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RED GINGER EXTRACT BALM AS AN ALTERNATIVE FOR DYSMENORRHEA RELIEF: A QUASI-EXPERIMENTAL STUDY WITH A CONTROL GROUP

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ABSTRACT

Dysmenorrhea is pain in the lower abdomen extending to the pelvic area during menstruation, which can significantly interfere with the daily activities of adolescent girls. A systematic review in 2020 reported that the global prevalence of dysmenorrhea ranges from 16.8% to 81%, while in Indonesia, a 2021 study found that 76.1% of adolescent girls experience this condition. This high prevalence indicates the urgent need for effective, practical management strategies. This study aims to evaluate the effectiveness of red ginger (*Zingiber officinale var. rubrum*) extract balm in reducing menstrual pain among adolescent girls at SMPN 8 Makassar. The research used a Quasi-Experimental Pretest-Posttest Control Group Design, with pre- and post-intervention measurements conducted in both groups. A total of 66 ninth-grade students were selected through purposive sampling and divided into intervention and control groups. Data were analyzed using non-parametric tests: the Wilcoxon Signed Rank Test and the Mann-Whitney U Test. The Wilcoxon test has shown a significant reduction in pain in the intervention group ($Z = -4.799$; $p < 0.001$). The Mann-Whitney U test also indicated a significant difference between the groups ($p < 0.001$), with the intervention group showing a lower mean rank (24.52) compared to the control group (42.48). These findings indicate that red ginger extract balm is effective in reducing menstrual pain intensity. Thus, it can be considered a practical and promising non-pharmacological alternative for managing dysmenorrhea. Further research is recommended to determine optimal application duration and assess effectiveness in broader populations.

Kata Kunci:

Dysmenorrhea;
Jahe Merah;
Balsem;
Nyeri Haid;
Remaja Putri.

ABSTRAK

Dismenore adalah nyeri pada perut bagian bawah hingga panggul saat menstruasi yang dapat secara signifikan mengganggu aktivitas harian remaja putri. Tinjauan sistematis tahun 2020 melaporkan bahwa prevalensi dismenore secara global berkisar antara 16,8% hingga 81%, sedangkan di Indonesia, sebuah studi tahun 2021 menemukan bahwa 76,1% remaja putri mengalami kondisi ini. Tingginya prevalensi ini mengindikasikan perlunya strategi penanganan yang efektif dan praktis. Penelitian ini bertujuan untuk mengevaluasi efektivitas balsam ekstrak jahe merah (Zingiber officinale var. rubrum) dalam menurunkan tingkat nyeri menstruasi pada remaja putri di SMPN 8 Makassar. Desain penelitian yang digunakan adalah Quasi-Experimental Pretest-Posttest Control Group Design, dengan pengukuran dilakukan sebelum dan sesudah intervensi pada kelompok intervensi dan kontrol. Sebanyak 66 siswi kelas IX dipilih melalui teknik purposive sampling dan dibagi menjadi dua kelompok. Data dianalisis menggunakan uji statistik non-parametrik, yaitu Wilcoxon Signed Rank Test dan Mann-Whitney U Test. Hasil uji Wilcoxon menunjukkan penurunan nyeri yang signifikan pada kelompok intervensi ($Z = -4,799$; $p < 0,001$). Uji Mann-Whitney U juga mengindikasikan perbedaan yang signifikan antara kedua kelompok ($p < 0,001$), dengan kelompok intervensi memiliki rata-rata peringkat lebih rendah (24,52) dibandingkan kelompok kontrol (42,48). Temuan ini mengindikasikan bahwa balsam ekstrak jahe merah efektif dalam mengurangi intensitas nyeri menstruasi. Oleh karena itu, balsam ini dapat dipertimbangkan sebagai terapi alternatif non-farmakologis yang praktis dan menjanjikan untuk mengatasi dismenore. Penelitian lebih lanjut disarankan untuk menentukan durasi penggunaan yang optimal dan efektivitas pada populasi yang lebih luas.

