



COMPARATIVE EFFECTIVENESS OF HOT DARK CHOCOLATE AND JESOMA (GINGER, SOYA, AND HONEY) ON DYSMENORRHOEA PAIN INTENSITY AMONG FEMALE STUDENTS

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ABSTRACT

Dysmenorrhoea is a common menstrual problem among adolescent girls and may interfere with daily activities and academic performance. Non-pharmacological interventions such as hot dark chocolate and herbal beverages are considered safer alternatives to manage menstrual pain. This study aimed to analyse the effectiveness of hot dark chocolate and Jesoma (ginger, soya, and honey) in reducing dysmenorrhoea pain intensity among female students at SMAN 3 Pontianak. This study employed a quantitative approach with a quasi-experimental design using two groups with pretest–posttest measurements. The sample consisted of female students who experienced dysmenorrhoea and were divided into a hot dark chocolate group and a Jesoma group. The sampling technique used was purposive sampling, with a total sample of 90 respondents, divided into 45 respondents in each group, based on calculations using G*Power with an additional 10% to anticipate dropout. Pain intensity was measured before and after the intervention using a Numeric Rating Scale (NRS) ranging from 0 to 10, where 0 indicates no pain and 10 indicates the worst possible pain. Data were analysed using the Wilcoxon test and Mann–Whitney test. The results showed a significant reduction in dysmenorrhoea pain intensity in both intervention groups ($p < 0.05$). The hot dark chocolate group demonstrated a moderate effect size (0.60), while the Jesoma group showed a large effect size (0.72). Comparative analysis indicated that Jesoma was more effective than hot dark chocolate in reducing dysmenorrhoea pain ($p = 0.038$). Both hot dark chocolate and Jesoma are effective non-pharmacological interventions for reducing dysmenorrhoea pain among adolescent girls; however, Jesoma demonstrates greater effectiveness.

Keywords: adolescent girls; dysmenorrhoea; hot dark chocolate; jesoma; menstrual pain management

How to cite (in APA style)

Sinaga, E. R., Hidayat, A. R., & Pabidang, S. (2026). Comparative Effectiveness of Hot Dark Chocolate and Jesoma (Ginger, Soya, and Honey) on Dysmenorrhoea Pain Intensity among Female Students. *Indonesian Journal of Global Health Research*, 8(4), 847–856. <https://doi.org/10.37287/ijghr.v8i4.1528>.

INTRODUCTION

Dysmenorrhoea is one of the most common menstrual disorders experienced by adolescent girls and constitutes a reproductive health problem that affects daily activities, learning concentration, and overall quality of life. Numerous studies have demonstrated that dysmenorrhoea has a high prevalence among adolescents and university students across various countries, including those in Asia and Africa, with pain severity ranging from mild to severe (Ameade et al., 2018; Chen et al., 2024; Fahmiah et al., 2022; Sima et al., 2022). This condition frequently results in school absenteeism and decreased academic productivity (Fahmiah et al., 2022; Sima et al., 2022).

Several factors have been identified as being associated with the occurrence of dysmenorrhoea among adolescent girls, including nutritional status, age at menarche, psychological stress, and other menstrual disorders. Previous studies have reported that suboptimal nutritional status and earlier age at menarche are associated with an increased risk of dysmenorrhoea (Alam & al., 2021; Miraturrofi'ah, 2020; Novita, 2018). In addition, psychological factors such as stress contribute to alterations in menstrual patterns and increased menstrual pain intensity (Mugiati, 2015; Purnomo, 2024).

Along with growing awareness of the potential adverse effects of long-term analgesic use, recent studies have increasingly focused on non-pharmacological approaches and complementary therapies for the management of dysmenorrhoea. Various natural ingredients and functional foods, such as ginger, honey, dark chocolate, soy milk, green tea, turmeric–tamarind beverages, green coconut water, and combinations of these ingredients, have been reported to be effective in reducing dysmenorrhoea pain intensity among adolescent girls (Arfailasufandi & Andiarna, 2018; Faizah & Mukhoiritin, 2019; Jannah & Setianingsih, 2021; Karmila, 2020; Maharani et al., 2023; Rofiasari et al., 2024). The effectiveness of these substances is associated with their anti-inflammatory, antioxidant, mineral, and bioactive compound contents, which play a role in reducing uterine contractions and pain perception (Kadri et al., 2017).

