



## The Effect of Ginger Brew on the Intensity of Dysmenorrhea Pain at Touluaan Vocational School, North Minahasa

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**Abstract.** *Dysmenorrhea is one of the most common gynecological complaints experienced by adolescent girls and can impact academic performance and quality of life. Pharmacological therapy is commonly used for dysmenorrhea management, but its use in adolescents is often limited by side effects and a tendency to self-medicate. Therefore, non-pharmacological alternatives are needed that are safe, easy to implement, and appropriate for the adolescent context. One complementary therapy that has the potential to reduce dysmenorrhea pain is ginger (*Zingiber officinale*), which has anti-inflammatory and analgesic effects. This study aimed to analyze the effect of ginger infusion on dysmenorrhea pain intensity in female students at Touluaan Vocational High School in North Minahasa. The study used a quasi-experimental design with a one-group pretest–posttest approach. The study sample consisted of 32 female students experiencing dysmenorrhea, selected using a purposive sampling technique. Pain intensity was measured using a Numeric Rating Scale (NRS) before and after administration of the ginger infusion. The intervention consisted of consuming the ginger infusion twice daily for the first two days of menstruation. Data were analyzed using univariate analysis and the Wilcoxon Signed Rank Test with a significance level of  $p < 0.05$ . The results showed a decrease in dysmenorrhea pain intensity after administering ginger infusion. Statistical analysis showed a significant difference between pain intensity before and after the intervention ( $p < 0.05$ ). The conclusion of this study indicates that ginger infusion has a significant effect on reducing dysmenorrhea pain intensity and can be recommended as a safe and applicable non-pharmacological complementary therapy for adolescent girls in school environments.*

**Keywords:** *ginger tea; dysmenorrhea; menstrual pain; adolescent girls; complementary therapy.*

### 1. INTRODUCTION

Dysmenorrhea is one of the most common gynecological disorders experienced by adolescent girls and women of reproductive age. This condition is characterized by cramping pain in the lower abdomen that occurs before or during menstruation and can be accompanied by systemic symptoms such as nausea, vomiting, dizziness, diarrhea, and fatigue. Globally, the prevalence of dysmenorrhea in adolescents is reported to be very high, ranging from 50–90%, with approximately 10–25% experiencing severe pain that significantly interferes with daily activities and quality of life (Ju et al., 2014; Iacovides et al., 2015). Dysmenorrhea is also a major cause of school absenteeism and decreased concentration in adolescent girls, impacting not only health but also academic achievement and psychosocial well-being (Chen et al., 2018; Wong et al., 2019). Clinically, dysmenorrhea is divided into primary and secondary dysmenorrhea. Primary dysmenorrhea is the most common form in adolescents and is not associated with anatomical pelvic abnormalities. The pathophysiology of primary dysmenorrhea is primarily related to increased endometrial prostaglandin production, particularly prostaglandins F<sub>2α</sub> and E<sub>2</sub>, which trigger excessive uterine contractions, vasoconstriction, and myometrial ischemia, resulting in pain (Dawood, 2016). This inflammatory mechanism underlies the use of non-steroidal anti-inflammatory drugs

(NSAIDs) as first-line therapy in the management of dysmenorrhea (Zahradnik et al., 2014). Although NSAIDs have been shown to be effective in reducing menstrual pain, their use in adolescents is not without limitations. Gastrointestinal side effects, the risks of long-term use, limited access, and the tendency to self-medicate without medical supervision are important considerations, particularly in the school-age adolescent population (Bernardi et al., 2017). This situation has driven increasing interest in non-pharmacological and complementary therapies, which are considered safer, easier to implement, and more suited to adolescent needs (Armour et al., 2019).

Globally, various non-pharmacological approaches have been studied to reduce dysmenorrhea pain, including exercise, heat therapy, relaxation, acupuncture, and the use of herbal remedies. One widely used herbal remedy with a strong scientific basis is ginger (*Zingiber officinale*). Ginger contains bioactive compounds such as gingerol, shogaol, and zingerone, which have anti-inflammatory and analgesic effects through inhibition of the cyclooxygenase and lipoxygenase pathways, thereby reducing prostaglandin synthesis (Daily et al., 2015; Terry et al., 2015). Theoretically, this mechanism is relevant to the pathophysiology of prostaglandin-mediated dysmenorrhea. Empirical evidence over the past decade suggests that ginger is potentially effective in reducing the intensity of dysmenorrhea pain. Controlled clinical trials have reported that ginger can significantly reduce primary dysmenorrhea pain compared to placebo and demonstrates comparable efficacy to mild NSAIDs, with a minimal side effect profile (Kashefi et al., 2014; Rahnama et al., 2018). Recent meta-analyses and systematic reviews also concluded that ginger is a promising intervention for primary dysmenorrhea, although they emphasized the need for further research with robust methodological designs and diverse population contexts (Chen et al., 2020; Shirvani et al., 2022).