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INTRODUCTION

Dysmenorrhea is pain in the lower abdominal area extending to the pelvis during menstruation. It is caused by excessive production of prostaglandins or an imbalance of progesterone hormones in the blood (Philip et al., 2016; Dewi et al., 2022; Z. Liu et al., 2023). This is classified into two types: primary dysmenorrhea and secondary dysmenorrhea. Primary dysmenorrhea is pain that occurs before or during the menstrual period without any anatomical abnormalities in the reproductive organs (Mirabi et al., 2014; Bahmani et al., 2015; Kirsch et al., 2024). This condition is usually not dangerous and does not cause complications, although it can interfere with activities such as studying, working, and social interactions (Handayani et al., 2021; Horman et al., 2021). On the other hand, secondary dysmenorrhea refers to pain or cramps caused by underlying health conditions, such as endometriosis or uterine fibroids (Lestari et al., 2025).

Globally, a systematic review published in 2019 analyzed a meta-analysis that included 21,573 young women from 38 trials. Dysmenorrhea was 71.1% regardless of economy in 23 low-, lower-middle-, or upper-middle-income studies and 15 high-income studies. Student dysmenorrhea rates were similar at school (N = 24, 72.5%, 95% CI 67.5–77.0) and university (N = 7, 74.9%, 62.9–84.0). Academic impact was significant, with 20.1% claiming dysmenorrhea-related school or university absenteeism (N = 19, n = 11,226, 95% CI 14.9–26.7) and 40.9% indicating worse classroom performance or concentration (Armour et al., 2019).

Dysmenorrhea not only affects physical health but also affects the quality of life of those affected. The pain experienced can interfere with daily activities, reduce productivity, and even lead to absenteeism from school or work. Therefore, managing dysmenorrhea is essential to improving the quality of life for affected individuals. Treatment approaches for dysmenorrhea include both pharmacological and non-pharmacological therapies. Pharmacological treatments, such as the use of analgesics, often cause side effects such as nausea, dizziness, and digestive disorders (Alorfi, 2023). Therefore, non-pharmacological therapies have become an attractive alternative. One commonly used non-pharmacological treatment is the application of warm compresses and muscle stretching exercises (J. Liu et al., 2025).

Red ginger *(Zingiber officinale var. rubrum)* is used as a traditional herbal remedy that has been widely used to relieve various types of pain, including dysmenorrhea (Moshfeghinia et al., 2024). The gingerol and shogaol compounds in red ginger possess strong anti-inflammatory and analgesic properties, which can help relieve uterine muscle contractions during menstruation. Most previous studies have focused on the oral consumption of red ginger in the form of capsules or beverages. However, the use of red ginger in topical applications, such as balm, has not been widely explored.

The use of red ginger-based balm offers a practical and direct solution for alleviating dysmenorrhea pain. Topical application allows the active compounds in red ginger to work directly on the pain area, providing faster relief than oral methods (Gurung et al., 2022). Previous research has shown that topical herbal applications can significantly reduce pain intensity. Primary dysmenorrhea typically occurs in individuals aged 15 to 25 years and is often triggered by factors such as low physical activity, family history, psychological stress, and frequent consumption of fast food (Pakniat et al., 2019). The pain caused by dysmenorrhea can disrupt daily activities, especially among students. It may result in difficulty concentrating, reduced school attendance, and decreased academic performance.

Healthcare providers commonly use non-pharmacological interventions such as warm compresses and muscle stretching exercises to relieve menstrual pain. However, their effectiveness and user comfort remain limited, prompting the need for innovative approaches. Red ginger (*Zingiber officinale var. rubrum*) is used for its anti-inflammatory and analgesic properties and has been widely used to alleviate various types of pain, including dysmenorrhea (Moshfeghinia et al., 2024). Most existing studies have focused on the oral use of red ginger in capsule or beverage form. To date, however, no studies have specifically evaluated the effectiveness of red ginger balm for dysmenorrhea relief.

