi-experimental studies, randomized or controlled clinical trials were used to explore numerous databases between 2005 and 2022. The search terms were "ginger" primary dysmenorrhea, "dysmenorrhea," "non-pharmacology therapies," and "menstrual pain for selecting articles." Trials testing the efficacy of ginger comparing to placebo, pharmaceutical treatment, or non-pharmacological, complementary therapy in women suffering from primary dysmenorrhea used as an oral treatment were included. **Results:** There have been 13 clinical trials extracted, which included five studies showing ginger to placebo, three research papers trying to compare ginger to a nonsteroidal anti-inflammatory drug (NSAID), two studies trying to compare ginger to vitamins, two studies comparing ginger to exercise, and one study comparing ginger to pineapple juice. **Conclusion:** Ginger was found to be more beneficial than placebo, exercise, vitamins, and pineapple juice in reducing pain intensity, as well as being similarly efficacious in decreasing menstrual cramps and length when combined with a nonsteroidal anti-inflammatory medicine (NSAID). Due to the heterogeneity of the studies, it was not possible to perform meta-analysis. The findings of this evaluation approach show that ginger in any form, can help with primary dysmenorrhea.

KEY WORDS: primary dysmenorrhea, ginger, menstrual pain, non-pharmacology methods, dysmenorrhea

INTRODUCTION

Dysmenorrhea is characterized by low abdominal or pelvic pain occurring before or during menstruation. It can be either primary (in the absence of an identifiable pathological condition) or secondary (due to organic pathology such as endometriosis or fibroids) ¹. In addition to

pelvic pain, some women with dysmenorrhea may also experience low back pain, nausea, vomiting, and changes in bowel habits^{1,2}. Dysmenorrhea is highly prevalent among women of reproductive age, with an estimated prevalence between 16% and 91%¹. As the leading cause of absenteeism from work or school among women, dysmenorrhea negatively affects individual women and society as a whole⁴.

Nearly 90% of childbearing women will experience painful menstruation cycles at some time in their life. Younger women suffers more than the older women^{5,6}.The prevalence of dysmenorrhea among women of reproductive age ranges from 16 to 91 percent, with severe dysmenorrhea affecting 10-12 percent of women.^{7,8}Dysmenorrhea is caused by an increase in prostaglandin production, which produces menstrual cramps and cramping pain. It is one of the most prevalent reasons for gynecological consultation. Dysmenorrhea has numerous social and economic ramifications. As a consequence, dysmenorrhea may be regarded as a major public health concern. Dysmenorrhea continues to have a substantial impact on several individuals' life quality, and therapeutic options are still limited^{6,7,8}

Progesterone depletion near the end of a menstruation causes dysmenorrhea; this depletion has been proven to prolong the production of prostaglandins F₂ (PGF₂) and E₂ (PGE₂). While NSAIDs are thought to decrease Cyclooxygenase-2, some persons would rather not or are unable to utilize traditional therapies (NSAIDs or hormone therapy) and still experience symptoms. It is one of the most well-known gynecological concerns affecting women's function, with 34 percent in 1950 of women left school or college due to this and lost their employment. There is no underlying biological basis for primary dysmenorrhea, which is induced by hyper contractility of the myometrium, arteriolar vasoconstriction, and tissue hypoxia^{8,9,10}.

Dysmenorrhea is commonly undertreated, if not altogether neglected, by healthcare workers and women herself, who may consider it as a normal part of the menstrual cycle. Regardless of the fact that now the etiology of primary dysmenorrhea is well understood, researchers are progressively focusing their efforts on treatments protocol to get aid to these frequently occurring phenomena¹¹.Although nonsteroidal anti-inflammatory medicines and contraceptive pills remain the main stay of treatments but additional complementary therapy like topical heat and regular exercise were also found to resolve the issue¹².

Ginger is the most potent, evidence-based natural health treatment available. Ginger is known as the "Queen of Herbs" in Ayurvedic scriptures since it is a complete cure in itself. Ginger includes "gingerol," a powerful anti-inflammatory chemical that helps with muscle and joint pain alleviation. Ginger has been used to treat a variety of ailments for at least 2,500 years^{13,14}.Ginger has long been used to relieve pain caused by dysmenorrhea, joint problems, arthritis, headaches, and digestive problems such as vomiting, nausea, and constipation. The American Food and Drug Administration has approved it as an herbal medication. The method through which ginger relieves pain is unknown. Despite this, data suggests that ginger contains

anti-inflammatory and analgesic properties. In addition, laboratory research suggest that ginger helps to relieve dysmenorrhea by inhibiting cyclooxygenase, which in turn inhibits prostaglandins and leukotrienes. Ginger has been shown to suppress COX-2, and its role in the alleviation of pain and inflammation has been studied. As a consequence, ginger may be beneficial in the treatment of dysmenorrhea.^{15,16}.

A detailed assessment of the literature on the efficacy of ginger in the treatment of primary dysmenorrhea was undertaken by Daley¹⁷.The researchers looked at all randomized trials on the impact of ginger powder on younger women. The study looked at the effects of ginger on persons between the ages of 13 and 30. The majority of the trials excluded women with irregular menstrual cycles, hormonal medications, oral or intrauterine contraception, or a history of pregnancy. 750-2,000 mg ginger powder capsules were given once a day for the first 3 days of the menstrual cycle. Ginger powder eaten during the first three to four days of the menstrual cycle was linked to a massive decrease in the discomfort visual analogue scale (risk ratio, -1.85 ; 95 percent confidence interval: -2.87 to -0.84 ; $P = .0003$), according to the meta-analysis. The tricky part is recommending a brand you know and trust, which is complicated by the lack of quality monitoring and controlling for over-the-counter, unorthodox drugs¹⁷.

