Original article

Efficacy of ginger tea and cinnamon tea on primary dysmenorrhea among young adults: A comparative study

Swathi S[1], Vineetha AN[2], Nitesh MK[3], Lakshmeesha[4], Balakrishna Ragavendrasamy[5], Prajwal HM[1], Vinaya Kumar T[6], Shravya CN[1], Ranjini Murthy P[1], Amshuman R Yadav[6]

From, [1]PG Scholar, Department of Naturopathy, [2]Associate Professor, [3]Assistant Professor, [4]Associate Professor, Alvas College of Naturopathy and Yogic Sciences, [5]Assistant Medical Officer Yoga and Naturopathy Lifestyle Clinic Government Hospital Udumalpet Tamilnadu, [6]PG Scholar, Department of Clinical Yoga, Alva's College of Naturopathy and Yogic Sciences, Moodabidri, Mangaluru, Dakshina Kannada, Affiliated to Rajiv Gandhi University of Health Sciences, Bangalore, Karnataka, India.

ABSTRACT

Background and Objectives: Primary dysmenorrhea affects many women and causes physical and mental suffering. The main cause is the release of prostaglandins, which causes uterine contractions and reduced blood supply. The main objective of the study was to compare the efficacy of ginger tea and cinnamon tea in alleviating the symptoms associated with primary dysmenorrhea. **Materials and Methods:** A total of 60 participants in the age group of 18–26 years were recruited for the study and randomly divided into two groups. Pre-assessments (VAS and MSQ) were recorded on the 1st day of the menstrual cycle in both groups. Group 1 was given ginger tea for 3 weeks, once a day after dinner, from the 6th day of the menstrual cycle, while Group 2 was given cinnamon tea for the same duration. After the intervention, post-assessments (VAS and MSQ) will be recorded on the 1st day of the next menstrual cycle. All the details of the study were explained, and informed consent was obtained from the subjects. **Results:** In the present study, a paired sample t-test for within-group changes showed a significant reduction in VAS for pain ($p \leq 0.05$), SF ($p \leq 0.05$), MSQ ($p \leq 0.05$), and a significant increase in CF ($p \leq 0.05$) following ginger tea. A similar improvement in VAS for pain ($p \leq 0.05$), SF ($p \leq 0.05$), MSQ ($p \leq 0.05$), and a significant increase in CF ($p \leq 0.05$) were observed following cinnamon tea. Between-group changes performed using analysis of covariance for variables of interest adjusted for their respective baseline values indicated a significant difference in the visual analogue scale, CF, and SF; no significant changes were observed for MSQ. **Conclusion:** The study found that both ginger tea and cinnamon tea were effective in reducing menstrual pain and symptoms in primary dysmenorrhea subjects, with ginger tea being more effective than cinnamon tea.

Key words: Primary Dysmenorrhea, Ginger, Cinnamon, Visual Analogue Scale, Menstrual Symptom Questionnaire.

Primary dysmenorrhea (PD) is characterized as the presence of dysmenorrhea in the absence of any pathological conditions affecting the reproductive organs. It constitutes the majority, over 90%, of all cases of dysmenorrhea [1]. The prevalence of PD among menstruating women worldwide is between 45% and 95%. In India, the prevalence is approximately 75%. In 2015, 84.2% of girls experienced dysmenorrhea, and 34.2% reported severe pain. A study conducted in 2018 found a prevalence rate of 73.83% among Indian universities [2]. However, it is of great significance to note that young female adults with primary dysmenorrhea have a disorder that is often not diagnosed and inadequately treated. This leads to a strong correlation with a low quality of life,

Access this article online

Received – 21th Nov 2023

Initial Review – 18th Dec 2023

Accepted – 31st Dec 2023

Quick Response Code

Correspondence to: Swathi S, PG Scholar, Department of Naturopathy, Alvas College of Naturopathy and Yogic Sciences, Moodabidri, Dakshina Kannada, Mangalore, Karnataka 574227, India. **Email:** drswathis03@gmail.com, **Tel.:**+91 8073765371

absenteeism, and suffering on both physical and mental levels [3]. The main cause of primary dysmenorrhea is Prostaglandin F (PGF). During menstruation, the shedding of the endometrial cells leads to the release of PGF [4].