Recent research found that both demonstrate the effectiveness of red ginger drinks in reducing menstrual pain among adolescent girls (Anggari et al., 2024). These findings reinforce that red ginger is an effective non-pharmacological therapy for managing dysmenorrhea. Given these benefits, red ginger extract formulated as a balm offers a promising innovation for topical application. This method

allows active compounds to be absorbed directly at the pain site, providing faster and more targeted relief. Therefore, developing red ginger-based balm could serve as a natural, safe, and effective solution for adolescent girls experiencing menstrual pain. Factors associated with dysmenorrhea include HIV, reproductive coercion, reproductive health, oxytocin, prolactin, trauma, metformin, anxiety, and breast cancer (Rejeki et al., 2024).

Since ginger can serve as a messenger, servant, and guide herb to get other herbal medicines to the location where they are needed, it is utilized in around half of all herbal prescriptions (Shahrajabian et al., 2019). These compounds help reduce uterine contractions and alleviate menstrual cramps. While most previous studies have examined oral formulations, there is a need for more practical and user-friendly alternatives. Given these benefits, red ginger extract formulated as a balm offers a promising innovation for topical application. This method allows active compounds to be absorbed directly at the pain site, providing faster and more targeted relief. Therefore, this study aims to assess the effectiveness of red ginger extract balm in reducing menstrual pain levels among adolescent girls by evaluating changes in pain intensity before and after the intervention in the intervention group, and comparing pain levels between the intervention and control groups.

METHOD

Type of Research

This study employed a quantitative approach using an experimental method with a Quasi-Experimental Pretest-Posttest Control Group Design**,** where measurements are conducted before and after the intervention in both groups: the intervention group, which receives the red ginger extract balm, and the control group, which does not receive any intervention (Handayani & Saeni, 2024). This study design aims to test the effectiveness of the intervention, compare differences between groups, and observe changes over a period of time before and after treatment. The objective of this research is to assess the effectiveness of red ginger extract balm in reducing menstrual pain levels among adolescent girls, evaluate changes in menstrual pain levels before and after the intervention within the intervention group, and analyze differences in menstrual pain levels between the intervention and control groups.

Place and Time of Research

This research was conducted at SMPN 8 Makassar. The study was carried out from September 23 to December 31, 2024.

Population and Sample

The population in this study has included all ninth-grade female students at SMPN 8 Makassar, totaling 216 individuals. From this population, 66 students were selected as the research sample, which was then divided into two groups: the intervention group and the control group. The sampling technique used in this study was purposive sampling (Handayani, 2017).

Data Collection

The data collection techniques in this study consisted of several stages, starting with the completion of an informed consent form, where respondents were asked to read and sign their consent before the study began and were given the opportunity to ask questions before agreeing. Next, respondents completed the Numeric Rating Scale (NRS) questionnaire during the pre-test to assess their pain level on a scale of 0-10 before receiving the intervention in the form of red ginger extract balm in the intervention group, while the control group was only monitored without intervention. They then completed the questionnaire again during the post-test to compare the results with the pre-test. The researcher also conducted observations of the pre-test and post-test results and recorded factors that could influence the outcomes, such as respondents' physical activity and psychological conditions. Additionally, respondents provided demographic data, including age, class, history of menstrual pain, and methods previously used to alleviate pain, which were analyzed to determine respondent characteristics. Instrument testing was conducted to ensure the validity and reliability of the questionnaire using the product-moment correlation, with the calculated r-value greater than the table

r-value (0.538), indicating a fairly good level of validity. Reliability was measured using Cronbach's alpha coefficient of 0.697, demonstrating good internal consistency of the instrument.

Data Analysis and Processing

The analysis used in this study includes univariate and bivariate analysis, utilizing non-parametric statistical methods, namely the Wilcoxon Signed Rank Test and the Mann-Whitney U Test, as the data are not normally distributed (Pallant, 2020). The selection of these non-parametric statistical methods was made because the obtained data did not meet the assumption of normal distribution, making these techniques more suitable for analyzing changes before and after the intervention within the same group and for comparing two independent groups (Handayani & Saeni, 2024; Field, 2021).