MATERIAL AND METHODS

1. Search Strategies

By identifying the terms and integrating them with all duplicates found in the database, the research was carried out in a systematic manner. Similarly, applying terms and search phrases from previous research works, a manual Web of Science, Pub Med, Cochrane, Research Gate, BMJ learning, and Google scholar search was conducted. During the initial investigation, 870 articles were discovered, 332 of which were carefully picked. As a result of database replication, 538 articles were removed. There was no duplication, and the eligibility of 150 papers was determined. 182 papers were rejected because the entire text was not available. As a result, 13 papers were thoroughly examined, including abstracts and full texts. A total of 1714 persons were included in the study, according to the inclusion criteria. The literature includes randomized clinical trials (RCTs) and quasi-experimental studies. "Ginger" AND "dysmenorrhea," "primary dysmenorrhea," "randomized controlled trial," "quasi - experimental research design," "non-pharmacology approaches," and menstruation discomfort were among the keywords mentioned.

2. Study Selection

We selected studies wherein female adolescents aged 12 to 30 years old were given oral ginger in any form (raw, powder, capsule, juice, or tea form) as a standard treatment and were evaluated to a placebo or active treatment. Only randomized controlled trials and quasi

experimental research were considered. A patient-reported evaluation tool was used to assess the severity and duration of self-reported menstrual discomfort. The data was reviewed and extracted by all three writers. The data from the included trials was collected independently by two reviewers: the first author assessed all of the studies, while the second and third researchers each examined 50% of them. With the help of the third reviewer, disagreements were resolved through debate and consensus. A study or piece of literature having a sample size of more than 30 people, written in English, and published between 2005 and 2022 was included. Trials of nonoral ginger use (e.g., ginger moxibustion, essential oil massage), non-human or in vitro studies, and observational studies were also excluded. Data were subjectively synthesized because heterogeneity between studies prohibited a proper meta-analysis.

Table 1: Summary of Included trials

Author details and Year	Title	Methodology	Ginger preparation	Comparison	Outcome Measure	Author conclusions
Ozgoli et al. ¹⁸	Comparison of Effects of Ginger, Mefenamic Acid, and Ibuprofen on Pain in Women with Primary Dysmenorrhea	Design: Double-blind comparative clinical trial Sample: Students Size: 150	Ginger -250 mg capsules/4times /3days	Mefenamic Acid and Ibuprofen	Verbal multidimensional scoring system	No significant difference in pain severity and discomfort was found between ginger, mefenamic acid and ibuprofen group
Rahnama et al. ¹⁹	Effect of Zingiber officinale R. rhizomes (ginger) on pain relief in primary dysmenorrhea: a placebo randomized trial	Design: Randomized, controlled trial Sample: Students Size: 120	Ginger root - 500 mg capsules of powder	Placebo	Visual Analogue Scale	Significant differences were noted in the severity of pain between ginger and placebo group. Ginger reduced the pain level.
Jenabi ²⁰	The effect of ginger for relieving of primary dysmenorrhea	Design: Clinical Trial Sample: Female students Size: 70	Ginger capsule – 500 mg	Placebo	Visual Analogue Scale	Ginger was more effective in minimizing the pain severity in primary dysmenorrhea.
Shirvani et al. ²¹	The effect of mefenamic acid and ginger on pain relief in primary dysmenorrhea: a randomized clinical trial	Design: Randomized clinical trial Sample: Female students Size: 122	Ginger-250 mg/6 hourly/2 days	Mefenamic Acid	Visual analog scale	There was no noticeable difference in pain intensity or duration between ginger and mefenamic acid.
Kashefi et al. ²²	Comparison of the Effect of Ginger and Zinc Sulfate on Primary Dysmenorrhea: A Placebo-Controlled Randomized Trial	Design: randomized trial Sample: High school students Size: 150	Ginger capsule	Zinc sulfate capsules and Placebo	Visual analog scale	Effects of ginger and zinc sulphate on the relief of primary dysmenorrheal discomfort in young women were similar.
Yeknami et al. ²³	The effect of a set of submaximal aerobic exercise and ginger on pain duration in the college girls with primary dysmenorrhea	Design: Quasi-experimental research Sample: Female students Size: 40	Ginger-250 mg for 4 days	Control Exercise Combined group (Ginger and Exercise)	Visual Analogue Scale	Ginger is useful in relieving the intensity and duration of pain of primary dysmenorrhea when combined with

						submaximal aerobic exercise or when used alone.
Pakniatet al. ²⁴	Comparison of the effect of vitamin E, vitamin D and ginger on the severity of primary dysmenorrhea: a single-blind clinical trial	Design: Single-blind clinical trial Sample: Female Medical students Size: 240	Ginger-500 mg	Vitamin D, Vitamin E, Placebo	Visual Analogue Scale	The ginger group experienced a much higher improvement in pain severity than the Vitamin E and Vitamin D groups.
Satyajit et al. ²⁵	A Quasi Experimental Study to Assess the Effectiveness of Ginger Powder on Dysmenorrhea among Nursing Students in Selected Nursing Colleges, Hoshiarpur, Punjab	Design: Quasi-experimental design Sample: Nursing students Size: 60	Ginger powder	Placebo	McGill pain questionnaire & Wong bakers faces pain rating scale	According to the findings, ginger powder had an effect on dysmenorrhea among nursing students in the experimental group.
Rad et al. ²⁶	Effect of Ginger and Novafen on menstrual pain: A cross-over trial	Design: Crossover clinical trial study Sample: Students Size: 168	Ginger- 200 mg capsule	Novafen	Visual analog scale, multidimensional verbal rating scale	Both medicines helped to relieve menstruation pain. In females with primary dysmenorrhea, both ginger and Novafen are excellent pain relievers.
Sheetalet al. ²⁷	Ginger Tea on Dysmenorrhea Among Nursing Students	Design: Quasi-experimental design Sample: nursing students Size: 50	Ginger tea-120 ml for 2 days	Placebo	Pain Quality Assessment Scale	Use of ginger tea can provide immediate relief to dysmenorrhea sufferers.
Wrisnijatiet al. ²⁸	Effects of Pineapple Juice and Ginger Drink for Relieving Primary Dysmenorrhea Pain among Adolescents	Design: Randomized trial study Sample: Female students Size: 39	Ginger drink	Pineapple juice	Numeric Rating Scale	Pineapple juice and ginger tea were found to be useful in reducing the pain of primary dysmenorrhea in female teenagers.