Although various non-pharmacological interventions have demonstrated beneficial effects, research findings indicate variability in effectiveness across different types of interventions and adolescent populations. This highlights the need for further studies to identify interventions that are most effective, practical, and appropriate for the characteristics of adolescent girls. Therefore, this study aimed to compare the effectiveness of hot dark chocolate and Jesoma (ginger, soya, and honey) in reducing dysmenorrhoea pain intensity among female students at SMAN 3 Pontianak.

METHOD

This study employed a quasi-experimental design using a pretest–posttest control group approach to compare the effectiveness of hot dark chocolate and Jesoma (a combination of ginger, soy milk, and honey) in reducing dysmenorrhoea pain intensity among female students at SMA Negeri 3 Pontianak. The study subjects were randomly allocated into two intervention groups to minimise selection bias. Pain intensity was measured before and after the intervention in both groups using the Numeric Rating Scale (NRS). Baseline characteristics of the respondents, including age, age at menarche, and initial pain intensity, were analysed descriptively to ensure homogeneity between the groups.

The study population consisted of all female students at SMA Negeri 3 Pontianak who experienced primary dysmenorrhoea, totalling 205 individuals. Sample size determination was conducted using G*Power software with a significance level of 0.05, a statistical power of 0.80, and a moderate effect size ($f^2 = 0.5$), resulting in a minimum required sample of 40 respondents. To anticipate a potential 10% dropout rate, the sample size was increased to 45 respondents per group, yielding a total sample of 90 participants. Purposive sampling was applied based on predefined inclusion and exclusion criteria. Inclusion criteria comprised students who were menstruating and experiencing dysmenorrhoea, not consuming analgesic medications, able to communicate effectively, and willing to participate in all research procedures by signing informed consent. Exclusion criteria included students who were not menstruating, were taking analgesics, or withdrew during the study period.

The interventions were administered on the first and second days of menstruation. The hot dark chocolate group received a hot chocolate beverage prepared from 30 g of dark chocolate powder containing at least 70% cocoa, dissolved in 200 ml of water at approximately 50°C. The Jesoma group received a warm herbal beverage consisting of 22 g of ginger, 200 ml of soy milk, and approximately 15 ml of pure honey, served at a temperature of 40–50°C. Each intervention was administered once daily. Dysmenorrhoea pain intensity was reassessed two hours after the intervention using the NRS, with scores ranging from 0 to 10, where higher scores indicated more severe pain.

Data collection included primary data obtained directly from respondents through observation and completion of pain intensity scales, as well as secondary data derived from students' health records at the School Health Unit. The collected data were processed through editing, coding, and tabulation prior to statistical analysis. Univariate analysis was used to describe respondent

characteristics and study variables, while bivariate analysis was conducted to assess differences in pain intensity before and after the intervention and between groups. The Wilcoxon test was applied for within-group analysis, and the Mann - Whitney test was used to compare the effectiveness between groups, with statistical significance set at $p \leq 0.05$. This study received ethical approval from the Research Ethics Committee of STIKes Guna Bangsa Yogyakarta (No. 015/KEPK/VIII/2025, dated 20 August 2025). All respondents were provided with detailed information regarding the study objectives, procedures, benefits, and potential risks prior to participation. Participation was voluntary, with assurances of anonymity and data confidentiality. All respondents were treated fairly in accordance with established research ethics principles.