Data Analysis and Processing

Bivariate analysis was conducted to assess the improvement in cognitive skills regarding diabetes mellitus prevention among school-age children through the use of the Diabetamon game. Data were analyzed using IBM SPSS version 21. The normality of the data distribution was tested using the Kolmogorov-Smirnov test ($p > 0.05$), which confirmed that the data were normally distributed. In the intervention group, the p-value was 0.334, and in the control group, it was 0.221, indicating normal distribution in both. Therefore, parametric tests were used. The paired t-test was used to analyze within-group differences (pre- and post-intervention), and the independent samples t-test (pooled t-test) was used to compare between-group differences (intervention vs. control).

RESULT

The results of the Chi-Square test for the lecturer characteristic variables can be seen in the table below:

Table 1. Frequency Distribution of Respondents' Characteristics (n=66)

Age (years)	**Frequency (n)**	**Percentage (%)**
13	1	2
14	44	66
15	18	27
16	3	5
Body Weight (kg)	Frequency (n)	Percentage (%)
35-40	5	8
41-45	10	16
46-50	28	42
51-55	18	27
56-60	5	8
Age of Menarche (years)	Frequency (n)	Percentage (%)
11	18	27
12	26	39
13	16	25
14	6	9
Duration of Menstruation	Frequency (n)	Percentage (%)
<5 days	5	8
>5 days	61	92
Total	66	100

Based on Table 1, the majority of respondents in this study were 14 years old (66%), followed by those aged 15 years (27%), indicating that most participants were in the mid-adolescence phase. In terms of body weight, the largest proportion of respondents fell within the 46–50 kg range (42%), followed by those in the 51–55 kg range (27%), suggesting that most participants had body weights

considered normal for their age group. Regarding the age of menarche, 39% of respondents reported experiencing their first menstruation at the age of 12, while 27% experienced it at the age of 11, indicating that the onset of puberty among participants occurred relatively early. Additionally, the majority of respondents (92%) reported menstrual durations lasting more than five days, while only 8% had shorter durations. These findings illustrate that the respondents in this study were primarily adolescent girls with typical developmental characteristics, including normal weight, early menarche, and prolonged menstruation. Such demographic and biological profiles are relevant in the context of dysmenorrhea, as these factors may influence the frequency and intensity of menstrual pain experienced.

Table 2. Frequency Distribution of Menstrual Pain Levels Pre-Test Intervention Group

Menstrual Pain Levels Pre-Test Intervention Group	Frequency (n)	Percentage (%)
Mild	10	15
Moderate	11	17
Severe	12	18
Total	33	50

Table 2 presents the pre-test results in the intervention group, where the majority of respondents experienced moderate to severe pain, with severe pain being the most common category, reported by 12 respondents (18%), followed by moderate pain with 11 respondents (17%). This indicates that most respondents, totaling 23 individuals (35%), experienced a significant level of menstrual pain before the intervention was conducted.

Table 3. Frequency Distribution of Menstrual Pain Levels Post-Test Intervention Group

Menstrual Pain Levels Post-Test Intervention Group	Frequency (n)	Percentage (%)
No Pain	10	15
Mild	14	21
Moderate	8	12
Severe	1	2
Total	33	50

Table 3 presents the post-test results in the intervention group, showing a shift in the distribution of pain levels. The majority of respondents experienced an improvement in their condition, with an increase in the number of respondents reporting no pain (15%) and mild pain (21%), as well as a significant decrease in severe pain to only 1 respondent (2%). These findings indicate that the intervention provided was effective in reducing menstrual pain levels among the respondents.

Table 4. Frequency Distribution of Menstrual Pain Levels Pre-Test Control Group

Menstrual Pain Level (NRS Category)	Frequency (n)	Percentage (%)
Mild (NRS 1–3)	9	14
Moderate (NRS 4–6)	15	22
Severe (NRS 7–10)	9	14
Total	33	50

Table 4 presents the pre-test distribution of menstrual pain levels in the control group, as measured using the Numeric Rating Scale (NRS). The results show that the largest proportion of respondents (45.5%) experienced moderate pain (NRS 4–6) before any intervention. Meanwhile, 27.3% of respondents reported mild pain (NRS 1–3), and another 27.3% reported severe pain (NRS 7–10). These findings suggest that before treatment, most respondents in the control group experienced

menstrual pain at moderate to severe levels, highlighting the need for effective pain management strategies even in the absence of active intervention.