Sultan et al. ²⁹	Analgesic effect of ginger and peppermint on adolescent girls with primary dysmenorrhea	Design: Clinical trial Sample: Adolescents, Size: 150	Ginger=250 mg (3 capsules/day following 5 days)	Placebo and Peppermint group	Pain assessment questionnaires	Comparison to peppermint and control groups, ginger was found to have a greater influence on pain reduction.
Kassaet al. ³⁰	Comparative Study on Ginger Supplement and Aerobic Exercise on Primary Dysmenorrhea: The Case of Debre Markos University Students, Amhara Regional State, Ethiopia	Design: Randomized comparative trial Sample: Female students Size: 40	Ginger group	Aerobic group	Visual Analogue Scale	Ginger tea group shows more significant change than aerobic exercise group on reducing pain intensity during and before menstruation

RESULTS

A PRISMA flow chart depicting the studies that are reported, screened, rejected, and incorporated is shown in Figure 1. A total of 870 studies were identified during the initial electronic searches, with 538 duplicate studies being deleted. Thirteen of the trials that satisfied the criteria were included in the narrative analysis.

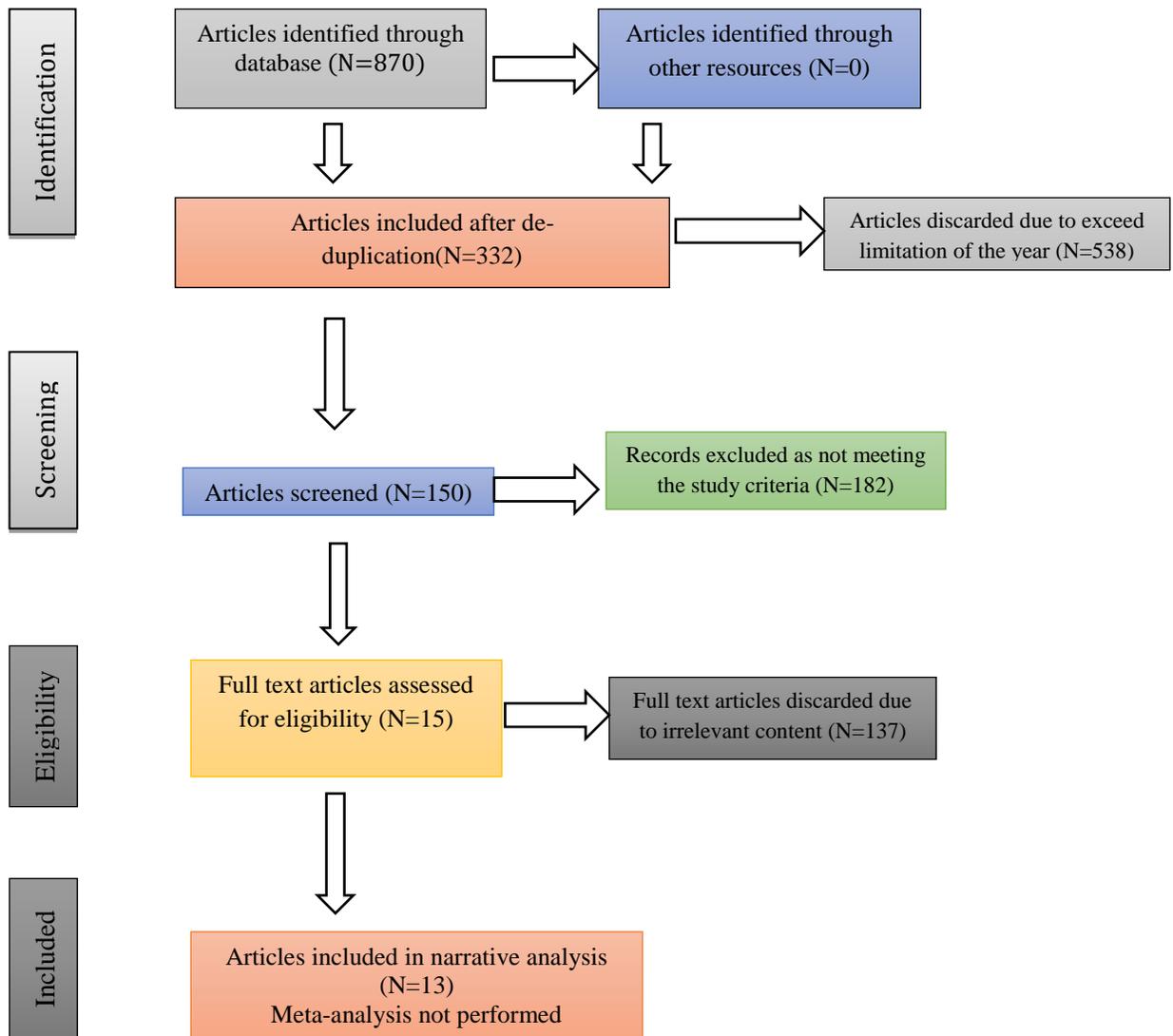


Fig. 1: Prisma flow diagram for Narrative analysis

The comprised studies were conducted between 2005 and 2022. Table 1 shows the basic characteristics of the studies that were included. Five of the thirteen studies examined were pretest posttest-controlled trials^{19,21,22,28,30}, one was a cross-over design by Rad et al.²⁶, four were single and double blinding clinical trials^{18,20,24,29}, and three were quasi experimental.^{23,25,27}. Each of the thirteen studies took place in Iran, India, Pakistan, Java, or Ethiopia. High school kids, female teenagers, and medical or nursing college students were among those who took part in the study. Pain intensity and duration of pain were the outcome variables in two studies^{19,21}, pain severity was the result variable in nine research^{20,23,25,26,24,27,28,29,30}, and the duration/discomfort of pain was the outcome variable in two studies^{18,22}.

The studies included a sample size of 39 to 240 people, divided into intervention and placebo/active management groups. Each comprised ginger in a number of forms, including powder, raw, juice, and capsules, that had been thoroughly studied. In some of the trials, ginger preparations and other interventions were not stated or recorded. Ginger can be taken in doses ranging from 700 mg to 1250 mg per day. The first to third day of menstruation was the most usual time for ginger treatment. In seven^{19,20,21,22,23,24,30} of the thirteen trials, pain severity and duration were assessed using a visual analogue scale of 10 cm points. Only one¹⁸ study uses a multidimensional verbal scoring system to evaluate pain intensity, one used Pain assessment questionnaire²⁹, one by Numeric pain rating scale²⁸, one by Pain quality assessment scale²⁷, and two trial involved both Mc Gill pain questionnaire and Wong Bakers pain rating scale²⁵ and other involved visual analogue scale as well as multidimensional verbal scoring system²⁶ for measuring pain intensity.

Effectiveness of Ginger

a. Severity of Pain

This review looks at the effectiveness of ginger in the treatment of primary dysmenorrhea. Giving ginger to an adolescent in any form has been proved in numerous trials to relieve menstrual discomfort which were included in this review. In a few trials, ginger was shown to be as beneficial when compared to mefenamic acid or Ibrufen in terms of pharmacological interventions, while ginger was found to be effective over a variety of complementary interventions in terms of non-pharmacological interventions.

i. Ginger versus placebo