RESULT

Characteristics of Female Students at SMA Negeri 3 Pontianak Age Distribution of Participants

Table 1
The Age Distribution of Female Students

The Hot Dark Choco Group	Age	f	%	Valid Percent	Cumulative Percent
	15	5	11.1	11.1	11.1
	16	13	28.9	28.9	40.0
	17	27	60.0	60.0	100.0
The Jesoma Group	15	6	13.3	13.3	13.3
	16	17	37.8	37.8	51.1
	17	16	35.6	35.6	86.7
	18	6	13.3	13.3	100.0

Table 1 shows that most participants in the hot dark chocolate group were 17 years old (60.0%), while in the Jesoma group the majority were 16 years old (37.8%), indicating that most respondents in both groups were in mid-to-late adolescence.

Class Level of Participants

Table 2
Class Level of Participants

The Hot Dark Choco Group	Class	f	%	Valid Percent	Cumulative Percent
	10	6	13.3	13.3	13.3
	11	11	24.4	24.4	37.8
	12	28	62.2	62.2	100.0
The Jesoma Group	10	2	4.4	4.4	4.4
	11	17	37.8	37.8	42.2
	12	26	57.8	57.8	100.0

Table 2 shows that the majority of participants in both the hot dark chocolate group (62.2%) and the Jesoma group (57.8%) were Grade 12 students, indicating that most respondents were in their final year of senior high school.

Age at Menarche

Table 3.
Age at Menarche

	Age	f	%	Valid Percent	Cumulative Percent
The Hot Dark Choco Group	9 – 10	12	26.6	26.6	26.6
	11 - 12	26	57.8	57.8	84.4
	13 - 14	7	15.5	15.5	100.0
The Jesoma Group	9 – 10	8	17.7	17.7	17.7
	11 - 12	27	60.0	60.0	77.7
	13 - 14	10	22.2	22.2	100.0

Table 3 shows that the majority of participants in both the hot dark chocolate group (57.8%) and the Jesoma group (60.0%) experienced menarche at the age of 11–12 years, indicating a similar distribution of age at menarche between the two groups.

Intensity of Dysmenorrhoea Pain Among Female Students

Dysmenorrhoea Pain Intensity Before and After Hot Dark Chocolate Intervention

Table 4

Dysmenorrhoea Pain Intensity Before and After Hot Dark Chocolate Intervention					
Pretest	Pain Scale	f	%	Valid Percent	Cumulative Percent
	Mild pain	6	13.3	13.3	13.3
	Moderate pain	8	17.8	17.8	31.1
	Severe pain	29	64.4	64.4	95.6
	Very severe pain	2	4.4	4.4	100.0
Posttest	No pain	3	6.7	6.7	6.7
	Mild pain	15	33.3	33.3	40.0
	Moderate pain	20	44.4	44.4	84.4
	Severe pain	7	15.6	15.6	100.0

Table 4, prior to the intervention, the majority of students in the hot dark chocolate group experienced severe dysmenorrhoea pain, with 29 students (64.4%), while 2 students (4.4%) reported very severe pain. Mild pain was reported by 6 students (13.3%), and moderate pain by 8 students (17.8%). These findings indicate that most participants experienced high pain intensity before receiving the intervention. Following the administration of hot dark chocolate, a shift toward lower pain intensity was observed. Three students (6.7%) reported no pain, 15 students (33.3%) experienced mild pain, 20 students (44.4%) reported moderate pain, and only 7 students (15.6%) continued to experience severe pain. These results suggest that the hot dark chocolate intervention contributed to a reduction in dysmenorrhoea pain intensity among the participants.