Furthermore, PGs cause abnormal uterine contractions, resulting in ischemia, hypoxia, and increased sensitivity of the nerve endings. Doppler ultrasonography studies have shown that women with PD have significantly higher resistance in the uterine and arcuate arteries compared to women without dysmenorrhea. This suggests that the constriction of uterine vessels contributes to the pain experienced during dysmenorrhea [5]. To address dysmenorrhea, a combination of pharmacological and non-pharmacological strategies is employed. Pharmacological therapies are the most commonly used and well-established means of treating dysmenorrhea [6].

Nonsteroidal anti-inflammatory drugs (NSAIDs) have been shown to reduce pain in primary dysmenorrhea. However, their use is associated with various gastrointestinal problems. Therefore, alternative treatment options, such as dietary supplements, can reduce dependence on NSAIDs and their associated side effects [7]. Anti-inflammatory drugs inhibit the synthesis of prostaglandins, preventing the conversion of arachidonic acid into endoperoxides. However, long-term use of NSAIDs can cause side effects such as headache, loss of appetite, gastrointestinal bleeding, acute asthma, nausea, vomiting, dizziness, drowsiness, dysuria and acne [8].

Complementary and Alternative Medicine (CAM) methods such as vitamins, dietary changes, acupressure and acupuncture, yoga, aromatherapy, psychotherapy, and relaxation techniques are widely accepted and adopted by women who experience pain and discomfort during menstruation [9]. Naturopathic medicine focuses on prevention and the use of non-toxic, natural therapies to treat and reverse diseases. These therapies include clinical nutrition, botanical medicine, oriental medicine, acupuncture, hydrotherapy, physical medicine, counselling, and other psychotherapies [10].

Medicinal plants contain bioactive compounds, such as alkaloids, flavonoids, terpenes, and phenolic compounds, which possess medicinal properties. These compounds play a crucial role in the biological functions of plants and have the potential to be used in the treatment of dysmenorrhea. For example, the alkaloid berberine interacts with opioid receptors similar to morphine and affects pain perception. Flavonoids and polyphenols have strong anti-inflammatory effects by inhibiting pro-inflammatory cytokines and enzymes. Ginger, known as Zingiber officinale, contains bioactive substances gingerol and shogaol, which have anti-inflammatory and analgesic effects and can potentially be used as a treatment for dysmenorrhea. The analgesic and anti-inflammatory effects of ginger are believed to be due to its regulation of pain perception and inflammation pathways. Gingerols inhibit the enzyme COX-2, reducing prostaglandin production and decreasing uterine contractions and menstrual pain. Additionally, ginger's antioxidative properties help reduce oxidative stress and modulate pain pathways. Ginger can be consumed by boiling it in water and drinking the liquid three times daily for dysmenorrhea relief. Studies have shown that ginger has similar pain-killing properties to ibuprofen or mefenamic acid, making it a natural therapy for dysmenorrhea [11].

Cinnamon is a spice from Indonesia and is an ancient herbal medicine. Research shows that cinnamon oil has anti-inflammatory properties and can be used to treat dysmenorrhea and stop bleeding. Cinnamon bark has a spicy and sweet taste and contains various chemicals including essential oils and tannins. Cinnamon also has antirheumatic and pain-relieving effects [12]. Although there are several pharmacological interventions available for the treatment of primary dysmenorrhea, most of them come with adverse effects. Therefore, the present study aims to investigate the efficacy of ginger tea compared to cinnamon tea in alleviating the symptoms associated with primary dysmenorrhea.