On 300 female students with primary dysmenorrhea, five trials looked at the effects of ginger and placebo on pain severity and discomfort^{19,20,22,25,27}. In all two clinical trials and two quasi experimental design studies, individuals in the ginger group saw a substantial reduction in pain severity when compared to the placebo group. Although the outcome measure for measuring pain or discomfort differed between the RCT and the quasi-experimental trial, resulting in measurement heterogeneity. In addition, Rahnama et

al¹⁹.found that a five-day ginger regimen significantly reduced pain duration (as measured by hours in pain) when compared to a placebo.

ii. Ginger versus NSAID

Shirvani et al.²¹, Rad et al.²⁶and Ozgoli et al.¹⁸, compared the effects of ginger and NSAID on pain intensity in 440 students; the findings of two trials^{21,26} showed that ginger and NSAID were similarly efficient in lowering pain severity among female students with primary dysmenorrhea, with no statistical difference between the two groups. Despite the fact that each study's pain outcome measure was different.

iii. Ginger versus Vitamins

Two randomized controlled trials, Pakniat et al.²⁴and Kashefi et al.²²compared the effects of ginger with Vitamin E, Vitamin D, or Zinc sulphate administration in 390 students. The results of one trial²² indicated that the effects of ginger and zinc sulphate on the relief of primary dysmenorrheal discomfort in young women were similar and there was no statistical difference between the two groups, whereas the results of the other however, data from another research²⁴ revealed that participants in the ginger group saw a considerable reduction in pain severity when compared to those in the vitamin supplement group, with a statistical difference between the two groups.

iv. Ginger versus other complementary therapy

Four studies^{23,29,30,28} looked at the effect of ginger and other supplementary drugs on pain severity in 269 students with primary dysmenorrhea. According to the findings of Yeknami et al.²³, Sultan et al.²⁹and Kassa et al.³⁰when paired with aerobic activity or administered alone or with peppermint capsule, Ginger was superior in reducing the discomfort of primary dysmenorrhea. Wrisnijati et al.²⁸compared the effects of ginger and pineapple juice on pain severity in students, and the results showed that both ginger and pineapple juice were equally effective in reducing pain severity in female students with primary dysmenorrhea, with no empirical difference between the two groups.

b. Duration of menstrual pain

Rahnama et al.¹⁹,Shirvani et al²¹., and Yeknami et al.²³found that ginger with placebo, ginger with mefenamic acid, and ginger with aerobic exercise were all beneficial in reducing pain duration in 182 students with primary dysmenorrhea. In a three-day study, Rahnama et al.¹⁹and Shirvani et al.²¹found no significant difference in pain duration between ginger and placebo and ginger with Mefenamic Acid, whereas Yeknami et al.²³found a significant reduction in pain duration between ginger and aerobic exercise in a four-day study.

c. Ginger's safety and side effects

In terms of side effects, the research found that ginger is generally safe and only causes minor problems (indigestion, heartburn and mild headache). This information is reliable in light of prior research on ginger, which shows that when used properly, it has an excellent safety profile. Sultan et al. and his colleagues in their investigations, Shirvani et al.²¹ and Janebi²⁰ found that ginger has no side effects and is an alternative treatment for primary dysmenorrhea. It also reduces nausea symptoms and lowers blood pressure when taken for a long time. Apart from that, one study²⁹ found that indigestion, headache, and heartburn are some of the mild adverse effects of taking ginger in excessive amounts.