In Indonesia, dysmenorrhea is a very common complaint among adolescent girls, but it is often considered a "normal" condition and therefore not optimally managed. National and regional studies show that most adolescent girls experience mild to moderate dysmenorrhea, with some experiencing severe pain that impacts their learning activities and school attendance (Kusmiran, 2020; Putri & Sari, 2019). Dysmenorrhea in Indonesian adolescents is often managed independently through rest, over-the-counter analgesics, or the use of traditional herbal remedies, without adequate education about safe and evidence-based therapeutic options. The use of ginger as a traditional therapy has long been recognized and culturally accepted in Indonesian society. Ginger is readily available, affordable, and often consumed as a brew. Several studies in Indonesia have reported that consuming brewed ginger can reduce

the intensity of dysmenorrhea pain in adolescents and female students, but most studies are limited to small sample sizes and specific location contexts (Sari et al., 2018; Lestari et al., 2021). Furthermore, variations in ginger administration methods (capsules, extracts, or infusions) and differences in respondent characteristics have resulted in inconsistent research results. This review reveals a relevant *research gap* : limited local empirical evidence regarding the effectiveness of ginger infusion as a non-pharmacological intervention for reducing dysmenorrhea pain in school-aged adolescents, particularly in North Minahasa. Furthermore, school-based research that considers acceptability, ease of implementation, and the sociocultural context of adolescents is still relatively rare. Schools are strategic settings for adolescent health interventions because they allow for structured education and monitoring.

Touluaan Vocational High School, North Minahasa, is a secondary education institution with a population of adolescent girls at an age vulnerable to dysmenorrhea. Untreated menstrual pain has the potential to disrupt students' learning and well-being. Therefore, research is needed to evaluate safe, effective, and easily implemented non-pharmacological interventions in the school environment. Based on this background, this study aims to analyze the effect of ginger infusion on dysmenorrhea pain intensity in female students at Touluaan Vocational High School, North Minahasa, as an effort to support the development of evidence-based complementary interventions in adolescent reproductive health services.

## **2. RESEARCH METHOD**

### **Research design**

This study used a quasi-experimental design with a one-group pretest–posttest approach, which aimed to assess changes in dysmenorrhea pain intensity before and after the ginger infusion intervention. This design was chosen because it allows for evaluation of the effectiveness of non-pharmacological interventions in a real-world setting in a school without a control group, and is appropriate for adolescent health intervention research.

### **Location and Time of Research**

The study was conducted at Touluaan Vocational High School, North Minahasa Regency, North Sulawesi Province. Data collection took place from February to April 2025, covering pain measurement before the intervention (pretest), implementation of the ginger infusion intervention, and pain measurement after the intervention (posttest).

### **Research Population and Sample**

The study population was all female students at Touluaan Vocational High School in North Minahasa who experienced dysmenorrhea during menstruation. The study sample

consisted of 32 female students, selected using a purposive sampling technique based on inclusion criteria: female students experiencing primary dysmenorrhea, willing to be respondents, and not currently taking analgesic drugs or other therapies during the study. Exclusion criteria included female students with a history of certain gynecological diseases or allergies to ginger.

### **Research Variables**

The independent variable in this study was ginger infusion, while the dependent variable was dysmenorrhea pain intensity. Ginger infusion is defined as an herbal beverage made from fresh ginger brewed with hot water and consumed according to the dosage specified in the study protocol. Dysmenorrhea pain intensity is defined as the level of pain experienced by respondents during menstruation and is measured using a numeric pain scale.

### **Research Instruments**

The instrument used in this study was the Numeric Rating Scale (NRS), with a score range of 0–10 to measure dysmenorrhea pain intensity, with a score of 0 indicating no pain and a score of 10 indicating very severe pain. The NRS scale was chosen because it is easy to use, valid, and reliable for measuring pain in adolescents, and is widely used in clinical and public health research.

