

**EFFECT OF ICE CREAM GIVEN SECANG WOOD EXTRACT (CAESALPINIA SAPPAN L.)
ON THE INTENSITY OF DISMINOREA PAIN IN
YOUNG WOMEN IN THE KUNDURAN PUSKEMAS
AREA BLORA DISTRICT**

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ABSTRACT

Dysmenorrhea is pain during menstruation, the cause in the blood is an imbalance of progesterone hormones, prostaglandins and stress / psychological factors that cause dysmenorrhea in women. Interventions that can be applied in dealing with the above problem is the provision of herbal therapy ice cream secang wood extract. This research to proved the benefits of Secang Wood Extract Ice cream (Caesalpinia Sappan L.) with vitamin E supplements on reducing Dysmenorrhea Pain Intensity in Adolescent Girls. This research is true experimental using pre-post test approach with control group design. Sampling was done with simple random sampling technique obtained 62 adolescent girls, Statistical analysis used Paired T - Test and Wilcoxon, and Mann Whitney U. Gave ice cream Secang Wood Extract dose of 100 grams / cup with the content of secang wood extract 246.7 mg / 60 kgBB before and after against Dysmenorrhea Pain with p value ($p = 0.000 < 0.05$), meaning there is a difference between before and after consumption of Secang Wood Extract Ice cream (Caesalpinia Sappan L.). The difference test in the Intervention group shows a meaningful difference with a value of ($p = 0.000$), meaning that the administration of Secang Wood Extract Ice cream (Caesalpinia Sappan L.) and has an effect on reducing the intensity of dysmenorrhea pain in adolescent girls. The Conclusion is the content of brazilin (40 mg) and flavonoids (1.47mg) in the ice cream preparation of Secang Wood Extract in the size of 100 grams can reduced the pain level of dysmenorrhea.

Keywords: Ice cream, Secang, Adolescents, Dysmenorrhea, Vitamins

INTRODUCTION

Menstruation is a period of hormonal changes that trigger uterine contractions to shed its lining before or during menstruation which can cause menstrual pain or dysmenorrhea problems. Dysmenorrhea is pain during menstruation because in the blood there is an imbalance of the hormones progesterone, prostaglandins and stress/psychological factors that cause dysmenorrhea in women (Sari, 2022).

In the world, the prevalence of experiencing pain during menstruation is quite high with an average of >50% of all women feeling menstrual pain. Every country, 90% or the equivalent of 1,769,425 people feel dysmenorrhea while with severe dysmenorrhea between 10-15% (Sulaeman & Yanti, 2019). In Indonesia, primary dysmenorrhea is the cause of inactivity in 59.2% of adolescent girls, 5.6% do not attend school or work and some 35.2% are not bothered. Central Java Province has 56.598 adolescent girls aged between 10-20 years, and the prevalence of dysmenorrhea is 56%, equivalent to 11.565 of them suffering from dysmenorrhea. (Rejeki, 2019).

Dysmenorrhea has a significant impact on the potential life course. It has a wide-ranging impact on women's mental and physical well-being, with long-standing disruptions to quality of life, personal relationships, and educational and career achievements. In addition, untreated dysmenorrhea can lead to hyperalgesia, which predisposes to chronic pelvic pain (Widyanti et al., 2021).

Government efforts in the field of adolescent health are regulated in Law No. 36 of 2009 concerning Health, including reproductive health, and requires the implementation of reproductive health through promotion, prevention, treatment and rehabilitation through the implementation of the Adolescent Health Services Program or (PKPR) Curative efforts include providing

pharmacological treatment to relieve menstrual cramps pain that can take pain relievers, for example aspirin, mefenamic acid, acetaminophen, caffeine, and fentanyl, novalgin, ponstan, but in general the side effects of pain relievers cause gastrointestinal tract, discomfort, nausea, indigestion, diarrhea and vomiting and other symptoms of gastric mucosal irritation, as well as skin erythema and headaches. (Larasati, T. A. & Alatas, 2019).

Non-pharmacological approaches are needed to minimize the side effects of analgesic consumption in adolescents with dysmenorrhea. Non-drug treatments are now on the rise, including traditional herbal or botanical medicine, acupressure, spa treatments, acupuncture, acupressure, hydrotherapy, aromatherapy, hypnotherapy and other methods. Nowadays, people are more interested in non-drug treatments. Because they do not cause side effects, can damage liver and kidney function and lead to dependence (Failisnur et al., 2019).