DISCUSSION

Menstrual cramping is not a life-threatening condition, but it can have a negative impact on a woman's quality of life and social connections. Dysmenorrhea affects the lower abdomen mostly, but it can also affect the lower back, waist, pelvis, upper thighs, and legs.^{31,32,33}

The evidence from 10 RCTs and three quasi-experimental studies examining the effectiveness of ginger on primary dysmenorrhea is summarized in this qualitative analysis. This study shows that ginger can help with pain associated with primary dysmenorrhea. We may state that ginger may be regarded to alleviate menstruation pain based on many findings from the observed investigations. Overall, ginger was proven to be more efficient than placebo in decreasing pain, though ginger and NSAID/Pineapple apple Juice/Zinc sulphate were found to be similarly beneficial in reducing pain severity. However, due of the small number of studies, lack of methodological consistency, and significant variability in the study, these findings should be treated with care.

Ginger has been studied for its ability to reduce inflammation and pain in a number of studies. Several studies have shown that ginger can help with auto-immune illness, rheumatoid arthritis, osteoarthritis, burns, migraine headaches, and chronic lower back pain.^{6,7,8,10,11}. Various investigations have established the use of ginger in folk medicine for the treatment of colds, fevers, sore throats, nausea, stomach distress, muscle aches, and arthritis¹². Ginger can help with a variety of aches and pains. It is not, however, completely beneficial for all types of pain. Although we only discovered three studies that examined pain duration in their trial^{51,34,35}, this review indicated the effect of ginger on discomfort duration.

The length of pain in the ginger group was significantly shorter than in the placebo group, according to three studies.^{23,36,,37}. Another study found that eating ginger two days before the start of the menstrual cycle was considerably better at lowering the degree of the discomfort. When it comes to safety, according to Rahnama et al.¹⁹ study, ginger is generally harmless with no known negative impacts (heartburn and headache). When taken correctly, ginger has a good

safety history, according to Lakhan et al.³⁸reports. It's significant to remember that the one RCT that reported treatment side effects found relatively minor symptoms and no differences between the ginger-treated and placebo-treated groups³³.

According to a comprehensive assessment, ginger is more long-term safe than NSAIDs for pain management, with fewer stomach side effects and less kidney issues. The conclusion of this review is similar to the conclusions of three previous reviews on the effect of ginger on primary dysmenorrhea by Daily et al.³⁹; Chen et al.⁴⁰ and Negi et al.⁴¹, but our review differs from these three reviews in that we included RCTs and quasi-experimental studies from various countries until 2021, giving all three reviews an extension.

Daily et al.⁴⁰ systematic review and Chen et al.⁴¹ systematic review found more evidence to support the efficiencies of ginger for primary dysmenorrhea in all eight randomized clinical trials, whereas Negi et al.³⁹ systematic review and meta-analysis found more facts to justify the efficiency of ginger for primary dysmenorrhea in all eight randomized clinical trials. Only RCT trials completed in one country, Iran, were included in Negi et al. review, which may limit the study's sample size and effect the generalization of the study. In addition, our qualitative analysis compares ginger to NSAIDs, vitamins, and other complimentary active substances, in addition to placebo. Given the widespread use of NSAIDs and supplementary therapy among women with menstrual cramps, researchers and clinicians may find comparative efficacy information beneficial.

The current study provides solid evidence of ginger's effectiveness in reducing menstruation discomfort and length. Ginger may be a possible supplementary treatment for primary dysmenorrhea due to its positive effects and minimal negative effects. It is vital to increase the practical or methodological consistency of future studies. Future studies will need to use efficient methods for creating random sequences, concealing allocation, blinding participants, blinding outcome assessors, resolving missing data (using intent-to-treat analysis), and reporting on pre-specified outcomes.

LIMITATIONS

There are a few flaws in our analysis. Despite the fact that we think our screening approach was thorough, we can be certain whether our efforts were effective because selection bias is an issue in both nursing and health or medical research, but it may be amplified in alternative medicine literature. A narrative overview was been suggested to be vulnerable to prejudice, inconsistency, and hampered by the lack of an effect magnitude. Nevertheless, some of the flaws that have been discovered are listed below.

First, the substantial variability of our article's experiments and outcomes must be interpreted with caution. To examine the efficacy of ginger on primary dysmenorrhea, researchers will need

to conduct RCTs and quasi-experimental investigations that are well-designed, well-powered, and long-term and the trials or investigation should be conducted in different countries.

Furthermore, this study wasn't really entered into Prospective Register of Systematic Reviews, nonetheless, future trials with large data sets should use the system.

Thirdly, due to heterogeneity of the trials, meta-analysis was not performed, which will be a major flaw making the study findings not generalizable.

RECOMMENDATIONS AND FUTURE DIRECTIONS

The results of ten clinical trials and three quasi-experimental studies examining the effectiveness of oral ginger for primary dysmenorrhea are summarized in this analysis. Based on the existing evidence, oral ginger offers a potential therapeutic option for pain in primary dysmenorrhea. Generally, ginger was shown to be more beneficial than placebo, vitamins, and complementary therapy for pain reduction, with no notable difference between ginger and NSAIDs.