MATERIALS AND METHODS

This is a Pre- Post Comparative Study. It was conducted at Alvas College of Naturopathy and Yogic Sciences, Moodbidri Mangalore Dakshina Kannada, Karnataka. After obtaining legally signed written consent, participants were screened through a routine medical checkup. Those who satisfy diagnostic criteria and inclusion criteria for primary dysmenorrhea were recruited. A total of 60 participants were recruited for the study. They were randomly divided into two groups. Study Group 1 n = 30 and Study Group 2 n = 30. Pre-assessments VAS and MSQ were recorded on the 1st day of the menstrual cycle.

Group 1 participants (n=30) were given 100 ml of ginger tea for 3 weeks once a day after dinner, from the 6th day of the menstrual cycle. Group 2 (n=30) was given 100 ml of Cinnamon tea for the same duration and frequency. After the intervention post assessments (VAS and MSQ) were recorded on 1st day of the next menstrual cycle. Ethical clearance is obtained from the Institutional Ethics Committee **(Figure 1).**

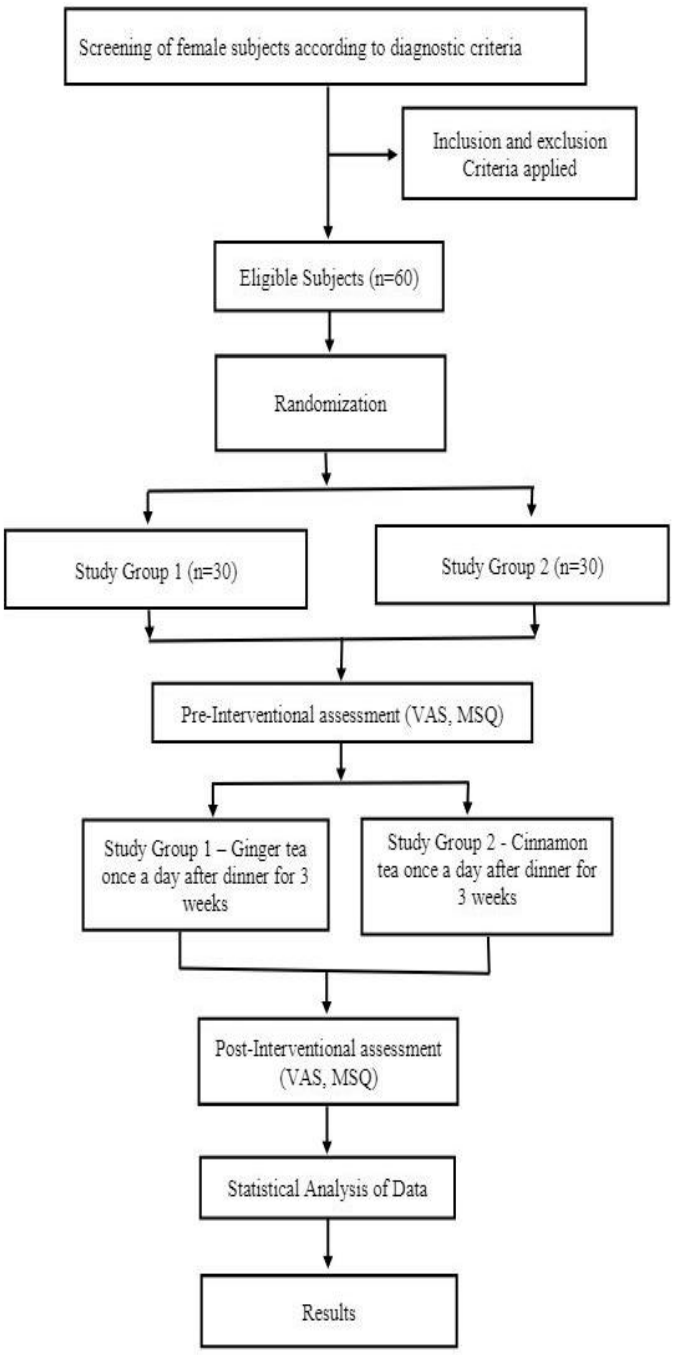

Figure 1: Illustration of study plan

Inclusion Criteria

- Age – 18 to 26 years.
- Female patients having a history of regular menstrual cycles that occurs between every 28 -32 days.
- Subjects who are willing to participate in the study by signing an appraised consent form.

