



# Effectiveness of Ginger Jelly Candy to Reduce Intensity and Duration of Primary Dysmenorrhea in Adolescents

Qanita Wulandara<sup>(✉)</sup>

Health Polytechnic of the Ministry of Health Tasikmalaya, Tasikmalaya, Indonesia  
qanitawulandara@gmail.com

**Abstract.** Dysmenorrhea is one of the most common gynecologic complaints experienced by teenagers and more than half of menstruating women. The adverse effects of dysmenorrhea affect the psychological and economy aspects. The purpose of this study was to analyze the differences decrease of intensity and duration of primary dysmenorrhea between adolescents who were given ginger jelly candies and given ibuprofen.

This research is an experimental Quasy research with nonequivalent pre test-post test control group design. Population in this research is student of Health Polytechnic of Health Ministry of Tasikmalaya which experienced primary dysmenorrhea with medium degree of dysmenorrhea which amount 94 people that divided into 2 groups. 47 respondents were given ginger jelly candy and 47 respondents were given ibuprofen. Samples were taken in consecutive sampling. The results showed that ginger jelly candy can decrease the intensity and duration of dysmenorrhea ( $p < 0.001$ ). After comparison, there was a difference of decrease in the intensity of dysmenorrhea after the first 6 h of jelly candy and ibuprofen treatment ( $p < 0.05$ ) but no difference in duration of dysmenorrhea between jelly candy and ibuprofen treatment ( $p = 0.991$ ) Conclusions in this study are jelly ginger and ibuprofen can both reduce the intensity and duration of primary dysmenorrhea in adolescents. Therefore, the decrease of intensity and duration of dismenorrhea in the group of adolescents treated with ibuprofen were higher than adolescents treated with ginger jelly candies.

**Keywords:** Ginger jelly · primary dysmenorrhea · adolescents

## 1 Introduction

Dysmenorrhea is one of the common gynecological complaints experienced by adolescents and affects more than half of menstruating women. The detrimental impact of dysmenorrhea affects psychological and economic aspects so that it affects the quality of life of adolescents themselves. One of the main causes of primary dysmenorrhea is the increased production of uterine prostaglandins derived from cyclooxygenase which is induced by pro-inflammatory cytokines and produces prostaglandins that mediate the inflammatory response, resulting in increased myometrial contractility, uterine ischemia,

sensitivity of pain fibers, and finally causing pain during menstruation. Management of dysmenorrhea consists of pharmacological and non-pharmacological approaches. The main pharmacological treatment is the administration of NSAIDs, one of which is ibuprofen, while the popular non-pharmacological treatment is the administration of herbs or phytopharmaceuticals. Ginger as an herbal product contains pharmacological properties as well as NSAIDs. Research and clinical trials conducted by Ozgoli et al., from Iran, showed that ginger has the same analgesic effect as ibuprofen or mefenamic acid, so it can be used to reduce the intensity and duration of dysmenorrhea. By processing ginger into functional food ingredients in the form of jelly candy, it is hoped that it will be more acceptable among adolescents to overcome the problem of primary dysmenorrhea.

## 2 Research Method

The design of this study is a quasi-experimental research design with a nonequivalent pre-test-post-test control group design. The research was conducted at Tasikmalaya, West Java to 94 adolescents midwifery students at Health Polytechnic of the Ministry of Health with primary dysmenorrhea as the study samples.

## 3 Results

Table 1 describes the pain intensity of adolescent dysmenorrhea before and after being treated in both groups. The table shows that before being given treatment, the average pain intensity of the two groups was at a score of 5 and 6 while after being given treatment the average pain intensity score in the ibuprofen group decreased to 1 and 2. This decrease in intensity was higher than the ginger jelly candy group with a pain intensity score. 3 and 4. The comparison of pain intensity before and after being given treatment showed a  $p$  value  $< 0.001$ , it showed that there was a significant decrease in pain intensity before and after being given ginger jelly candy or ibuprofen.

Table 2 shows that the decrease in pain scores from 2 h to 4 h and from 2 h to 6 h has a  $p$  value of  $< 0.05$ , which means that there is a significant difference in the intensity decrease of dysmenorrhea in the decrease in pain scores in the first 6 h after giving ginger jelly candy and ibuprofen. The decrease in pain scores from 2 h to 8 h, 2 h to 10 h and 2 h to 12 h had a  $p$  value of  $> 0.05$  which means there was no difference in the decrease in the intensity of dysmenorrhea between adolescents who were given ginger jelly candy and adolescents who were given ibuprofen.