In order to ensure safety, the studies found that ginger is generally safe, with very few noticeable symptoms (heartburn and headache) and equal rates of adverse outcomes for ginger and placebo or other active management groups^{42,43,33}. This is in line with earlier reports that ginger has a low risk of side effects when used correctly^{44,43,38}. According to one comprehensive analysis, ginger has a better safety profile than NSAIDs as a pain reliever, with less gastrointestinal side effects and renal concerns³⁸.

Ginger may be helpful for women with dysmenorrhea who cannot or do not want to utilize traditional drugs, based on its clinical efficacy and initial efficacy results. In determining therapeutic decisions, patient values and preferences would be significant. Those who use Nifedipine or anticoagulants, on the other hand, should use ginger with precaution due to the risk of drug side effects⁴⁵.

Later articles should include a detailed description of the trial techniques, particularly critical features of the design and ginger preparations. Four of the available trials did not quantify or publish the quantity of materials in ginger formulations, and seven of them neglected to note the number of doses to be sustained for how many days and weeks. Two trials employed two outcome measures to assess the severity of pain, but did not specify which two would be used to determine the actual outcome. It's difficult to distinguish between study and clinical suggestions without this information. When planning and reporting studies, we recommend that researchers examine the CONSORT statement for alternative therapy trials^{46,47,48,49}

Similarly, prospectively registering trials is recommended to allow for the examination of confounding factors and result reporting bias.

Recent guidelines suggest that it would be beneficial to measure the effect of an intervention over relevant time frame. Regulatory authorities typically require 12-week trials and trials involving fewer than 50 patients per treatment arm are potentially more biased than larger trials^{50,51,52,53}.

Finally, this analysis indicates that oral ginger may be beneficial in the treatment of primary dysmenorrhea discomfort, although the results should be regarded with care due to the constraints of the existing trials. Future trials must be meticulous in their design and execution, with proper documentation of trial details to allow for interpretation of the results of outcomes.

IMPLICATION

a. Nursing practice

Providing non-pharmacological pain support measures to girls and women during their early adolescent and late adolescent years is critical. Nurses can use non-pharmacological interventions such as ginger (in powder, juice, or oral supplement form) to help women feel more comfortable during menstruation and improve their reproductive experience.

Further Nurses working in hospitals can recommend these ginger remedies to adolescent girls and women for management of primary dysmenorrhea. However, well-designed studies about roles, doses, duration of treatment and side effects of ginger remedies should be conducted. Students use ginger because ginger preparation are easily available and effective home remedy which has significant effect in relieving primary dysmenorrhea. So, it is important to enhance the usage of natural and home remedies for management of dysmenorrhea with less expensive, less side effects and easily available methods. Student nurses during community positing and home visit can target the adolescent girls and women suffering with menstrual pain and can suggest the ginger remedies in any form. Further trials should be conducted on effects of ginger supplement on primary dysmenorrhea on large number of populations^{53,54,50,51}.

b. Nursing Education

Nurse educators should emphasize the use of non-pharmacological pain relief techniques such as oral ginger administration in nursing education as part of reproductive age group care, as well as school health programmes that include menstrual hygiene, particularly among female teenager. The nurse educator can encourage the kids and lead a session to test the effects of oral ginger on neighborhood adolescent students. Continuing nursing education, as well as skill training programmes, can be organized to aid in the dissemination of information on the benefits of non-pharmacological measures in the treatment of menstrual pain in women of

reproductive age. Non-pharmacological measures such as oral ginger supplements to relieve pain should be covered in nursing curriculum to equip nurses to deliver holistic care^{50,51,52}.

In the current situation, nurses are actively conducting research, publishing findings, and using findings in practice to improve patient care and strengthen evidence-based nursing. Non-pharmacological measures of pain management during primary dysmenorrhea should be the focus of the nurse researcher's investigation. The nurse researcher should review research findings on a regular basis and disseminate them through conferences, seminars, and publication in national and international publications. During their PHC posts, the nurse researcher should also counsel the nurses to apply this evidence-based technique to offer nursing care^{55,56}.

CONCLUSION

Ginger is a good painkiller for adolescent girls suffering with primary dysmenorrhea, according to the statistical analysis of the papers. The body's natural protection system is pain. It is unavoidable in the vast majority of circumstances. The severity of discomfort, however, can be reduced with the correct remedies. Natural cures are becoming increasingly popular as a means of coping with discomfort around the world. Dysmenorrhea is one type of pain that cannot be avoided but can be managed to a degree with the correct treatment. Alternative medicines, such as ginger, which can relieve pain without causing many negative side effects, ought to be promoted more extensively.

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References

1. Wang S, Zhang C, Yang G, Yang Y. Biological properties of 6-gingerol: A brief review. *Nat Prod Commun* 2014; 9:1027–1030.
2. Young HY, Luo YL, Cheng HY, et al. Analgesic and antiinflammatory activities of [6]-gingerol. *J Ethnopharmacol* 2005;96:207–10.
3. Gustin T. Stew Tamarind and Ginger as an Effort to Reduce Dysmenorrhea. *Faletehan Health Journal* 2019;6(1):11–15.