Exclusion Criteria

- Females having dysmenorrhea with underlying pelvic pathology (secondarydysmenorrhea)
- Subject history of abnormal uterine bleeding, infections
- Females who are not willing to participate in the study.

Assessments

Visual Analogue Scale (VAS)

The Visual Analogue Scale, a tool used to measure the intensity of pain [13]. VAS consists of a straight line; one extremity of the line represents 'no pain at all' and the other extremity represents 'pain as bad as it could'. The patient is asked to mark the level of pain on the line [14]. VAS scores are classified as 8-10 the severe primary dysmenorrhea, 4-7 the moderate primary dysmenorrhea, and 1-3 the mild primary dysmenorrhea [15].

Menstrual Symptom Questionnaire (MSQ)

The Menstrual Symptom Questionnaire (MSQ) was planned by Chesney and Tasto.Menstrual symptoms of dysmenorrhea were measured by the Menstrual Symptom Questionnaire (MSQ). To assess the menstrual pain and symptoms, a 24-item self-report measure was used in the Menstrual Symptom Questionnaire (MSQ). Participants were instructed to use one of five response options, Never (N), Rarely (R), Sometimes (S), Often (O), and Always (A), to indicate degree to which they experienced a given symptom when structuring the first 24 items. The 24 items demonstrate symptoms of spasmodic or congestive dysmenorrhea, with the classification of dysmenorrhea determining the scoring order for each item. Items categorized as Spasmodic are scored on a scale of 1-5, whereas those categorized as Congestive are marked in reversed order [16].

Intervention

On the 1st day of the Menstrual Cycle pre-assessments are recorded. From the 6th day of the Menstrual Cycle, subjects are asked to visit the diet section of Alva's Anandamaya Arogyadhama Hospital where subjects are given specific tea every day for 3 weeks. In Group 1 each subject was given 100ml of Ginger tea for 3 weeks after dinner, from the 6th day of the menstrual cycle. In Group 2 each subject was given 100 ml of Cinnamon tea for 3 weeks after dinner, from the 6th day of the menstrual cycle [17].

Preparation of Ginger tea

1000 mg of ginger powder in 200 ml of water, boiled to reduce to100 ml [17,18].

Preparation of Cinnamon tea:

1000 mg of cinnamon powder in 200 ml of water, boiled to reduce to 100 ml [17,19].

Statistical Analysis

The data was visually inspected for manual typographic errors. The Shapiro-Wilk's test for Normality showed that the data was normally distributed. A paired samples t-test was used to assess within-group differences. Analysis of covariance (ANCOVA) was performed to assess between-group changes controlled for their respective baseline values. Levene's test for equality of variances was performed.

RESULTS

The present study was conducted to compare the efficacy of ginger tea and cinnamon tea in PD. The data was analyzed by Paired samples t-test for Within-group changes showed a significant reduction in visual a scale for pain ($p \leq 0.05$), spasmodic factor (SF) ($p \leq 0.05$), MSQ ($p \leq 0.05$), and a significant increase in congestive factor (CF) ($p \leq 0.05$) following Ginger Tea. A similar improvement in the Visual analog scale for pain ($p \leq 0.05$), SF ($p \leq 0.05$), MSQ ($p \leq 0.05$), and a significant increase in congestive factor (CF) ($p \leq 0.05$) was observed following Cinnamon Tea.