Survey institute Goodstats has released research data on Indonesian ice cream lovers. Based on the data, it can be concluded that younger people consume more ice cream compared to older people. 38% of ice cream lovers between the ages of 18-29 years. In addition to the survey above, the selection of ice cream products is based on the fact that ice cream is a food that is highly preferred because of its texture, unique taste and has a psychological effect that can be caused because it produces endorphin hormones after consumption which increases feelings of happiness and relaxation. (Basri, 2021).

The high interest of female adolescents in consuming ice cream makes the author interested in creating herbal therapy secang wood extract (*Caesalpinia sappan* L) processed into ice cream that is liked, attractive, safe for consumption, and does not cause

saturation when consumed continuously. This action is expected to reduce the intensity of dysmenorrhea pain in adolescent girls in the Kunduran Health Center Area, Blora Regency.

LITERATURE REVIEW

Overview Of Adolescence

Definition Of Adolescence

Adolescence is a period of dynamic development in a person's life. One of the biological signs of youth is the onset of menstruation in adolescents. Adolescence is also known as the transition period or the connecting period between childhood and adulthood. Youth have a very important role in maintaining the future of the country. Adolescents are potential working-age individuals, capable of developing in the future, so they must prepare themselves to become quality human resources (Rejeki, 2019).

According to the World Health Organization (WHO), adolescents are those aged between 10 and 19 years. According to the Health Regulation of the Republic of Indonesia Number 25 of 2014, adolescents are the age group between 10 and 18 years old and according to the Population and Family Planning Agency (BKKBN), the adolescent age group is 10-24 (Aisyaroh Noveri et al., 2022).

Physical Changes in Adolescents

Sexual characteristics of adolescent girls include enlarged hips and buttocks, smoother skin, and increased height and weight. In addition, breast development begins at a younger age, between 8 and 10 years. Active sweat glands show increased levels of perspiration, armpit and genital hair also begins to grow, while the secondary sexual characteristics of adolescents are often characterised by a deeper voice, growing apples, increasing height, weight, and increasing body size.

weight. Hair on the armpits, genitals, chest and face begins to grow. In addition, excessive sweating indicates that the sweat glands are actively working. In the genital area, the penis and testicles enlarge (Sari, 2022).

Overview Of Dismenore

Definition Of Dismenore

Dysmenorrhoea is also known as dysmenorrhoea or dysmenorrhoea. In English, menstrual cramps are often referred to in books as "dysmenorrhoea" or painful menstrual cycle. Menstrual cramps mainly occur in the lower abdomen, but can also radiate to the lower back, waist, hips, thighs and calves. This pain may also be accompanied by severe abdominal cramps. These cramps occur due to very strong contractions of the uterine muscles along with the flow of menstrual blood out of the uterus. This very strong muscle contraction then tightens the muscles and causes cramps or pain. This muscle tension does not only occur in the abdominal area, but also occurs in the muscles supporting the lower back, waist, hips, thighs, and calves (Widyanthi et al., 2021).

Type Of Dismenore

The category of dysmenorrhoea falls into two classifications including (Horman et al., 2021):

- a. Primary dysmenorrhoea, experienced by women with normal pelvic anatomy and no abnormalities.
- b. Secondary dysmenorrhoea is caused by pelvic disorders that cause endometriosis, bleeding, IUD use, cysts etc.

Mechanism of Dismenore

When pregnancy does not occur, the corpus luteum regresses and this results in a decrease in progesterone levels. This decrease will result in the stabilisation of the lysosomal membrane, making it prone to rupture

and releasing the enzyme phospholipase A2. This enzyme will hydrolyse the phospholipid compounds present in the endometrial cell membrane; producing arachidonic acid. The presence of arachidonic acid along with endometrial damage will stimulate the arachidonic acid cascade which will produce prostaglandins, including PGE2 and PGF2 alpha (Widiatami et al., 2019).

Increased uterine contractions and dysrhythmias will lead to decreased blood flow to the uterus and this will result in ischaemia. Prostaglandins themselves and endoperoxids also cause sensitisation and further lower the pain threshold of the afferent nerve endings of the nervus pelvicus to physical and chemical stimuli (Fatmawati et al., 2019).

Non-Pharmacological Management Of Dysmenorrhoea

Phytotherapy is one of the most popular treatments in the community. Besides being cheap, herbal treatment can be applied easily. Herbal treatment can be done by preparing herbal drinks such as cinnamon (contains quinic acid to relieve pain), soybeans (contains phytoestrogens that improve hormonal balance), calories, coriander, turmeric, nutmeg, ginger and dried fruit (contains flavonoids as support for pain relief), and sappan wood (contains brazilin and flavonoids as support for pain relief) (Rustam, 2022).