Table 5. Frequency Distribution of Menstrual Pain Levels Post-Test Control Group

Menstrual Pain Level (NRS Category)	Frequency (n)	Percentage (%)
Mild (NRS 1–3)	10	15
Moderate (NRS 4–6)	17	26
Severe (NRS 7–10)	6	9
Total	33	100

Table 5 presents the distribution of menstrual pain levels after observation in the control group. The majority of respondents (51.5%) continued to experience moderate pain, with 30.3% reporting mild pain and 18.2% reporting severe pain. Compared to the pre-test results, there was a slight increase in the proportion of respondents reporting mild pain and a decrease in those reporting severe pain. However, these changes were not substantial. This indicates that in the absence of intervention, menstrual pain levels among respondents remained relatively stable, with only minor variations in distribution.

Table 6. Normality Test of the Effect of Red Ginger Extract Balm (*Zingiber Officinale Var. Rubrum*) on the Reduction of Menstrual Pain Levels

	Shapiro-Wilk			
Pain Level	**Statistic**	**df**	**Sig.**	**Description**
Pre-test Intervention	0.794	33	0.000	Not Normally Distributed
Post-test Intervention	0.850	33	0.000	Not Normally Distributed
Pre-test Control	0.812	33	0.000	Not Normally Distributed
Post-test Control	0.803	33	0.000	Not Normally Distributed

Table 6 presents the results of the Shapiro-Wilk normality test, indicating that all menstrual pain level data, both in the intervention and control groups, pre-test and post-test, are not normally distributed. This is evidenced by the significance value (p-value) of 0.000, which is lower than the significance threshold of 0.05. Therefore, the data in this study do not meet the normality assumption. Consequently, further data analysis will use a non-parametric statistical test more suitable for non-normally distributed data, specifically the Wilcoxon Signed Rank Test**.**

Table 7. Analysis of Menstrual Pain Before and After Administration of Red Ginger Extract Balm (*Zingiber Officinale Var. Rubrum*)

		N	Mean Rank	Sum of Ranks
Post-Test Pain Level Based on NRS - Pre-Test Pain Level Based on NRS	Negative Ranks	31[a]	17.29	536.00
	Positive Ranks	2[b]	12.50	25.00
	Ties	33[c]		
	Total	66		

a. Post-test pain level based on NRS < Pre-test pain level based on NRS
b. Post-test pain level based on NRS > Pre-test pain level based on NRS
c. Post-test pain level based on NRS = Pre-test pain level based on NRS

Table 7 shows that based on the results of the Wilcoxon Signed Rank Test, out of a total of 66 respondents, 31 respondents (Mean Rank = 17.29, Sum of Ranks = 536.00) experienced a decrease in menstrual pain levels after the intervention (Negative Ranks), indicating that most respondents experienced an improvement in their condition. In contrast, only 2 respondents (Mean Rank = 12.50, Sum of Ranks = 25.00) experienced an increase in pain levels after the intervention (Positive Ranks), indicating that only a small portion of respondents experienced an increase in pain. Meanwhile, 33 respondents in the control group did not experience any changes in pain levels between pre-test and post-test (Ties). These results indicate that the intervention provided was effective in reducing

menstrual pain levels for most respondents. Thus, it can be concluded that the intervention using red ginger extract balm is effective in reducing menstrual pain levels in adolescent girls.