Between-group changes performed using analysis of covariance for variables of interest adjusted for their respective baseline values indicated a significant difference in visual analog scale ($F(1, 57)= 20.78$, $p \leq 0.05$, $p\eta^2 = 0.267$), CF ($F(1, 57)= 5.80$, $p=0.019$, $p\eta^2 = 0.092$) and SF ($F(1, 57)=8.50$, $p=0.005$, $p\eta^2= 0.13$). No significant changes were observed for MSQ ($F(1, 57)= 0.978$, $p=0.33$, $p\eta^2 = 0.017$) **(Table 1).**

Table 1: Results of within group and between groups through Paired samples t-test and ANCOVA

	Ginger Tea		Cinnamon Tea	
	Pre (Mean±SD)	**Post (Mean±SD)**	**Pre (Mean±SD)**	**Post (Mean±SD)**
Age	22.20 ± 1.86		22.07±2.22	
VAS	6.7 ± 0.99	2.5 ± 1.17[a,b]	6.40 ± 1.61	3.3 ± 1.69[a]
CF	43.03 ± 7.45	51.5 ± 6.56[a,b]	44.47 ± 3.4	47.87 ± 8.53[a]
SF	36.98 ± 10.48	22.37 ± 5.91[a,b]	30.60 ± 6.77	24.17 ± 7.14[a]
MSQ	80.00 ± 6.51	73.87 ± 7.55[a]	75.17 ± 8.36	71.93 ± 4.17[a]

Table mentioning the results of within and between groups through Paired samples t-test and ANCOVA

a = within-group changes using paired t-test, level of significance $p \leq 0.05$

b= Between-group changes, adjusted for respective baseline using Analysis of covariance, $p \leq 0.05$

DISCUSSION

The present research aimed to compare the efficacy of ginger tea and cinnamon tea in individuals with primary dysmenorrheal According to Dalton's hypothesis, it suggests that primary dysmenorrhea can be classified into two separate types: spasmodic and congestive. The spasmodic type is characterized by spasms of pain analogous to labor pains that are on the first day of menstruation. The congestive type, on the other hand, denotes a variant or symptom of premenstrual syndrome accompanied with dull, aching pains, lethargy, and depression before the onset of menstruation. In this study, we have used MSQ which includes two categories that are spasmodic factor and congestive factor which helps to understand the severity of spasmodic and congestive type of primary dysmenorrhea respectively.

Along with this questionnaire, to understand the severity of menstrual pain assessment was done using VAS. The within-group statistical analysis of VAS shows that consumption of ginger and cinnamon tea was found to be effective in reducing menstrual pain, ($P< 0.05$), and between the group analysis of VAS shows ginger tea consumption is more effective than cinnamon tea. Primary dysmenorrhea, referred to as spasmodic and painful cramps in the lower abdomen that commence shortly before or at the initiation of menses in the absence of any pelvic pathology, is a commonly reported issue among both young and adult females. The onset of this condition predominantly takes place during adolescence, specifically within a timeframe of 6 to 24 months after menarche. The pain experienced during dysmenorrhea displays a distinct and recurring pattern, typically reaching its peak intensity on the first day of menses and persisting for a duration of up to 72 hours [20].

Complementary and alternative medicine (CAM) treatments have been explored as non-pharmacological

options for dysmenorrhea [21]. As per a study, it was observed that 48% of women obtained complementary and alternative medicine instead of prescribed medication [22]. Non-pharmacological interventions, including TENS, acupuncture, acupressure, spinal manipulation, behavioral interventions, and herbal and nutritional therapy, have been used by women as an alternative medication for dysmenorrhea. [23]. Ginger is highlighted for its analgesic and anti-inflammatory effects, as well as its ability to decrease cyclooxygenase and reduce prostaglandins and leukotrienes, making it potentially useful in the treatment of dysmenorrhea [24].

Ginger is a plant that contains both non-volatile and volatile components, including gingerols, shogaols, and zingiberene. The concentration of these phytocompounds depends on the form of ginger used, either fresh or dry, and the method of extraction. In particular, the fresh rhizome contains a substantial amount of gingerol that is transmuted into the shogaol form via the process of heating or drying. Lipoxygenases, which are a family of iron-containing enzymes, play a crucial role in catalyzing the deoxygenation of polyunsaturated fatty acids (PUFAs). Various lipoxygenases are involved in the metabolism of leukotrienes, which are a family of eicosanoid inflammatory mediators.