Previous research explains that sappan wood steeping water can be used as therapy in several diseases such as hypertension, cataracts, dysmenorrhoea, cancer, obesity, and vascular diseases such as diabetic retinopathy. The existence of anticancer and anti-inflammatory effects on sappan wood (*Caesalpinia Sappan L.*) is due to the content of polyphenols that function as antioxidants in sappan wood, such as

flavonoids and tannins. Flavonoid compounds contained in secang wood are brazilin, sappanchalcone, and brazilin. It is known that flavonoid compounds with their antioxidant properties play an important role in antiangiogenesis while other secang wood chemical content, namely Brazilin, has anti-inflammatory effects that can reduce pain in dysmenorrhoea sufferers and anti-bacterial (*Staphylococcus aureus* and *Escherichia coli*). The dose of sappan wood decoction water is 550 ml with the frequency of administration in the morning and at night before bed (2x a day) since 3 days at the beginning of menstruation (Sampara & Prianti, 2021).

Tinjauan tentang Kayu Secang Definition of Sappan Wood (*Caesalpinia sappan L.*)

The plant used in this study was the sapan tree (*Caesalpinia sappan L.*). Sappan wood is a piece or shavings of *Caesalpinia sappan L.* It grows in India, Malaysia and Indonesia. secang wood (*Caesalpinia sappan L.*) usually grows in open areas up to 1,000 m above sea level, such as in rocky but not too cold mountainous areas. The tree is 5-10 m tall, woody, round, with a greenish-brown colour. There are curved spines on the trunk and branches (Lestari et al., 2019).

Content of Sappan Wood

Secang is rich in chemical components as it contains gallic acid, tannins, resin, Brazil, Brazil, D-Aphhellandrene, Oskimen and volatile oil. In phytochemical tests, the secang tree also contains other chemical compounds such as alkaloids, flavonoids and saponins. Secondary plant substances that act as antioxidants are parasites and flavonoids. The following content of Secang tree includes (Rina, 2021):

a. Brazilin

Brasilin is a yellow crystal with the chemical formula $C_{6}H_{14}O_5$. When brazilin is oxidised, a red-brown brazilin compound is formed, which is soluble in water. Brazilin is a flavonoid compound whose structure belongs to the isoflavonoid group. Brazilin's bright red colour is achieved under neutral pH conditions (pH 6-7) and turns burgundy with increasing pH, while it becomes yellow at low pH (pH 2-5). Sappan wood can also treat cancer by inhibiting the process of survivin, an apoptosis inhibitor involved in the activation of caspase 3 and caspase.

A specific compound in secang wood, brazilin, has anti-inflammatory and analgesic effects. Brazilin in secang wood has higher antioxidant power than commercial antioxidants (BHT and BHA) so it is more potential as a free radical antidote. If antioxidants bind to free radicals, cell membrane damage can be reduced, so that the proliferation phase can proceed. The level of pain is influenced by oxidative stress in the tissue during the unproliferation phase (Sucita et al., 2019).

Brazilin when oxidised will produce red brazilin in secang wood with the structure $C_{16}H_{14}O_5$. Based on the results of previous research, brazilin in secang wood has reliable antioxidant power with an antioxidant index of secang wood water extract higher than commercial antioxidants.

Brazilin will quickly form a red colour due to the formation of brazilein. If brazilin is oxidised by oxidative compounds such as hydrogen peroxide, it will produce brazilein compounds which are brownish-red in colour and soluble in water. Ethanol extract of secang wood as a natural colouring agent for dye preparation, obtained

brown colour at 25% concentration, dark brown colour at 70% concentration and dark brown to black colour at 100% concentration.

b. Flavonoid

Flavonoids are one of the secondary metabolite compounds whose presence in plant tissues is thought to be influenced by the process of photosynthesis, so that young plants or leaves are known to not contain many flavonoids. Flavonoids are pigments that have colours found in plants, such as anthocyanins as constituents of blue, violet, and red; flavones and flavonols as constituents of dim yellow; chalcones and aurones as constituents of bright yellow, while isoflavones and flavonols are colourless compounds (Sulistiowati et al., 2023).