Table 8. Comparison of Menstrual Pain Levels and Mann–Whitney Test Results between Control and Intervention Groups after Treatment (Post-Test, n = 66)

Menstrual Pain Level (NRS Category)	Control Group (n)	%	Intervention Group (n)	%	Mann–Whitney Test Result
Mild (NRS 1–3)	10	30	26	79	
Moderate (NRS 4–6)	17	51	7	21	*p*-value (2-tailed) < 0,001
Severe (NRS 7–10)	6	19	0	0	
Total	33	100	33	100	

Table 8 shows a comparison of menstrual pain levels between the control and intervention groups after treatment, based on the Numeric Rating Scale (NRS). In the control group, the majority of respondents reported moderate pain (51%), followed by mild pain (30%) and severe pain (19%). In contrast, the intervention group showed a significant shift in pain distribution, with 79% of respondents experiencing only mild pain, 21% experiencing moderate pain, and none reporting severe pain. The results of the Mann–Whitney test indicated a statistically significant difference in post-test pain levels between the two groups ($p < 0.001$). This suggests that the application of red ginger extract balm was effective in reducing the intensity of menstrual pain among adolescent girls. The absence of severe pain cases in the intervention group further supports the potential of red ginger balm as a non-pharmacological alternative for menstrual pain management.

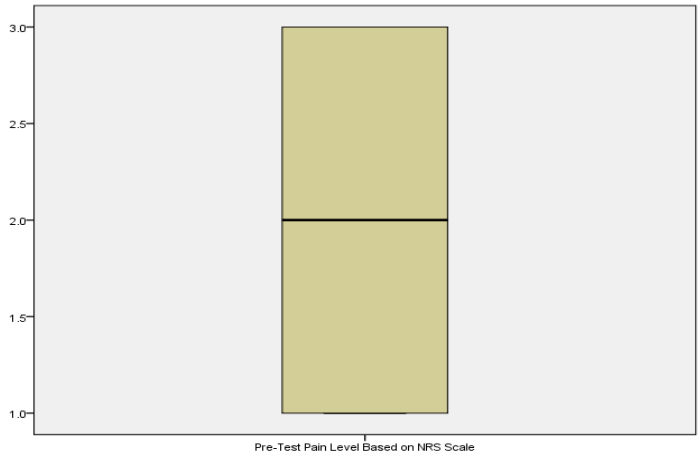

Figure 1. Boxplot Distribution of Pre-Test Pain Level Data Based on NRS (Numerical Rating Scale)

Figure 1 shows that, based on the normality test using boxplots, before the intervention with red ginger extract balm, the majority of respondents' pain levels ranged from 1 to 3, with a median of around 2.0, indicating that menstrual pain was quite high before the intervention. This supports the need for an intervention to reduce menstrual pain in adolescent girls.

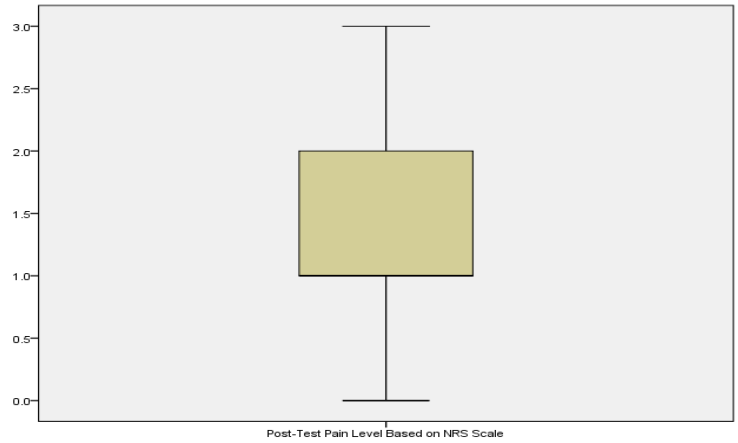

Figure 2. Boxplot Distribution of Post-Test Pain Level Data Based on NRS (Numerical Rating Scale)

Figure 2 shows that after the red ginger extract balm intervention, most respondents' pain levels ranged from 1 to 2, with a minimum pain level of 0 and a maximum of 3. The median is around 1.5, indicating a significant reduction in pain for most respondents. No outliers were detected, suggesting that the measurement results were relatively consistent across the sample.