From Table 3 known that the median duration of dysmenorrhea before being given ginger jelly candy was 17 h and before being given ibuprofen was 18 h with a  $p$  value of 0.020, whereas after being given treatment, either consumption of ginger jelly candy or ibuprofen, the median duration of pain was reduced to 16 h with a value of  $p$  0.991. The decrease in the duration of dysmenorrhea between adolescents who were given ginger jelly candy and adolescents who were given ibuprofen was  $p = 0.006$ , which means that there was no difference in the decrease in duration between adolescents who were given ginger jelly candy and adolescents who were given ibuprofen. Comparison of the duration of dysmenorrhea before and after administration of ginger jelly candy or ibuprofen  $p < 0.001$ . This shows that both ginger jelly candy and ibuprofen can reduce

the duration of dysmenorrhea in other words that there is a significant decrease in the duration of dysmenorrhea before and after treatment.

### 4 Discussion

Table 1 and Table 3 show that before being given treatment (cycle I/pretest), there was no statistically significant difference in terms of intensity and duration of dysmenorrhea in

**Table 1.** Comparison of the intensity of dysmenorrhea (pre and post) in the two treatment groups

Pain Intensity	Treatment		p value*
	Ginger Jelly Candy (n = 47)	Ibuprofen (n = 47)	
Pre data :			
Pre 2 hours	6 (4 – 7)**	6 (4 – 7)	0,372
Pre 4 hours	6 (4 – 6)	5 (4 – 6)	0,084
Pre 6 hours	5 (4 – 6)	5 (4 – 6)	0,387
Pre 8 hours	5 (4 – 6)	5 (4 – 6)	0,285
Pre 10 hours	5 (4 – 6)	5 (4 – 6)	0,221
Pre 12 hours	5 (3 – 6)	5 (3 – 6)	0,133
Post Data :			
Post 2 hours	4 (2 – 6)	2 (2 – 5)	<0,001
Post 4 hours	4 (1 – 6)	2 (0 – 3)	<0,001
Post 6 hours	4 (1 – 6)	2 (0 – 3)	<0,001
Post 8 hours	3 (1 – 5)	1 (0 – 3)	<0,001
Post 10 hours	3 (1 – 5)	1 (0 – 3)	<0,001
Post 12 hours	3 (1 – 5)	1 (0 – 3)	<0,001
Pre vs Post Comparison :			
2 hours		p<0,001	p<0,001
4 hours	p<0,001		p<0,001
6 hours	p<0,001		p<0,001
8 hours	p<0,001		p<0,001
10 hours	p<0,001		p<0,001
12 hours	p<0,001		p<0,001

**note :** \*) Mann-Whitney test, \*\*) median value and range; \*\*\*) Wilcoxon test

**Table 2.** Comparison of Dysmenorrhea Intensity Score Decrease in the two Treatment groups

Pain score decrease	Treatment		Nilai <i>p</i> *
	Ginger jelly candy (n = 47)	Ibuprofen (n = 47)	
From 2 hours to 4 hours	0 (-1 – 2)**	1 (0 – 4)	0,002
From 2 hours to 6 hours	0 (-1 – 3)	1 (0 – 5)	0,161
From 2 hours to 8 hours	1 (0 – 3)	1 (0 – 5)	0,207
From 2 hours to 10 hours	1 (0 – 3)		0,142
From 2 hours to 12 hours	1 (0 – 3)		

**note :** \*) Mann-Whitney test, \*\*) median value and range

**Table 3.** Comparison of the duration of dysmenorrhea (pre and post) in the two treatment groups

Pain Duration (hour)	Treatment		<i>p</i> value*
	Ginger jelly candy (n = 47)	Ibuprofen (n = 47)	
Pre Data :	17 (12-25)**	18 (15-22)	0,020
Post Data :	16 (10 – 19)	16 (11 – 19)	0,991
Decrease in the duration of dysmenorrhea	1 (0-8)	2 (0-6)	0,006
Pre vs post comparison	p<0,001***	p<0,001	

**note :** \*) Mann-Whitney test, \*\*) median value and range; \*\*\*) Wilcoxon test

the treatment group (ginger jelly candy) and control group (ibuprofen). This condition was caused by the fact that the respondents in this study both had moderate degrees of dysmenorrhea and homogeneous characteristics in terms of age, menarche, length of menstruation and BMI. After being given treatment (cycle II/posttest) giving ginger jelly candy or ibuprofen to both groups on the first day of menstruation, there was a decrease in the intensity and duration of dysmenorrhea in both groups where the mean value of decreased intensity and duration of dysmenorrhea in the treatment group was lower than the control group. These average values indicate the success of giving ginger jelly candy in reducing the intensity and duration of dysmenorrhea although the decrease in the intensity of dysmenorrhea is lower than ibuprofen. These findings explain ginger as a herbal product that has pharmacological properties as well as NSAIDs. This is in line with research and clinical trials conducted by Ozgoli et al., from Iran, which showed that ginger has the same analgesic effect as ibuprofen or mefenamic acid, so it can be used as a treatment to reduce the intensity and duration of dysmenorrhea. The results of Rahnema et al.'s research showed that consuming 1500 mg powdered ginger capsules 2 days before the onset of the menstrual cycle until the third day of menstruation was significantly better in reducing the intensity and duration of dysmenorrhea compared to placebo. In this study, ginger extract was given as much as  $2 \times 50$  mg. With a span of 6 h when converted is equivalent to  $2 \times 1000$  mg of ginger powder. This dose increase is safe because based on the results of previous studies giving 50 mg of ginger extract in a single dose did not cause any side effects. In this study, none of the respondents complained of any side effects.