One of the flavonoids contained in the secang tree is anthocyanin. Anthocyanin compounds are glycosidic compounds of anthocyanin compounds and secondary metabolites of flavonoids. Flavonoids have antioxidant, antibacterial, anti-inflammatory, and anticancer functions

What can cause inflammation is when the cell membrane is damaged or dysfunction in chemical, physical, or mechanical stimuli, so that the phospholipid enzyme contained in the cell membrane becomes arachidonic acid after which some of it is converted by the cyclooxygenase enzyme into endoperoxides and then prostaglandins. The arachidonic acid is converted by the cyclooxygenase enzyme into leukotrin which plays an inflammatory role. Flavonoid compounds contained in ethanol extract of secang wood can inhibit the activity of cyclooxygenase and lipoxygenase enzymes by reducing

the production of prostaglandins by arachidonic acid so as to reduce pain (Widhasari, 2019).

c. Tanin

Tannins are secondary metabolic compounds found in plants that have the ability to bind to proteins. Tannins are components of phenolic organic substances with astringent, antidiarrhoeal, antibacterial and antioxidant effects. Tannins can be classified into two types, namely hydrolysed tannins and condensed tannins. Hydrolysable tannins are gallate polymers linked to sugar molecules through esters (Hadisaputro et al., 2020). Hydrolysed tannins are polymers of flavonoid compounds with double carbon bonds in the form of catechins and galocatechins (Perdana et al., 2020).

Benefit of Sappan Wood

Sappan wood is often used as a traditional medicine by the people of Indonesia. The method of using secang chips is by boiling it in water for about 15 minutes until it turns red and drinking it twice a day, morning and evening. In Indonesia, the sanga tree is used as a red beverage colourant. Sappan wood extract can be used as food, clothing and cosmetics. Sappan tree extract is also effective in treating syphilis, diarrhoea, bloody stools, dirty blood, tumours and malaria. In addition, it is also used as an antidote, cataract, postpartum care, angina pectoris, stomach ulcers and fatigue (Irawan et al., 2022).

The provision of secang wood extract (*Caesalpinia sappan* L.) herbal therapy will certainly experience several obstacles in its implementation because the target target is adolescent girls who on average do not like the aroma of typical herbal drinks with a neutral salty to sweet taste. Therefore, herbal therapy of secang

wood extract (*Caesalpinia sappan* L.) can be created into other food products that are liked, attractive, and do not cause boredom when consumed continuously with the creation of processed ice cream (Julianto & Putra, 2022).

Judging from its nutritional content, ice cream contains calcium, phosphorus, protein, vitamins and minerals. However, ice cream also contains other nutrients, namely fat and carbohydrates, both of which are limiting factors, especially for ice cream lovers who are on a diet. Most artificial ice cream is made from animal milk, which is high in saturated fat. Therefore, sometimes people don't want to eat it too often, for fear of gaining weight due to the fat content of ice cream. So there must be an alternative to making ice cream with plant-based ingredients, such as skimmed milk. Another option is to combine ice cream with herbal ingredients, including sappan wood extract (Sucita et al., 2019).

Overview of Extraction

Definition of Extract

Extracts are supplies obtained by extracting active ingredients from plants or simple plant animals with a suitable solvent. Any solvent is subsequently evaporated and the remaining pulp or material is processed according to requirements (Elisa, 2019).

Definition of Extraction

Extraction is a separation process based on the diffusion process. In diffusion, the separation process occurs when the solute moves in the same direction from the aqueous phase to the solvent phase due to the potential difference between the two phases in contact at a point in the equilibrium system (Rohmah, 2021).

Overview of The Ice Cream

Definition of The *Ice Cream*

Ice cream is a semi-solid food made from cream powder or a mixture of milk, animal or vegetable fat, sugar, and other permitted ingredients. Ice cream is a frozen food made from dairy products such as ice cream (or similar) combined with flavourings and sweeteners. Ice cream is also a processed product whose main ingredients are milk, sugar, cream and water (Manurung, 2020).

Nutrition Content of Ice Cream

Ice cream with a soft and sweet taste turns out to have an unexpected nutritional content. The advantage of ice cream lies in its main ingredients, namely skimmed milk and milk fat. Milk is considered an almost perfect food because it contains all the nutrients. Researchers have found more than 100,000 types of molecules in milk. In addition to water and fat, these molecules also contain proteins, carbohydrates, minerals, enzymes, gases, and vitamins A, C, and D (Julianto & Putra, 2022).

Stages of Making Ice Cream

Stages of Ice cream Making In the process of making ice cream, it starts with several stages, namely (Basri, 2021):

Mixing

Liquid ingredients such as milk are added first, then heated to a temperature of $\pm 45^{\circ}\text{C}$, then dry ingredients such as sugar are added into the dough slowly so as not to clot.