For instance, leukotrienes are synthesized within the cell from arachidonic acid by arachidonate 5-lipoxygenase which increases the prostaglandins leading to menstrual pain. The ginger extracts, as well as gingerol, shogaol, and other structurally related substances in ginger, show a broad spectrum of anti-inflammatory activities. One of the possible mechanisms behind the anti-inflammatory properties of ginger is suppressing prostaglandin synthesis through inhibition of cyclooxygenase-1 and cyclooxygenase-2 and suppressing leukotriene biosynthesis by inhibiting 5-lipoxygenase, which helps to reduce primary dysmenorrhea [25].

A study review has been conducted on the beneficial effects of cinnamon on metabolic syndrome, inflammation, and pain, as well as the mechanisms underlying these effects. The study concluded that cinnamon contains active compounds such as cinnamaldehyde and cinnamophilin, which have been shown to have antimicrobial, immunomodulatory, antihypertensive, antiviral, antitumor, antilipemic, and gastroprotective properties. Additionally, a clinical trial found that 1000 mg of cinnamon capsules reduced the intensity of pain more than a control group [19].

The findings of the present study show a reduction in menstrual pain and symptoms in both the ginger tea and cinnamon tea group. Between the groups VAS, SF, and CF were found to be significant but MSQ as a whole was not statistically significant. In previous studies, intervention is done during the first 3 days of the menstrual cycle, and in this study intervention was given before the menstrual cycle and it act mainly on spasmodic and congestive type primary dysmenorrhea. This suggests that ginger tea is more effective than cinnamon tea in relieving menstrual pain and symptoms and this intervention cost is feasible.

CONCLUSION

The present study showed a significant reduction in menstrual pain and symptoms and improved general well-being in both the ginger tea and cinnamon tea groups but ginger tea was found to be more effective and intervention is cost-effective**.**

REFERENCE

1. Chen B, Guo Q, Zhang Q, et al. Revealing the Central Mechanism of Acupuncture for Primary Dysmenorrhea Based on Neuroimaging:A Narrative Review. Pain Res Management. 2023;18(2):1–8.
2. Upganlawar DS, Patil S, Dhage PP. Efficacy of Connective Tissue Therapy and Abdominal Stretching Exercises in Individuals With Primary Dysmenorrhea: A Review. Cureus. 2023 Oct 5;15(10). DOI: 10.7759/cureus.46553.
3. Tewani S, Sharma H, Tewani GR, et al. The Long-Term Impact of Therapeutic Fasting on Primary Dysmenorrhea in Young Female Adults: A Randomized Controlled Trial. Cureus. 2023; 15(7). DOI: 10.7759/cureus.41437
4. Nagy H, Carlson K, Khan MAB. Dysmenorrhea. Stat Pearls. Treasure Island (FL): StatPearls Publishing; 2023.
5. Núñez-Troconis J, Carvallo D, Martínez-Núñez E. Primary Dysmenorrhea: pathophysiology. Investigación Clínica. 2021; 62(4):378–406.
6. Barcikowska Z, Grzybowska ME, Wąż P, et al. Effect of Manual Therapy Compared to Ibuprofen on Primary Dysmenorrhea in Young Women—Concentration Assessment of C-Reactive Protein, Vascular Endothelial Growth Factor, Prostaglandins and Sex Hormones. J Clini Med. 2022;11(10):2686.
7. Matsas A, Sachinidis A, Lamprinou M, et al. Vitamin Effects in Primary Dysmenorrhea. Life. 2023;13(6):1308.
8. Sharghi M, Mansurkhani SM, Ashtary-Larky D, et al. An update and systematic review on the treatment of primary dysmenorrhea. JBRA Assist Reproduction. 2019;23(1):51.
9. Tsonis O, Gkrozou F, Barmpalia Z, et al. Integrating Lifestyle Focused Approaches into the Management of Primary Dysmenorrhea: Impact on Quality of Life. Inter J Women's Health.2021;13:327–36.
10. Michael T, Murray ND, JPND. The Encyclopedia of natural medicine. 5th edit. Vol. 1. New York: Atria Books; 2020.
11. Tahreem Riaz, Muhammad Akram, Umme Laila et.al.