4. Chrubaski JE, Roufogalis BD, Chrubasik S. Evidence of effectiveness of herbal anti-inflammatory drugs in the treatment of painful osteoarthritis and chronic low back pain. *Phytother Res* 2007; 21:675–83.
5. Abadi M, Vakilian DK, Aghdam NSZ, Ranjbaran M. The effect of valerian and ginger on dysmenorrhea: a randomized clinical trial. *International Journal of Women's Health Reproduction Science* 2020; 8:101-105.
6. Al-Nahain A, Jahan R, Rahmatullah M. Zingiber officinale: a potential plant against rheumatoid arthritis. *Arthritis* 2014:159089.
7. Chen CX, Draucker CB, Carpenter JS. What women say about their dysmenorrhea: A qualitative thematic analysis. *BMC Women's Health* 2018;18(1): 1–8.
8. Ferries RE, Corey E, Archer JS. Primary dysmenorrhea: Diagnosis and therapy. *Obstetrics and gynecology* 2020 ;136 (5): 1047–58.
9. Corte LD, Di FC, Gabrielli O, Rapuccia S, La VLS, Ragusa R, Fichera M, Commodari E, Bifulco G, Giampaolino P. The burden of endometriosis on women's lifespan: A narrative overview on quality of life and psychosocial wellbeing. *International Journal of Environment Research and Public Health* 2020;17(13): 1–17.
10. Akhtar N, Haqqi TM. Current nutraceuticals in the management of osteoarthritis: a review. *Therapeutic Advances in Musculoskeletal Disease* 2012; 4:181-207.
11. Sepahvand R, Esmaeili-Mahani S, Arzi A, Rasoulia B, Abbasnejad M. Ginger (Zingiber officinale Roscoe) elicits antinociceptive properties and potentiates morphine-induced analgesia in the rat radiant heat tail flick test. *Journal of Medicinal Food* 2010; 13:1397-401.
12. Cady RK, Schreiber CP, Beach ME, Hart CC. Gelstat migraine (sublingually administered feverfew and ginger compound) for acute treatment of migraine when administered during the mild pain phase. *Medical Science Monitor* 2005; 11:165-9.
13. Young HY, Luo YL, Cheng HY, Hsieh WC, Liao JC, Peng WH. Analgesic and anti-inflammatory activities of gingerol. *Journal of Ethnopharmacology* 2005; 96:207-10.
14. Chrubaski JE, Roufogalis BD, Chrubasik S. Evidence of effectiveness of herbal anti-inflammatory drugs in the treatment of painful osteoarthritis and chronic low back pain. *Phytotherapy Research* 2007; 21:675-83.
15. Baliga MS, Haniadka R, Pererira MM, D'Souza JJ, Pallaty PL, Bhat HP, Popuri S. Update on the chemo preventive effects of ginger and its phytochemicals. *Critical Reviews in Food Science and Nutrition* 2011; 51:499-523.
16. Tseng YF, Chen CH, Yang YH. Rose tea for relief of primary dysmenorrhea in adolescents: a randomized controlled trial in Taiwan. *Journal of Midwifery Women's Health* 2005;50(5):e51–e57.
17. Daley AJ. Exercise and primary dysmenorrhea: A comprehensive and critical review of the literature. *Sports Medicine* 2008;38(8):659–670.
18. Ozgoli G, Goli M, Moattar F. Comparison of effects of ginger, mefenamic acid, and ibuprofen on pain in women with primary dysmenorrhea. *J Altern Complement Med* 2009; 15:129–32.
19. Rahnama P, Montazeri A, Huseini HF, Kianbakht S, Naseri M. Effect of Zingiber officinale R. rhizomes (ginger) on pain relief in primary dysmenorrhea: A placebo randomized trial. *BMC Complement Altern Med* 2012; 12:92.
20. Jenabi E. The effect of ginger for relieving of primary dysmenorrhoea. *J Pak Med Assoc* 2013; 63:8–10.

21. 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; 291:1277–81.
22. Kashefi F, Khajehei M, Tabatabaeichehr M, Alavinia M, Asili J. Comparison of the effect of ginger and zinc sulfate on primary dysmenorrhea: A placebo-controlled randomized trial. *Pain Manag Nurs* 2014; 15:826–33.
23. Yeknami FN, Maryam N, Fereshteh S, Majid K. The effect of a set of submaximal aerobic exercise and ginger on pain duration in the college girls with primary dysmenorrhea. *Advanced Herbal Medicine* 2015;1(3): 27-30.
24. Pakniat H, Chegini V, Ranjkesh F, Hosseini MA. Comparison of the effect of vitamin E, vitamin D and ginger on the severity of primary dysmenorrhea: A single-blind clinical trial. *Obstetrics and Gynecology Science* 2019;62(6):462–468.
25. Satyajit K, Ishmeet. A Quasi Experimental Study to Assess the Effectiveness of Ginger Powder on Dysmenorrhea among Nursing Students in Selected Nursing Colleges, Hoshiarpur, Punjab. *International Journal of Innovative Research in Medical Science* 2017;02(08):1204-1210.
26. Rad HA, Zahra B, Fatemeh B, Ali MA, Soraya K, Zeynab KF, Maryam N, Somayeh K. Effect of Ginger and Novafen on menstrual pain: A cross-over trial. *Taiwanese Journal of Obstetrics and Gynecology* 2018;57(6):806-809.
27. Sheetal CP, Fernandes PS. Ginger Tea on Dysmenorrhea Among Nursing Students. *Journal of Health and Allied Sciences NU* 2019;9(2):64-75.
28. Wrisnijiati D, Budiyantri W, Sugiarto. Effects of Pineapple Juice and Ginger Drink for Relieving Primary Dysmenorrhea Pain among Adolescents. *Indonesian Journal of Medicine* 2019;4(2): 96-104.
29. Sultan S, Zaheer A, Asma A, Farhat R, Fatima M, Nauman K. Analgesic effect of ginger and peppermint on adolescent girls with primary dysmenorrhea. *Food Science and Technology* 2021;41(4): 833-839.
30. Kassa DK, Edosa TJ. Comparative Study on Ginger Supplement and Aerobic Exercise on Primary Dysmenorrhea: The Case of Debre Markos University Students, Amhara Regional State, Ethiopia. *Systematic Review Pharmacy* 2021;12(6): 425-430.
31. Najafi N, Khalkhali H, Tabrizi FM, Zarrin R. Major dietary patterns in relation to menstrual pain: A nested case control study. *BMC Women's Health* 2018 ;18 (1): 1–7.
32. Halder A. Effect of progressive muscle relaxation versus intake of ginger powder on dysmenorrhoea amongst the nursing students in Pune. *Nurs J India* 2012; 103:152–6.
33. Kashefi F, Ziyadlou S, Khajehei M, et al. Effect of acupuncture at the Sanyinjiao point on primary dysmenorrhea: A randomized controlled trial. *Complement Ther Clin Prac* 2010; 16:198–202
34. Lee SH, Cekanova M, Baek SJ. Multiple mechanisms are involved in 6-gingerol-induced cell growth arrest and apoptosis in human colorectal cancer cells. *Mol Carcinog* 2008; 47:197–208.
35. Kim T, Park H, Lee H, Chung S. Premenstrual syndrome and dysmenorrhea in the career women at Bucheon City. *Kor J Obstet Gynecol* 2011;54: 523–8.
36. Daniels SE, Torri S, Desjardins PJ. Valdecoxib for treatment of primary dysmenorrhea, a randomized, double-blind comparison with placebo and naproxen. *J Gen Intern Med* 2005; 20:62–7.
37. Wong CL, Lai KY, Tse HM. Effects of SP6 acupuncture on pain and menstrual distress in young women with dysmenorrhea. *Complement Ther Clin Prac* 2010; 6:64–9.
38. Lakhani SE, Ford CT, Tepper D. Zingiberaceae extracts for pain: a systematic review and meta-analysis. *Nutrition Journal*. 2015; 14:1-50.