Table 9. Comparison of Menstrual Pain Intensity Between Control and Intervention Groups After Treatment (Post-Test; n = 66)

Group	n	Mean Rank	Sum of Ranks	Mann–Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)
Intervention	33	24.52	809.00				
Control	33	42.48	1402.00				
Test Results				248.000	809.000	-4.024	< 0.001

Table 9 presents the comparison of menstrual pain intensity between the control and intervention groups after treatment, using the Mann–Whitney U test. The mean rank in the intervention group (24.52) was notably lower than in the control group (42.48), indicating that respondents who received the red ginger extract balm experienced significantly lower menstrual pain. The Mann–Whitney U value of 248.000 with a Z-score of -4.024 and $p < 0.001$ confirms that the difference in pain intensity between the two groups was statistically significant. These findings demonstrate that the application of red ginger extract balm was effective in reducing menstrual pain among adolescent girls compared to those who did not receive the intervention.

Figure 3 illustrates the distribution of menstrual pain levels, measured using the Numerical Rating Scale (NRS), across four groups: Control Pre-Test, Control Post-Test, Intervention Pre-Test, and Intervention Post-Test. Before the intervention, both the control and intervention groups had similar distributions, with pain levels ranging from 1 to 3 and median scores around 2, indicating baseline equivalence. After the intervention, the control group showed no significant change, maintaining a similar pain distribution. In contrast, the intervention group experienced a noticeable shift, with pain levels ranging mostly from 0 to 2 and a lower median of approximately 1. This reduction indicates the effectiveness of the red ginger extract balm in alleviating menstrual pain.

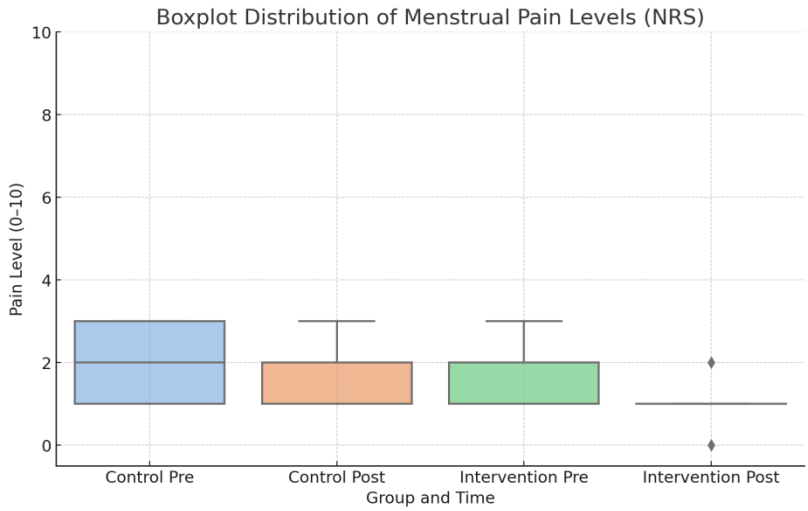

Figure 3. Distribution of Menstrual Pain Levels Based on the Numerical Rating Scale (NRS) Before and After Treatment in the Control and Intervention Groups

No outliers were observed in any group, suggesting consistent responses across participants. Overall, the figure visually reinforces the statistical findings, demonstrating a meaningful decrease in pain levels in the intervention group following the application of red ginger balm, compared to the control group.

DISCUSSION

1. Analysis of Menstrual Pain Before and After the Application of Red Ginger Extract Balm (*Zingiber Officinale Var. Rubrum*)

Based on existing theories and supported by recent studies, the use of red ginger (*Zingiber officinale var. rubrum*) extract balm has been proven effective in reducing menstrual pain intensity in adolescent girls. This study supports the use of ginger as a safe and effective adjunctive therapy for primary dysmenorrhea in a female student (Pakniat et al., 2019). The analysis using the Wilcoxon Signed Rank Test revealed a significant decrease in menstrual pain levels after the application of red ginger extract balm ($p < 0.05$), with the majority of respondents reporting reduced pain intensity. These findings indicate that the balm formulation offers a non-pharmacological, evidence-based alternative that is both practical and effective for dysmenorrhea management in adolescents.