Pasteurisation

The purpose of pasteurisation is to destroy harmful bacteria such as pathogenic bacteria, help dissolve ingredients, and improve flavour. Pasteurisation is done by the high temperature short time method (HTST) between 78°C to 80°C for 25 seconds. Not only does it help eliminate disease-

causing bacteria, but it also helps to solubilise ingredients, improve flavour and quality, as well as prevent dough from sticking together and shorten the time required for dough aging, thus providing a better creamy consistency.

Homogenisation

The purpose of the homogenisation process is to distribute fat particles evenly throughout the product, so that the breakdown of fat particles results in a uniform structure. The homogenisation process helps to increase the surface of the fat particles, improve the whipping quality, lower the viscosity and form a uniform structure in the ice cream, this leads to a more uniform product composition. Cream powders are usually homogenised at 80°C . Several factors influence this process, such as: viscosity level, composition, dough stability, temperature and design of the machine used.

Ice crystal Formation

Cold temperatures during crystal formation (cooking) can cause the mixture to thicken and form large ice crystals in ice cream resulting in a rough texture. The aging process produces soft ice crystals. Freezing is done at 0°C for 3-4 hours.

Refrigeration

Cooling should occur as quickly as possible at 0°C - 4°C after homogenisation, with the aim of freezing the mixture without air (mixing). The operating principle is that this leads to a more uniform product composition. Cream powders are usually homogenised at 80°C . Several factors influence this process, such as: viscosity level, composition, dough stability, temperature and design of the machine used. Freeze at 3°C \pm 30-40 minutes in the ice cream maker's cooling tank. Ice cream is then poured into the desired container and placed in the freezer

until frozen. Packing can be done manually, semi-automatically or automatically and usually must be done quickly to prevent the ice from melting.

Freezing

Freezing occurs by storing icecream in the freezer. Tempering usually occurs at -5°C to -10°C or lower. Hardening aims to maintain the character so that the shape, structure, softness and appearance do not change. Hardening is continued for \pm 24 hours until a semi-frozen ice cream with a soft volume and consistency is obtained.

Benefits Of Secang Wood To Reduce Dysmenorrhoea Pain

Herbal treatment is carried out as a non-drug therapy aimed at relieving menstrual cramps through herbal medicine or traditional herbal medicine. Cinnamon, cloves, coconut water, tamarind, turmeric, ginger, begonia, and sappan wood are herbal plants used to relieve pain. One of the chemical components in sappan wood is Brazilin, which is a group of compounds that give sappan its red colour with a crystalline structure of $\text{C}_{16}\text{H}_{14}\text{O}_5$. Brazilin is a chemical compound with anti-inflammatory and analgesic effects to relieve pain in patients with menstrual cramps. Another content in secang wood, based on phytochemical tests, also shows the presence of flavonoid compounds that inhibit the production of cyclooxygenase, so it can be used to relieve pain. The content of flavonoids and Brazilin in 100 grams of secang wood (*Caesalpinia sappan* L.) is 7.36 mg of flavonoids and 200 mg of Brazilin. While the content of secang wood extract (*Caesalpinia sappan* L.) in the form of extract is higher, namely flavonoids reaching 11.36 mg/100 ml extract and Brazilin reaching 11.36 mg/100 ml extract increased to 327.52 mg.

METHOD RESEARCH

This type of research is True-Experimental research with Pretest-Posttest with Control Group Design. Researchers arranged two groups, namely the intervention group, namely the administration of Secang Wood Extract (*Caesalpinia Sappan* L) ice cream with vitamin E supplements and the control group giving Vitamin E supplements. The intervention was given 1x a day for 5 days (2 days before menstruation, and the first 3 days of menstruation). Measurement of dysminorrhea pain intensity was done twice, on day 1 (pre test), and day 5 (post test).