### **Research Procedures**

The research procedure began with an explanation to the respondents and *informed consent was obtained*. Next, respondents were asked to complete the NRS pain scale as a pretest measurement on the first day of menstruation. The intervention consisted of consuming a ginger brew made from approximately 2 grams of fresh ginger brewed with 200 ml of hot water and consumed twice daily for the first two days of menstruation. After the intervention was completed, respondents' pain intensity was measured again using the NRS scale as a posttest.

### **Data Analysis**

Data were analyzed using univariate and bivariate analyses. Univariate analysis was used to describe the characteristics of respondents and the distribution of dysmenorrhea pain intensity before and after the intervention. Bivariate analysis was conducted to determine differences in dysmenorrhea pain intensity before and after ginger infusion using the Wilcoxon Signed Rank Test, because the data were ordinal and not normally distributed. The statistical significance level was set at  $p < 0.05$ .

### 3. RESULTS AND DISCUSSION

#### Results

##### *Respondent Characteristics*

This section presents the characteristics of the female students who participated in the study at SMK Touluaan, North Minahasa. The characteristics analyzed included the respondents' age, age at menarche, duration of menstruation, and grade level, to provide a general overview of the respondents' profile in this study.

**Table 1.** Distribution of Characteristics of Female Students with Dysmenorrhea at Touluaan Vocational School, North Minahasa (n = 32).

| Characteristics         | Category  | n  | %    |
|-------------------------|-----------|----|------|
| Age (years)             | 15–16     | 9  | 28.1 |
|                         | 17–18     | 19 | 59.4 |
|                         | >18       | 4  | 12.5 |
| Age of Menarche (years) | <12       | 7  | 21.9 |
|                         | 12–13     | 18 | 56.3 |
|                         | >13       | 7  | 21.9 |
| Menstrual Period (days) | <5        | 6  | 18.8 |
|                         | 5–7       | 20 | 62.5 |
|                         | >7        | 6  | 18.8 |
| Grade Level             | Class X   | 10 | 31.3 |
|                         | Grade XI  | 12 | 37.5 |
|                         | Grade XII | 10 | 31.3 |

Based on Table 1, the majority of respondents were in the 17–18 age range (59.4%), while the remainder were 15–16 years old and above. The majority of female students experienced menarche at 12–13 years old (56.3%), with relatively equal proportions in the earlier and later menarche age groups. The respondents' menstrual cycles generally fell within the normal range of 5–7 days (62.5%), although some female students experienced periods lasting less than 5 days or more than 7 days. The distribution of respondents by grade level was relatively even, with the largest proportion in grade XI. These characteristics indicate that the respondents were young women in their early reproductive years with varying menstrual patterns, which is an important context in the analysis of dysmenorrhea pain intensity.

##### *Intensity of Dysmenorrhea Pain Before Ginger Infusion (Pretest)*

This section presents an overview of dysmenorrhea pain intensity in female students at Touluaan Vocational School in North Minahasa before receiving ginger infusion. Pain intensity was measured on the first day of menstruation using a numeric pain *rating scale* (NRS).

**Table 2.** Distribution of Dysmenorrhea Pain Intensity Before Ginger Infusion (Pretest) (n = 32).

| Pain Intensity (NRS) | Category  | n         | %            |
|----------------------|-----------|-----------|--------------|
| 1–3                  | Light     | 6         | 18.8         |
| 4–6                  | Currently | 18        | 56.3         |
| 7–10                 | Heavy     | 8         | 25.0         |
| <b>Total</b>         |           | <b>32</b> | <b>100.0</b> |

Based on Table 2, the majority of respondents (56.3%) experienced moderate dysmenorrhea before receiving the ginger infusion. Twenty-five percent of the students reported severe dysmenorrhea, while 18.8% reported mild pain. This distribution indicates that before the intervention, the majority of students experienced dysmenorrhea that significantly disrupted their daily activities, necessitating intervention to help reduce the intensity of menstrual pain.

### ***Intensity of Dysmenorrhea Pain After Ginger Infusion (Posttest)***

This section presents an overview of dysmenorrhea pain intensity in female students at Touluaan Vocational School in North Minahasa after receiving a ginger infusion. Pain intensity was measured using a Numeric *Rating Scale (NRS)* after the respondents consumed the ginger infusion according to the research protocol.