The study found that red ginger decoction significantly decreased menstrual pain in adolescent students, and this confirmed the analgesic efficacy of red ginger-based drinks. Although most prior research focused on oral administration, this study highlights the potential of topical application in the form of balm, which provides direct, localized relief and enhanced user convenience (Anggari et al., 2024). In addition, these results are also in line with the research (Handayani et al., 2022) which showed that abdominal stretching exercises can significantly reduce the intensity of dysmenorrhea. Both interventions suggest that non-pharmacological approaches have the potential to be effective in reducing menstrual pain, both through biological pathways (prostaglandin inhibition) and mechanical (muscle relaxation through stretching).

Additionally, recent meta-analyses support the claim that red ginger contains active compounds such as gingerol and shogaol, which possess strong anti-inflammatory properties. These compounds inhibit cyclooxygenase enzymes involved in prostaglandin synthesis, which are directly linked to uterine contractions and pain. Furthermore, the balm's warming effect enhances pelvic blood flow, reducing muscle tension and promoting relaxation. Menstrual discomfort was lessened by both medications. For females with primary dysmenorrhea, ginger and Novafen both effectively reduce pain (Moshfeghinia et al, 2024). This highlights the need for further studies to establish optimal dosage, frequency, and long-term safety of red ginger balm in diverse populations.

2. Analysis of Differences in Menstrual Pain Intensity Between the Intervention and Control Groups

Based on the Mann-Whitney U test results, the mean rank in the intervention group was 24.52, while in the control group, it was 42.48. This difference indicates that the menstrual pain intensity in the intervention group was lower than that of the control group after applying red ginger extract balm. These results suggest that the use of red ginger extract balm is effective in reducing menstrual pain intensity compared to the group that did not receive the intervention.

Further analysis shows a significant difference between the intervention and control groups in menstrual pain intensity after the intervention, with a p-value of 0.000 ($p < 0.05$). Thus, the null hypothesis (H_0), which states that there is no difference between the two groups, can be rejected. These findings indicate that red ginger extract balm has a significant impact in reducing menstrual pain intensity in adolescent girls.This finding aligns with research conducted by Anggari et al., (2024), which found that the consumption of red ginger drinks effectively reduced dysmenorrhea intensity in adolescent girls at SMPI Al Falah Babelan Bekasi. Another study showed that red ginger decoction significantly reduced dysmenorrhea intensity in adolescent girls at MTS Darul Falah Lampung. The mechanism by which red ginger alleviates menstrual pain is related to its gingerol content, which possesses anti-inflammatory and analgesic effects, inhibiting prostaglandin production that contributes to menstrual pain (Handayani et al., 2022).

However, the use of red ginger aromatherapy does not provide a significant effect in reducing menstrual pain in adolescent girls, indicating that the application method and duration of use are crucial factors in the intervention's effectiveness. The findings of this study suggest that red ginger extract balm can be considered a natural and non-pharmacological alternative for relieving menstrual pain in adolescent girls. With its anti-inflammatory properties, this intervention can be incorporated into daily life to help adolescent girls manage menstrual pain more naturally and safely. Further research can be conducted to explore the optimal duration of red ginger balm usage and its effectiveness across a broader age group (Anggari et al., 2024).

CONCLUSION

This study provides empirical support for the use of red ginger extract balm as an effective non-pharmacological intervention to reduce menstrual pain in adolescent girls. The reduction in pain intensity following the intervention suggests not only statistical significance but also practical benefits, such as improved comfort, concentration, and potential enhancement of daily functioning and school attendance. These findings reinforce the clinical relevance of herbal-based topical treatments as accessible, affordable, and safer alternatives to conventional analgesics.

The use of red ginger balm may be particularly beneficial for adolescents seeking natural methods to manage dysmenorrhea without the side effects associated with pharmacological painkillers. In addition to applying the balm, adolescents are encouraged to adopt supportive health behaviors, such as engaging in regular physical activity, maintaining adequate hydration, and following a nutritious diet, to maximize the benefits of non-pharmacological approaches. Further studies are recommended to examine the long-term safety, optimal duration, and dosage of red ginger balm use, as well as its effectiveness across different age groups and severity levels of dysmenorrhea.

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