The target population in this study were all adolescent girls who experienced dysminorrhea aged 15-17 years. The sampling technique used is probability sampling with simple random sampling. the selection of research samples is classified as Inclusion Criteria (a) Adolescent girls live in the working area of the Kunduran Health Center, Blora Regency (b) Adolescent girls aged 15-17 years (c) Adolescent girls experience dysmenorrhea, with a moderate-heavy pain scale (d) Adolescent girls are willing to become respondents. Exclusion criteria: (a) Adolescent girls who experience dysmenorrhea but have taken pain medication, (b) Adolescent girls who experience dysmenorrhea at night, (c) Adolescents who are reluctant to consume routine sappan wood extract ice cream / ice cream is not spent (drop out) (d) Respondents stop or resign at the time of the study

Data processing was done through editing, coding, data entry, and data cleaning. Statistical tests were carried out with the SPSS program. The data normality test was carried out using the Kolmogrov Sminrov normality test, because the number of samples was 62, which is > 50 samples. Based on the results of the data normality test, in the

unpaired data group, data that meet the assumptions of normality use the paired t-test while in data that are not normally distributed, the Wilcoxon sign-rank test is used and then for unpaired double groups the Mann Whitney test is used.

This study applied the research ethics of informed consent, anonymity, confidentiality, autonomy, beneficency, justice, veracity and non

maleficiency. This study was conducted, after obtaining ethical clearance from the health research ethics committee of the Sultang Agung Islamic University Semarang (UNISULA) (NO. 1251/EA/KEPK/2023) on November 27, 2023 where the statement of ethical feasibility is valid for the period November 27, 2023 - November 27, 2024.

RESULT RESEARCH

Table 1. Frequency Distribution Based on Demographic Characteristics in Intervention Group and Control Group (n=31)

Characteristics	Intervention n=31		Control n=31		P
	N	%	N	%	
Usia Menarche					
a. < 11 Tahun	20	64.5	20	64.5	1.000
b. ≥ 11 Tahun	11	35.5	11	35.5	
Total	31	100	31	100	
Lama Siklus Menstruasi					
a. Normal (4 - 7 Hari)	16	51.6	8	25.8	1.137
b. Tidak Normal (< 4 Hari - > 7 Hari)	15	48.4	23	74.2	
Total	31	100	31	100	
Indeks Massa Tubuh (IMT)					
a. Normal (18.0 - 25.0)	13	41.9	13	41.9	1.000
b. Tidak Normal (< 18.0 - > 25.0)	18	58.1	18	58.1	
Total	31	100	31	100	

The characteristics of respondents in this study include age of menarche, length of menstrual cycle, and body mass index (BMI), adolescent girls who experience dysmenorrhea in the Kunduran Health Center Working Area, Blora Regency. The results of univariate analysis to determine the characteristics of respondents in the form of mean, frequency, percentage are described in table 1.

The results of the study in table 1 show that the average age of menarche

in each group is statistically the same or homogeneous ($p = 1,000$) with the majority experiencing menarche at the age of <11 years, a total of 20 adolescents (64.5%) in each intervention and control group, the length of the menstrual cycle is statistically the same or homogeneous in both groups ($p = 1.137$) with the majority having an abnormal menstrual cycle length (<4 days - >7 days) of 15 adolescents (48.4%) in the intervention group and 23 adolescents (74.2%) in the control group,

Body Mass Index (BMI) in adolescent girls was also statistically the same or homogeneous ($p=1.000$) with the

majority being at an abnormal BMI of 18 people (58.1%) in each group.

Table 2. Differential Test of Pretest and Posttest Dysmenorrhea Pain Scale in the Intervention Group and Control Group

Group	Pretest	Posttest	Δ	P
	Mean \pm SD	Mean \pm SD	Mean \pm SD	
Intervention	7.06 \pm 1.879	2.52 \pm 1.363	-4.54 \pm 1.650	0.000
Control	7.42 \pm 1.785	5.77 \pm 1.927	-1.64 \pm 1.112	0.000

* Paired T-Test (Intervensi)

* Wilcoxon signed rank test (Kontrol)

The results of the study in Table 2 show the average pain intensity before and after being given sappan wood extract ice cream in each group. Before being given warmth, the respondents of each group. Table 2 shows that the average dysmenorrhea pain scale in both groups before and after treatment experienced significant changes. In the intervention group at pretest, the average respondent's pain scale was 7.06

and the posttest average was 2.52, this shows a decrease in the dysmenorrhea pain scale in the intervention group of -4.54 with a value of ($p = 0.000$), while in the control group at pretest, the average respondent's pain scale was 7.42 and the posttest average was 5.77, this shows and a decrease in the dysmenorrhea pain scale in the control group of -1.64, with a value of ($p = 0.000$).