Dysmenorrhoea Pain Intensity Before and After Jesoma Intervention

Table 5

Dysmenorrhoea Pain Intensity Before and After Jesoma Intervention					
	Pain Scale	f	%	Valid Percent	Cumulative Percent
Pretest	Mild pain	9	20.0	20.0	20.0
	Moderate pain	6	13.3	13.3	33.3
	Severe pain	28	62.2	62.2	95.6
	Very severe pain	2	4.4	4.4	100.0
Posttest	No pain	7	15.6	15.6	15.6
	Mild pain	18	40.0	40.0	55.6
	Moderate pain	19	42.2	42.2	97.8
	Severe pain	1	2.2	2.2	100.0

As shown in Table 5, before the Jesoma intervention, most participants reported severe dysmenorrhoea pain, accounting for 28 students (62.2%), while 2 students (4.4%) experienced very severe pain. Mild pain was reported by 9 students (20.0%), and moderate pain by 6 students (13.3%). This distribution indicates that the majority of students experienced high levels of pain prior to the intervention. After the Jesoma intervention, improvements in pain intensity were evident. Seven students (15.6%) reported no pain, 18 students (40.0%) experienced mild pain, 19 students (42.2%) reported moderate pain, and only 1 student (2.2%) continued to experience severe pain. These findings indicate that the Jesoma intervention was associated with a substantial reduction in dysmenorrhoea pain intensity among the participants.

Normality Test

To assess the normality of data distribution, the Kolmogorov–Smirnov test was applied, as the sample size in each group exceeded 50 participants. Data were considered normally distributed if

the significance value was greater than 0.05; conversely, a significance value less than 0.05 indicated a non-normal distribution.

Table 6
Normality Test

Variable	Kolmogorov-Smirnov		
	Statistic	df	Sig.
Hot Dark Choco	0.138	45	0.032
Jesoma	0.172	45	0.002

As presented in Table 6, the results of the Kolmogorov–Smirnov test showed a significance value of 0.032 for the hot dark chocolate group and 0.002 for the Jesoma group. Both values were below the threshold of 0.05, indicating that the data in both groups were not normally distributed. Given the non-normal distribution of the data, non-parametric statistical tests were employed for further analysis. The Wilcoxon Signed-Rank Test was used to examine changes in dysmenorrhoea pain intensity before and after the interventions within each group, while the Mann–Whitney U test was applied to compare the effectiveness of hot dark chocolate and Jesoma in reducing dysmenorrhoea pain intensity among female students at SMA Negeri 3 Pontianak.

Bivariate Analysis

Differences in Dysmenorrhoea Pain Scores Before and After the Hot Dark Chocolate Intervention.

Table 7
Differences in Dysmenorrhoea Pain Scores Before and After the Hot Dark Chocolate Intervention

Hot Dark CHoco	N	Mean	Median	Min	Max	Asymp.Sig.(2-tailed)	Effect Size
Pretest	45	6.91	8.00	1	10	0.000	0.60
Posttest	45	4.09	4.00	0	9		

As shown in Table 7, the mean dysmenorrhoea pain score in the hot dark chocolate group decreased from 6.91 at pretest to 4.09 at post-test. Similarly, the median pain score declined from 8.00 before the intervention to 4.00 after the intervention. The minimum and maximum pain scores at pretest ranged from 1 to 10, while at post-test they ranged from 0 to 9. The Wilcoxon Signed-Rank Test revealed a statistically significant difference between pretest and post-test pain scores in the hot dark chocolate group (Asymp. Sig. = 0.000, $p < 0.05$). The effect size was 0.60, indicating a moderate effect of hot dark chocolate on reducing dysmenorrhoea pain intensity. These findings demonstrate that the hot dark chocolate intervention was effective in alleviating dysmenorrhoea pain among female students at SMA Negeri 3 Pontianak.

Differences in Dysmenorrhoea Pain Scores Before and After the Jesoma Intervention

Table 8
Differences in Dysmenorrhoea Pain Scores Before and After the Jesoma Intervention

Jesoma	N	Mean	Median	Min	Max	Asymp.Sig.(2-tailed)	Effect Size
Pretest	45	6.62	8.00	1	10	0.000	0.72
Posttest	45	3.00	3.00	0	7		

Table 8, the mean dysmenorrhoea pain score in the Jesoma group decreased from 6.62 at pretest to 3.00 at post-test. The median pain score also declined from 8.00 before the intervention to 3.00 after the intervention. The pretest pain scores ranged from 1 to 10, whereas the post-test scores ranged from 0 to 7. The Wilcoxon Signed-Rank Test indicated a statistically significant difference between pretest and post-test pain scores in the Jesoma group (Asymp. Sig. = 0.000, $p < 0.05$). The effect size of 0.72 suggests a large effect of the Jesoma intervention in reducing dysmenorrhoea pain intensity. These results confirm that Jesoma was highly effective in alleviating dysmenorrhoea pain among female students at SMA Negeri 3 Pontianak.