Table 1 shows that there is a decrease in the intensity of dysmenorrhea starting in the first 2 h after giving ginger jelly candy or ibuprofen, while Table 3 shows that there is a decrease in the duration of dysmenorrhea in the first 24 h after giving ginger jelly candy or ibuprofen. This is in accordance with research on the absorption of ibuprofen by Rambe et al. that the absorption of ibuprofen is fast through the stomach and maximum plasma levels are reached after 1.2 h. The plasma half-life is about 2 h. Ninety percent of ibuprofen is bound to plasma proteins. Onset is approximately 30 min. Studies on the pharmacological effects of ginger extract in human clinical trials, analyzed human plasma samples and detected low concentrations of free 10-gingerol and shogaol 6., while mostly 6., 8., 10. And gingerol and shogaol 6. present in plasma as glucuronide and sulfate metabolites. The pharmacokinetics of 6., 8., 10. And gingerols and shogaol 6. and their metabolites were analyzed. The half-life of all compounds and their metabolites is between 1 and 3 h. A pharmacokinetic study conducted by Yanke Yu et al. said that after oral administration of 2 g of ginger extract, the active compound gingerol content began to be detected in plasma 1 h after and began to be undetectable 2 h later. Meanwhile, the active compound content of shogaol began to be detected in plasma 2 h after the oral dose and began to be undetectable 4 h after. The average half-life of the active compounds metabolized gingerol and shogaol is 1.3 h.

The mechanism of decreasing the intensity and duration of dysmenorrhea is in accordance with the pathophysiology that primary dysmenorrhea occurs due to the mechanism of endometrial prostaglandins and leukotrienes. After ovulation occurs in response to increased production of progesterone, fatty acids will increase in the phospholipids of cell membranes. Then arachidonic acid and other omega-7 fatty acids are released and initiate

a flow of prostaglandins and leukotrienes in the uterus which results in the mediation of the inflammatory response, menstrual cramps, and other menstrual molimina. The product of arachidonic acid metabolism is prostaglandin (PG) F<sub>2</sub>-alpha, which is a cyclooxygenase (COX) which causes hypertonus and vasoconstriction in the myometrium, resulting in ischemia and menstrual pain. However, the role of prostaglandins and leukotrienes has not been explained in detail and requires further research. To reduce the primary dysmenorrhea, one of the ways is by inhibiting the COX-2 pathway. The active substances found in ginger such as 10-gingerols, 8-shogaol and 10-shogaol can inhibit the COX-2 pathway, so that the formation of prostaglandins from arachidonic acid is disrupted. Other factors that can have an effect on reducing the intensity and duration of dysmenorrhea. In this study, the results of the GCMS test of the main compound identified in the thick ginger extract was 6-shogaol, so it was suspected that 6-shogaol also played a role as a COX-2 inhibitor. Ginger extract contains various components, hence it is important to identify the compounds responsible for its pharmacological effects. In a study mentioned that 6-, 8-, and 10-gingerol and 6-shogaol act as anti-inflammatory, antibacterial, antipyretic, anti-lipidemic, antitumorigenic, and antiangiogenic. In most clinical trials, the content of the active ingredients in ginger extract was not measured. The use of non-standardized ginger extracts in different clinical studies partly explains the mixed results of clinical studies in addition to the various study designs and dosing regimens. A study by Schwertner et al. showed that variable amounts of 6-gingerol, 6-shogaol, 8-gingerol, and 10-gingerol in different brands of ginger dietary supplements. In different products, 6-gingerol ranged from 0.00–9.43 mg/g, 6-shogaol ranged from 0.16–2.18 mg/g, 8-gingerol ranged from 0.00–1.10 mg/g, and 10-gingerols ranging from 0.00–1.40 mg/g.<sup>42</sup> Active compounds in ginger such as gingerdiol and gingerdione, shogaol, beta-carotene, capsaicin, caffeic acid and curcumin act as inhibitors of cyclooxygenase (COX) and lipooxygenase resulting in inhibition of cyclooxygenase (COX) and lipooxygenase. Leukotrienes and prostaglandin synthesis and acts as an anti-inflammatory and analgesic drug in primary dysmenorrhea.

## 5 Conclusion

Ginger jelly candy can reduce the intensity and duration of primary dysmenorrhea, although the decrease in the intensity and duration of primary dysmenorrhea in adolescents who consume ibuprofen is higher than adolescents who consume ginger jelly candy. However, giving ginger jelly candy can be an alternative treatment for dysmenorrhea for adolescents who do not like to take drugs.

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