Table 3. Analysis of Dysmenorrhea Pain Scale After Treatment Between Intervention Group and Control Group

Variabel		Intervensi	Kontrol	P
		Mean \pm SD	Mean \pm SD	
Skala Dismenore	Nyeri	2.52 \pm 1.363	5.77 \pm 1.927	0.000
Delta Dismenore	Nyeri	-4.54 \pm 1.650	-1.64 \pm 1.112	0.000

*Mann Whitney U-Test

The results of the study in table 3 show the average difference in pain intensity between groups, namely the mean value of dysmenorrhea pain between the Secang Wood Extract Ice Cream Intervention group with Vitamin E Supplements and the control group

shows a significant difference with a value of ($p = 0.000$), with a mean delta value for a decrease in dysmenorrhea pain scale in the Intervention group more, namely -4.54 in the intervention group and -1.64 in the control group with a value of ($p = 0.000$)

DISCUSSION RESEARCH

Relationship between Respondents' Characteristics and Dysmenorrhoea Pain Age Of Menarche

Menarche occurs at an earlier than normal age where the reproductive organs are not ready to undergo changes and there is still a narrowing of the cervix, so there will be pain when menstruation occurs. The age of menarche varies, from the age range of 10-16 years. However, the age of menarche can be said to be normal if it occurs at the age of 11-14 years. Increased prostaglandin hormones cause irregular and uncoordinated uterine contractions. Another mechanism by prostaglandins and other hormones that can cause pain is the ability of some hormones including prostaglandins that can make pain sensory nerve fibres in the uterus become hypersensitive to the work of bradykinin and other physical and chemical pain stimuli (Horman et al., 2021).

Based on previous research and existing theory, there is no gap in the results of this study, because the average range of respondents who experience dysmenorrhoea is mostly at the age of <11 years, this is due to the imperfection of hormonal secretion and nociceptor sensitivity in the uterus which causes dysmenorrhoea.

Menstrual Cycle

Abnormal menstrual duration can cause dysmenorrhoea because irregular menstrual duration will cause an increase in prostaglandins because menstruation causes the uterus to contract more frequently. The findings of this study support the hypothesis (Christiana et al., 2019) that more prostaglandins are produced because menstruation lasts longer and occurs more frequently due to uterine

contractions. The longer menstruation occurs, the more often the uterus contracts as a result, the more prostaglandins are produced. The result of excessive prostaglandin production will cause severe pain during menstruation (Basri, 2021).

Based on previous research and existing theory, there is no gap in the results of this study, due to the range of most adolescents who experience dysmenorrhoea experiencing irregular menstrual cycles, irregular menstrual cycles can also be caused by fast food consumption, as well as psychological pressure such as stress experienced by adolescent girls when the intervention is given during the study.

Body Mass Index (BMI)

Overweight or obesity is one of the risk factors for dysmenorrhoea. Excessive nutrition can cause dysmenorrhoea, because there is excessive fat tissue that can cause hyperplasia of blood vessels, namely the pressing of blood vessels by fatty tissue in the female reproductive organs so that the blood that should flow in the menstrual process is disturbed and causes pain. In addition, it is supported by the habit of consuming inappropriate foods, which contain very little or no calcium, iron, folic acid, vitamins A and C, while saturated fat and cholesterol are very high. Consuming fatty foods can increase prostaglandin hormones that can cause pain in the lower abdomen or dysmenorrhoea (Widyanthi et al., 2021).

Based on the results above, it can be seen that the body mass index of respondents increases the risk of dysmenorrhoea. However, in this study some respondents who had normal BMI also experienced dysmenorrhoea. This is because

normal BMI in adolescents does not necessarily mean that the nutritional intake consumed is good and balanced, so that the lack of certain nutritional factors in adolescent girls will have an impact on reducing reproductive function and the production of estrogen hormones, progesterone. Low progesterone hormone causes the release of pain mediators, namely prostaglandins.

Ice cream Intervention of Secang Wood Extract (*Caesalpinia Sappan L.*) on Reduction of Dysmenorrhoea Pain

This study was conducted at Kunduran Health Center, Blora Regency for approximately 1 month. Based on the demographic data of this study in the form of patient characteristics including age of menarche, menstrual cycle and body mass index showed no statistically significant differences, so it can be said that the four groups have homogeneous data and can be compared.

Based on the analysis of the average dysmenorrhea pain scale in both groups before and after treatment changes, where the average decrease in dysmenorrhea pain scale after intervention in the intervention group was -4.54, while the average decrease in dysmenorrhea pain scale after intervention in the control group was -1.64.