**Table 3.** Distribution of Dysmenorrhea Pain Intensity After Ginger Infusion (Posttest) (n = 32).

| Pain Intensity (NRS) | Category  | n         | %            |
|----------------------|-----------|-----------|--------------|
| 1–3                  | Light     | 17        | 53.1         |
| 4–6                  | Currently | 13        | 40.6         |
| 7–10                 | Heavy     | 2         | 6.3          |
| <b>Total</b>         |           | <b>32</b> | <b>100.0</b> |

Based on Table 3, after administering the ginger infusion, the majority of female students reported mild dysmenorrhea pain intensity, at 53.1%. The proportion of female students with moderate pain decreased to 40.6%, while only 6.3% still experienced severe pain. This distribution indicates a shift in dysmenorrhea pain intensity to a milder category after the ginger infusion intervention.

### ***Comparison of Dysmenorrhea Pain Intensity Before and After Ginger Infusion***

This section presents a comparison of dysmenorrhea pain intensity in female students at Touluaan Vocational School in North Minahasa before and after receiving ginger infusion. The comparison was conducted to illustrate changes in the distribution of pain categories after the intervention.

**Table 4.** Comparison of Dysmenorrhea Pain Intensity Before and After Ginger Infusion (n = 32).

| <b>Pain Intensity</b>     | <b>Pretest n (%)</b> | <b>Posttest n (%)</b> |
|---------------------------|----------------------|-----------------------|
| <b>Light (NRS 1–3)</b>    | 6 (18.8)             | 17 (53.1)             |
| <b>Moderate (NRS 4–6)</b> | 18 (56.3)            | 13 (40.6)             |
| <b>Heavy (NRS 7–10)</b>   | 8 (25.0)             | 2 (6.3)               |
| <b>Total</b>              | <b>32 (100.0)</b>    | <b>32 (100.0)</b>     |

Table 4 shows a change in the distribution of dysmenorrhea pain intensity before and after the ginger infusion. The proportion of female students with mild pain increased from 18.8% in the pretest to 53.1% in the posttest. Conversely, the proportion of students with moderate pain decreased from 56.3% to 40.6%, and those with severe pain decreased from 25.0% to 6.3%. This comparison indicates a shift in dysmenorrhea pain intensity toward a milder category after the ginger infusion intervention.

### *Analysis of the Effect of Ginger Brew on Dysmenorrhea Pain Intensity*

This section presents the results of a statistical analysis to determine the effect of ginger infusion on dysmenorrhea pain intensity in female students at Touluaan Vocational School in North Minahasa. The analysis was conducted by comparing pain scores before and after the intervention using the Wilcoxon Signed Rank Test, as the pain intensity data was ordinal and not normally distributed.

**Table 5.** Results of the Wilcoxon Test of Dysmenorrhea Pain Intensity Before and After Ginger Infusion (n = 32).

| <b>Variables</b>                   | <b>Median (Min–Max) Pretest</b> | <b>Median (Min–Max) Posttest</b> | <b>Z</b> | <b>p-value</b> |
|------------------------------------|---------------------------------|----------------------------------|----------|----------------|
| <b>Dysmenorrhea Pain Intensity</b> | 5 (2–8)                         | 3 (1–7)                          | -4,012   | 0,000          |

Based on Table 5, there was a significant difference between the intensity of dysmenorrhea pain before and after ginger infusion. The median pain score decreased from 5 in the pretest to 3 in the posttest. The Wilcoxon test results showed a p value of 0.000 ( $p < 0.05$ ), indicating that ginger infusion significantly reduced the intensity of dysmenorrhea pain in female students at Touluaan Vocational High School, North Minahasa.

### **Discussion**

The results of this study indicate that ginger infusion significantly reduced the intensity of dysmenorrhea pain in female students at Touluaan Vocational High School in North Minahasa. Descriptively, there was a shift in the distribution of pain intensity from moderate

and severe to mild after the intervention. This finding is supported by the Wilcoxon test results, which showed a statistically significant decrease in pain scores. These results indicate that ginger infusion is an effective non-pharmacological intervention in reducing dysmenorrhea pain in adolescent girls in the school environment. The reduction in pain intensity after consuming ginger infusion can be explained by the clinical mechanism of ginger as a natural anti-inflammatory and analgesic agent. Ginger is known to contain bioactive compounds such as gingerol and shogaol, which can inhibit prostaglandin synthesis through the cyclooxygenase (COX) and lipoxygenase (LOX) pathways, thereby reducing excessive uterine contractions and myometrial ischemia, the main causes of primary dysmenorrhea pain (Daily et al., 2015; Marx et al., 2017). This mechanism is in line with the working principle of NSAIDs, but ginger has the advantage of a lower risk of side effects, especially in the gastrointestinal system (Thomson et al., 2014).