Medicinal plants for the treatment of dysmenorrhea: A review. Inter Arch Integr Med. 2023;10(11):21-30.
12. Niasty Lasmy Zaen. Effect of Cinnamon (Cinnamomum Burmanni) Aromatherapy on Primary Dysmenorrhea Pain in Students at Air Batu High School in 2021. Science Midwifery. 2021;10(1).
13. Myles PS, Troedel S, Boquest M, et al. The Pain Visual Analog Scale: Is It Linear or Nonlinear? Anesthesia & Analgesia. 1999;89(6):1517.
14. Haefeli M, Elfering A. Pain assessment. European Spine J. 2006;15(1):17–24.
15. Şentürk Ş. Relation between uterine morphology and severity of primary dysmenorrhea. J Turk Soc Obst Gyne. 2020;17(2):84–9.
16. Negriff S, Dorn LD, Hillman JB, et al. The measurement of menstrual symptoms. J health psych. 2009;14(7):899–908.
17. Dhanya S. A Pre Experimental Study to Assess the Effectiveness of Ginger Tea upon Dysmenorrhea among Students at Apollo College of Nursing, Chennai 2020 Aug 25
18. Gupta R, Kaur S, Kaur A. Comparison to Assess The Effectiveness Of Active Exercises And Dietary Ginger Vs. Active Exercises On Primary Dysmenorrheal Among Adolescent Girls. NMRJ. 2013 DOI: 10.33698/nrf0163.
19. Jahangirifar M, Taebi M, Dolatian M. The effect of Cinnamon on primary dysmenorrhea: A randomized, double-blind clinical trial. Complementary therapies in clinical practice. 2018;33:56–60.
20. Itani R, Soubra L, Karout S, et al. Primary Dysmenorrhea: Pathophysiology, Diagnosis, and Treatment Updates. Korean J Fam Med. 2022;43(2):101–8. doi: 10.4082/kjfm.21.0103
21. Samba Conney C, Akwo Kretchy I, Asiedu-Danso M, et al. Complementary and Alternative Medicine Use for Primary Dysmenorrhea among Senior High School Students in the Western Region of Ghana. Obst Gyne Inter. 2019;25:1–8.
22. Crasta S, Fernandes P, Paul S. Ginger Tea on Dysmenorrhoea among Nursing Students. Journal of Health and Allied Sciences NU. 2019;09(02):64–75.
23. Wal P, Gupta D, Wal A, et al. A Wholistic Approach to Non-Pharmacological Intervention for Primary Dysmenorrhea. Current Women s Health Reviews. 2023;20(1). DOI: 10.2174/1573404819666230109105829
24. Barkha Devi, Ranjita Devi, Doma Giri, et al. Analysis of Clinical Studies and Quasi-Experimental Studies in the Management of Primary Dysmenorrhea: Review on Efficacy of Ginger. J Jilin Uni. 2022;41(07). DOI 10.17605/OSF.IO/BNH2J
25. Ali AMA, El-Nour MEM, Al-Atar AA, et al. Chemical profile, anti 5-lipoxygenase and cyclooxegenase inhibitory effects of ginger (Zingiber officinale) rhizome, callus and callus treated with elicitors. Ciência Rural, Santa Maria. 2022;52(10). DOI: 10.1590/0103-8478cr20210372.

How to cite this article: Swathi S, Vineetha AN, Nitesh MK, Lakshmeesha, Balakrishna Ragavendrasamy, Prajwal HM, Vinaya Kumar T, Shravya CN, Ranjini Murthy P, Amshuman R Yadav. Efficacy of ginger tea and cinnamon tea on primary dysmenorrhea among young adults: A comparative study. Indian J Integr Med. 2023; 3(4):107-112.

Funding: None *Conflict of Interest: None Stated*