The average decrease in pain intensity occurred on days four and five. This is influenced by the content of secang wood extract whose effectiveness will be seen when consumed continuously and continuously in accordance with the predetermined dose and frequency. This is in line with the theory that secang wood will be effective as an anti-inflammatory or analgesic when consumed for \pm 1 week. Some flavonoid compounds such as brazilin, tannin, and angiogenesis. The mechanism of action of flavonoid compounds takes \geq 72 hours to work optimally to inhibit the synthesis of

nucleic acids that play a role in the formation of arachidonic acid which plays a role in suppressing the production of prostaglandins as mediators of menstrual pain/dysmenorrhea (Sampara & Prianti, 2021).

The decrease in dysmenorrhea pain scale in the intervention group was more than the control group. In the intervention group, the score was 7.06 (severe pain) before treatment to 2.52 (mild pain) after treatment. Meanwhile, in the control group, the average dysmenorrhea pain scale before treatment was a score of 7.42 (severe pain) to a score of 5.77 (mild pain). The above results are in line with Sabila's research (2021), where secang wood extract has an effect on reducing rheumatoid arthritis pain in the elderly with ($p = 0.003$).

Phytochemical components in secang provide pharmacological effects, namely antioxidant activity in suppressing oxidative stress as a promoter of disease including inflammation. Anti-inflammatory activity that plays a role in inhibiting the regulation of proinflammatory cytokines, suppressing prostaglandin production which causes inhibition of pain degradation (Nomer et al., 2019).

The content of specific compounds in sappan wood ice cream, namely, brazilin, has anti-inflammatory and analgesic effects. Brazilin in sappan wood has higher antioxidant power than commercial antioxidants, so it is more potential as a free radical antidote. If antioxidants bind to free radicals, cell membrane damage can be reduced, so that the proliferation phase can proceed. The role of phenolic compounds contained in sappan wood also helps flavonoids and brazilin in preventing oxidation reactions by stopping chain reactions due to the generation of free radicals. The level of pain is influenced by oxidative stress in the tissue during the unproliferation phase (Sucita et al., 2019).

Based on the results of previous research, brazilin in sappan wood has reliable antioxidant power with the antioxidant index of sappan wood water extract higher than commercial antioxidants, so it has potential as a free radical antidote, antidiabetic, anti-inflammatory agent, brazilin also has anti-cancer and antimicrobial activity (Suraini & Enlita, 2021).

In addition to Secang Wood Extract, pharmacological therapy is given in the form of Vit. E 400iu. Vitamin E is known as an antioxidant that plays an important role in protecting polyunsaturated fatty acids and other cell membrane components from free radical oxidation. vitamin E is a source of antioxidants that can prevent menstrual disorders. plays a role in reducing pain during dysmenorrhea by controlling neuromuscular activity in the uterus due to excessive prostaglandin hormones (Rishel, 2018).

Vitamin E supplements can prevent dysmenorrhea because it can reduce prostaglandin synthesis through its ability as an anti-inflammatory and antioxidant can improve micro blood vessel circulation, so that uterine contractions will be reduced causing the nerves in the uterus not to be pinched and menstrual pain will be reduced (Saraswati et al., 2020).

In this study, the administration of Secang Wood Extract Ice Cream and vitamin E was carried out for 5 days (2 days before menstruation and 3 days during menstruation). The interaction of Brazilin content as an anti-inflammatory and vitamin E content as an antioxidant is effective in reducing dysmenorrhea in adolescent girls. However, brazilin and vitamin E taken together, cannot be consumed for more than 2 weeks because brazilin can interfere with vitamin K metabolism which contributes to normal blood clotting or wound healing. Vitamin E also cannot be taken continuously > 2 weeks - 1 month as it inhibits platelet aggregation.

At the recommended dose and within the normal period of time, the intervention interaction of Secang Wood Extract Ice Cream and vitamin E had an impact on a significant decrease in the intensity of dysmenorrhea pain. Ice Cream of Secang Wood Extract and vitamin E consumed together can inhibit prostaglandin synthesis. The anti-inflammatory and antioxidant effects of Secang Wood Extract Ice Cream and vitamin E reduce oxidative stress by suppressing levels of Reaction stress oxydative (ROS) in tissues and cell membranes so that the work of enzymes in the cycloogenesis cycle which plays a major role in producing prostaglandins is inhibited, and prostaglandin levels decrease.

CONCLUSION

Ice cream administration of Secang Wood Extract (*Caesalpinia Sappan L.*) and vitamin E supplements are effective in reducing the intensity of dysmenorrhea pain in adolescent girls in the Working Area of Kunduran Health Center, Blora Regency.

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