Comparison of Hot Dark Chocolate and Jesoma Interventions

Table 9

Comparison of Hot Dark Chocolate and Jesoma Interventions

	Group	N	Mean	Asymp.Sig.(2-tailed)
Posttest	Hot Dark Choco	45	50.82	0.038
	Jesoma	45	40.18	

Table 9, the Mann–Whitney U test demonstrated a statistically significant difference between the two intervention groups ($p = 0.038$). The mean rank of pain reduction in the hot dark chocolate group was 50.82, whereas the Jesoma group had a lower mean rank of 40.18. A lower mean rank indicates a greater and more consistent reduction in pain intensity. These findings indicate that there was a significant difference in the effectiveness of hot dark chocolate and Jesoma in reducing dysmenorrhoea pain intensity. Moreover, the Jesoma intervention was found to be more effective than hot dark chocolate in lowering dysmenorrhoea pain scores among female students at SMA Negeri 3 Pontianak.

DISCUSSION

The characteristics of the respondents indicate that the majority of female students at SMA Negeri 3 Pontianak were within a relatively homogeneous late-adolescent age range. The hot dark chocolate group was predominantly composed of 17-year-old students, whereas the Jesoma group was mainly dominated by students aged 16 years. This age range falls within the same stage of biological and psychological development; therefore, age was unlikely to act as a significant confounding factor. Adolescents aged 16–17 years are classified as being in middle to late adolescence, a period during which most girls have already experienced menstruation and are particularly susceptible to dysmenorrhoea (Chen et al., 2019).

In terms of educational level, most respondents in both intervention groups were enrolled in Grade 12, both in the hot dark chocolate and Jesoma groups. The predominance of final-year students suggests higher cognitive and psychosocial maturity compared to Grade 10 students, indicating that participants were capable of understanding research instructions and providing more stable responses. This finding is consistent with Piaget’s theory of cognitive development and Erikson’s psychosocial theory, which state that late adolescents have reached the formal operational stage and developed a stronger sense of personal identity (Wirenviona & Riris, 2020).

Regarding age at menarche, the majority of students in both groups experienced menarche between 11 and 12 years of age, which falls within the normal range according to the World Health Organization. Menarche at this age is associated with activation of the hypothalamic–pituitary–ovarian axis and increased estrogen levels that trigger the onset of menstruation. Variations in earlier or later age at menarche are influenced by genetic factors, nutritional status, environmental conditions, and lifestyle factors (Alam & al., 2021)

Prior to the intervention, most students in both the hot dark chocolate and Jesoma groups experienced severe dysmenorrhoea pain. This condition has the potential to interfere with learning activities, concentration, and overall quality of life among adolescent girls. Following the interventions, both hot dark chocolate and Jesoma demonstrated a substantial reduction in pain intensity, as evidenced by an increased proportion of participants reporting mild pain or no pain and a marked decrease in severe and very severe pain.

The reduction in pain observed in the hot dark chocolate group can be explained by the physiological effects of magnesium and flavonoids, which contribute to uterine smooth muscle relaxation, suppression of prostaglandin production, and increased release of endorphins and serotonin. These mechanisms reduce uterine contractions and improve mood, thereby lowering pain perception (Aprilianti, 2021; Fatkurrohman et al., 2023; Hasiani et al., 2024b, 2024a)