39. Negi R, Sharma SK, Gaur R, Bahadur A, Jelly P. Efficacy of Ginger in the Treatment of Primary Dysmenorrhea: A Systematic Review and Meta-analysis. *Cureus* 2021;6;13(3):e13743.
40. Daily JW, Zhang X, Kim DS, Park S. Efficacy of ginger for alleviating the symptoms of primary dysmenorrhea: a systematic review and meta-analysis of randomized control trials. *Pain Med* 2015; 16:2243-2255.
41. Chen X, Barrett B, Kwekkeboom K. Efficacy of oral ginger (zingiber officinale) for dysmenorrhea: a systematic review and meta-analysis. *Evidence-Based Complementary and Alternative Medicine*. 2016:1-10. <https://doi.org/10.1155/2016/6295737>
42. Gupta R, Kaur S, Singh A. Comparison to assess the effectiveness of active exercises and dietary ginger vs. active exercises on primary dysmenorrhea among adolescent girls. *Nursing Midwifery Res J* 2013; 9:168–77.
43. Khayat S, Masoomah K, Moghadam ZB, Hamed F, Amir K, Mani J. Effect of Treatment with Ginger on the Severity of Premenstrual Syndrome Symptoms. *Obstetrics and Gynecology* 2014;792708.
44. Terry R, Posadzki P, Watson LK, Ernst E. The use of ginger (*Zingiber officinale*) for the treatment of pain: A systematic review of clinical trials. *Pain Med* 2011; 12:1808–18.
45. Natural Medicines. Ginger, 2015, <http://naturaldatabaseconsumer.therapeuticresearch.com>.
46. Gagnier JJ, Boon H, Rochon P, Moher D, Barnes J, Bombardier C. Reporting randomized, controlled trials of herbal interventions: an elaborated CONSORT statement. *Annals of Internal Medicine* 2006;144(5):364–367.
47. Dawood MY. Primary dysmenorrhea: advances in pathogenesis and management. *Obstetrics & Gynecology* 2006;108(2):428–441.
48. Zick SM, Blume A, Normolle D, Ruffin M. Challenges in herbal research: a randomized clinical trial to assess blinding with ginger. *Complementary Therapies in Medicine* 2005; 13(2):101–106.
49. Gagnier JJ, Boon H, Rochon P, Moher D, Barnes J, Bombardier C. Reporting randomized, controlled trials of herbal interventions: an elaborated CONSORT statement. *Annals of Internal Medicine* 2006;144(5):364–367.
50. Ostad SN, Soodi M, Shariffzadeh M. The effect of fennel essential oil on uterine contraction as a model for dysmenorrhea, pharmacology and toxicology study. *Journal of Ethnopharmacology* 2003; 76(3):299-304.
51. Hsua CS. Effect of “Dang – Qui – Shao – Yao-San” a Chinese medicinal prescription for dysmenorrhea on uterus contractility in vitro. *Phytomedicine*. 2006; 13:94–100.
52. Jalili Z, Safi ZH, Shams PN. Prevalence and facing of primary dysmenorrhea in college students in Sirjan. *Iran J Paesh*. 2004; 4:61–7.
53. Kamjou A. Prevalence and intensity of primary dysmenorrhea and some of its related risk factors in dormitory students. *Iran J Hormozgan Univ Med Sci*. 2001; 5:6–9.
54. George A, Bhaduri A. Dysmenorrhea among adolescent girls – symptoms experienced during menstruation. *Health Promotion Educ*. 2002; 17:4.
55. Ziaei S, Faghihzadeh S, Sohrabvand F, Lamyian M, Emamgholy T. A randomized placebo-controlled trial to determine the effect of Vitamin E in treatment of primary dysmenorrhea. *Br J Obstet Gynecol*. 2001; 108:1181–3.
56. Parvin R. The effects of *Zingiber Officinale* R. on Primary dysmenorrhea. *Journa; of medicinal plants* 2010; 9(36): 81-86.