The results of this study are consistent with previous studies reporting the effectiveness of ginger in reducing dysmenorrhea pain. An experimental study by Ozgoli et al. (2019) showed that ginger significantly reduced the pain intensity of primary dysmenorrhea in female students compared to a control group. Another study by Shirvani et al. (2015) reported that ginger was comparable in effectiveness to mefenamic acid in reducing menstrual pain. Furthermore, a systematic review by Chen et al. (2020) concluded that ginger is one of the herbal therapies most consistently demonstrating analgesic effects in primary dysmenorrhea. In the context of adolescents, these study findings are particularly relevant. Adolescent girls often experience limited access to formal health services and tend to self-medicate to manage menstrual pain (Armour et al., 2019). Ginger infusion, an easy-to-prepare and culturally acceptable herbal beverage, could be a realistic and safe alternative. Research by Jenabi and Khazaei (2015) confirmed that herbal therapies are more readily accepted by adolescents because they are perceived as natural and have minimal side effects, potentially increasing adherence to interventions.

Although most respondents experienced a reduction in pain intensity, a small number of female students still reported moderate to severe pain after the intervention. These findings suggest that the response to ginger infusion is not homogeneous. Variations in response may be influenced by individual factors such as pain threshold, stress level, physical activity, sleep patterns, nutritional status, and differences in the metabolism of ginger's active compounds (Bernardi et al., 2017; De Sanctis et al., 2016). Furthermore, the dose, frequency of consumption, and timing of ginger administration also potentially influence the results, so a single protocol may not be optimal for all respondents. The lack of measurement of

confounding factors in this study, such as physical activity level or a family history of severe dysmenorrhea, is a limitation that requires consideration. Nevertheless, clinically, the reduction in median pain scores and the shift in pain category to a milder level still demonstrate the benefits of ginger infusion as a complementary intervention. These findings align with the concept that non-pharmacological interventions can function as adjunct therapy *in* menstrual pain management, particularly in adolescents (Acién & Acién, 2014).

The clinical implications of this study are significant. Ginger infusion can be recommended as an early intervention option to reduce dysmenorrhea pain in adolescent girls, particularly in school settings. This intervention is relatively inexpensive, easy to implement, and can be done independently without relying on analgesic medications. School health workers, midwives, and community nurses can play a role in providing education on the preparation method, safe dosage, and optimal consumption time of ginger infusion as part of adolescent reproductive health promotion (WHO, 2018).

Furthermore, the results of this study support the development of school-based adolescent health programs that integrate complementary therapies with menstrual health education. This approach not only has the potential to reduce dysmenorrhea pain but also improves adolescents' understanding of reproductive health and safe pain management. Future research is recommended to use a control group design, a larger sample size, and to evaluate the combination of ginger infusion with other non-pharmacological interventions such as gentle exercise or heat therapy to obtain more comprehensive results. Overall, this discussion confirms that ginger infusion is an effective and clinically relevant complementary therapy in reducing dysmenorrhea pain intensity in adolescent girls. These findings strengthen the scientific evidence regarding the role of local herbal ingredients as a safe and applicable alternative for menstrual pain management in the context of adolescent health in Indonesia.

#### 4. CONCLUSION

This study aimed to analyze the effect of ginger infusion on the intensity of dysmenorrhea pain in female students at Touluaan Vocational High School in North Minahasa. The results showed that ginger infusion significantly reduced the intensity of dysmenorrhea pain. This finding confirms that ginger has the potential to be an effective non-pharmacological complementary therapy in menstrual pain management, especially in adolescent girls. Scientifically, the results of this study support the anti-inflammatory mechanism of ginger in inhibiting prostaglandin synthesis, which plays a role in the pathophysiology of dysmenorrhea. Clinically, ginger infusion can be recommended as a safe, easy-to-implement, and affordable

alternative intervention in the school environment. Integrating education on the use of ginger infusion into adolescent reproductive health programs has the potential to improve the quality of life and comfort of female students during menstruation.

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