In the Jesoma group, dysmenorrhoea pain intensity also decreased significantly following the intervention. Ginger exerts anti-inflammatory and analgesic effects through inhibition of cyclooxygenase (COX) enzymes and reduction of prostaglandin synthesis. Soy milk contains isoflavones that act as phytoestrogens, contributing to hormonal balance, while honey provides antioxidant and relaxation effects that further support pain reduction (Bustamam et al., 2021; Seriana & Yusnaini, 2021)

Furthermore, comparison of effectiveness using the Mann–Whitney U test demonstrated a statistically significant difference between the two interventions ($p = 0.038$), with Jesoma showing superior effectiveness compared to hot dark chocolate in reducing dysmenorrhoea pain scores. This finding aligns with previous studies reporting that ginger and herbal combinations are more effective than single-component interventions in managing menstrual pain (Almufaridin et al., 2025).

Overall, this study concludes that both non-pharmacological interventions were effective in reducing dysmenorrhoea pain among female students at SMA Negeri 3 Pontianak; however, Jesoma demonstrated greater effectiveness. The combination of ginger, soy, and honey appears to work synergistically through anti-inflammatory, hormonal, and antioxidant pathways, making it a safe, practical, and affordable complementary therapy for adolescent girls (Andayani et al., 2025; Hasiani et al., 2024b).

Additionally, the findings of this study can be contextualized within the broader body of literature on non-pharmacological interventions for dysmenorrhoea. A recent systematic literature review examining the effects of dark chocolate consumption on dysmenorrhoea pain intensity among adolescent girls reported consistent evidence that intake of dark chocolate (35–95 g) was associated with reductions in menstrual pain across multiple studies. These findings support the physiological rationale underlying the analgesic properties of dark chocolate, primarily mediated through its magnesium and flavonoid content, although the magnitude of effect varied between studies. Importantly, the review highlights that while dark chocolate may be effective as a standalone intervention, combining it with other active components such as ginger, soy, and honey, as formulated in Jesoma has the potential to produce greater analgesic effects through additional anti-inflammatory and hormonal modulation pathways. This observation is consistent with the greater effectiveness of Jesoma observed in the present study (Sinaga et al., 2025).

Several limitations of this study should be acknowledged. First, the availability of hot dark chocolate materials depended on order delivery schedules, which led to delays in the research timeline. Second, other potential factors influencing dysmenorrhoea were not examined in this study. Third, the short duration of the intervention did not allow for evaluation of the long-term effects of hot dark chocolate or Jesoma consumption on subsequent menstrual cycles.

CONCLUSION

The characteristics of female students at SMA Negeri 3 Pontianak in this study indicate that most respondents were within the late-adolescent age range. The hot dark chocolate group was predominantly composed of 17-year-old students, whereas the Jesoma group mainly consisted of 16-year-old students. In terms of educational level, the majority of respondents in both groups were enrolled in Grade 12, with only a small proportion from Grade 10. Regarding age at menarche, most students in both groups experienced menarche at 11–12 years of age, with a smaller proportion experiencing either earlier or later onset. Overall, the respondents' characteristics were relatively homogeneous in terms of age, class level, and biological maturity.

The study findings demonstrate that both hot dark chocolate and Jesoma were effective in reducing dysmenorrhoea pain intensity among female students at SMA Negeri 3 Pontianak. Both

interventions showed significant reductions in mean and median pain scores from pretest to post-test, as confirmed by the Wilcoxon test (Asymp. Sig. = 0.000, $p < 0.05$). However, differences in the magnitude of effect were observed, with hot dark chocolate showing a moderate effect size (0.60) and Jesoma demonstrating a large effect size (0.72). Furthermore, the Mann–Whitney U test revealed a statistically significant difference between the two interventions ($p = 0.038$), with the Jesoma group exhibiting greater and more consistent pain reduction compared to the hot dark chocolate group. These results indicate that Jesoma was more effective in alleviating dysmenorrhoea pain among female students at SMA Negeri 3 Pontianak.

ACKNOWLEDGEMENTS

The authors would like to express their sincere gratitude to STIKes Guna Bangsa and all parties who contributed to the data collection and the successful completion of this research.

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