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Intervention of Dark Chocolate Consumption on Complaints of Menstrual Pain in Adolescent Girls: Descriptive Case Study

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ABSTRACT

The incidence of dysmenorrhoea in North Kalimantan Province is reported at 72.89% for primary dysmenorrhoea and 27.11% for secondary dysmenorrhoea. The aim of this study was to determine the effectiveness of dark chocolate consumption in reducing pain levels among adolescents with dysmenorrhoea. This research employed a descriptive case study method with a midwifery care approach, evaluating two groups: the case group, consisting of adolescent girls with dysmenorrhoea who received an intervention in the form of dark chocolate therapy for menstrual pain complaints, and a control group of adolescent girls with dysmenorrhoea who received no such intervention. The research subjects were two 19-year-old adolescent girls experiencing primary dysmenorrhoea, selected using purposive sampling from midwifery students at the University of Borneo Tarakan. The midwifery care process, including assessment, intervention, and evaluation, was conducted from 1st to 3rd August 2022. The results showed that the adolescent with dysmenorrhoea who received dark chocolate therapy experienced a reduction in pain intensity to a level 2 (mild pain). In contrast, the control subject who only received counselling, without any intervention, reported a reduction in pain to level 5 (moderate pain). It can be concluded that the adolescent with dark chocolate intervention showed a significant decrease in pain level from 7 (severe pain) to 2 (mild pain), while the control subject without intervention showed a less significant decrease from level 7 to level 5. It is recommended that this form of complementary therapy be considered for integration into midwifery care practices as part of a holistic approach to menstrual pain management.

Keywords: Dark Chocolate, Adolescents, Dysmenorrhea.

ABSTRAK

Angka kejadian dismenore di Provinsi Kalimantan Utara dilaporkan sebesar 72,89% untuk dismenore primer dan 27,11% untuk dismenore sekunder. Tujuan dari penelitian ini adalah untuk mengetahui efektivitas konsumsi cokelat hitam dalam menurunkan tingkat nyeri pada remaja yang mengalami dismenore. Penelitian ini menggunakan metode studi kasus deskriptif dengan pendekatan asuhan kebidanan, dengan mengevaluasi dua kelompok: kelompok kasus, yaitu remaja putri yang mengalami dismenore dan mendapatkan intervensi berupa terapi cokelat hitam untuk keluhan nyeri haid, dan kelompok kontrol, yaitu remaja putri yang mengalami dismenore tetapi tidak menerima intervensi tersebut. Subjek penelitian adalah dua remaja putri berusia 19 tahun yang mengalami dismenore primer, yang dipilih secara purposive sampling dari mahasiswa kebidanan Universitas Borneo Tarakan. Proses asuhan kebidanan, termasuk pengkajian, intervensi, dan evaluasi, dilaksanakan pada tanggal 1 hingga 3 Agustus 2022. Hasil penelitian menunjukkan bahwa remaja dengan dismenore yang menerima terapi cokelat hitam mengalami penurunan intensitas nyeri menjadi tingkat 2 (nyeri ringan). Sebaliknya, subjek kontrol yang hanya menerima konseling tanpa intervensi mengalami penurunan nyeri menjadi tingkat 5 (nyeri sedang). Dapat disimpulkan bahwa remaja yang mendapat intervensi cokelat hitam mengalami penurunan tingkat nyeri yang signifikan dari skala 7 (nyeri berat) menjadi skala 2 (nyeri ringan), sedangkan subjek kontrol tanpa intervensi hanya menunjukkan penurunan yang tidak signifikan dari skala 7 menjadi skala 5. Disarankan agar terapi komplementer ini dipertimbangkan untuk diintegrasikan dalam praktik asuhan kebidanan sebagai bagian dari pendekatan holistik dalam manajemen nyeri menstruasi.

Kata Kunci: Remaja, Coklat Hitam, Dismenorea

INTRODUCTION

Adolescence is a period of developmental transition from childhood to adulthood. According to the World Health Organization (WHO), adolescence is the age period 10-19 years (Asih et al., 2020). Adolescents will experience a puberty situation where they will experience physical and emotional/psychological changes. One of the physical changes that occur during puberty is the gradual development of secondary sexual characteristics in adolescent girls which is characterized by menstruation (Larasati, & Alatas, 2016).

Based on data from WHO, as many as 90% of adolescent women throughout the world experience problems during menstruation and more than 50% of menstruating women experience primary dysmenorrhea with 10-20% of them experiencing quite severe symptoms. In Indonesia itself, the prevalence of dysmenorrhea is quite high, reaching 64.5%, with most cases found in teenagers, namely aged 17-24 years. The incidence of primary type dysmenorrhea in Indonesia is 54.89%, while the remaining 45.11% is the secondary type (Larasati, & Alatas, 2016). The incidence of dysmenorrhea in North Kalimantan province in 2017 was 72.89% for primary dysmenorrhea and 27.11% for secondary dysmenorrhea (Badan Pusat Statistik Tarakan, 2021).

Menstruation is regular bleeding from the uterus as a sign that the uterine organs are functioning maturely. Menstruation is the process of shedding of the uterine wall accompanied by bleeding that occurs repeatedly every month except during pregnancy. Every woman's menstrual cycle is not the same, with normal variations between 26-32 or 28-35 days (Ginanjarsari, 2019).

Some teenagers will experience premenstrual syndrome or PMS before their first day of menstruation. These symptoms can include one or more physical, psychological or emotional complaints such as headaches, stomach cramps, constipation or diarrhea, back and waist pain, fatigue, breast pain, acne, joint or muscle weakness, swelling in the legs, which can interfere with productivity. Based on research results, this is closely related to adolescent nutritional intake (Sari & Husaidah, 2021).

During menstruation, disturbances can occur both physically and psychologically. From a physical perspective, one of the disorders that often occurs is dysmenorrhoea or menstruation which is accompanied by pain (Handayani et al., 2016). Dysmenorrhea or menstrual pain usually occurs in the lower abdomen, waist and even back. It can also take the form of lower abdominal cramps that radiate to the back or legs and are usually accompanied by gastrointestinal and neurological symptoms such as weakness (Asih et al., 2020b).

Dysmenorrhea is divided into 2, namely primary dysmenorrhea and secondary dysmenorrhea. Primary dysmenorrhea is a condition that is associated with the ovulatory cycle, while secondary dysmenorrhea is menstrual pain that develops from primary dysmenorrhea that occurs after the age of 25 years and is caused by pelvic abnormalities (Nurwana et al., 2017).

The causes of dysmenorrhoea consist of several factors, the first is psychological factors, teenagers are emotionally unstable, such as being irritable and easily angry, plus if teenagers don't know and don't get good knowledge then this can cause dysmenorrhea. The second is constitutional factors, which are closely related to psychological factors which can reduce the body's resistance to pain, while these factors take the form of anemia or chronic illnesses which can influence the onset of desminorrhoea. The third is endocrine or hormonal factors, this factor is because the endometrium produces the hormone prostaglandin F2 which causes movement of smooth muscles. If excessive amounts of prostaglandins are released into the bloodstream, it will cause desminorrhoea. Fourth, the allergic factor is due to the presence of menstrual toxins. While the cause of secondary dysmenorrhoea is known to be problems with the reproductive organs such as endometriosis, tumors in the uterus, or chronic inflammation of the inner pelvis, intrauterine devices can also influence the appearance of dysmenorrhea in some people (Fara & Handayani, 2020).

Research conducted by Larasati and Alatas, (2016) found that the form of primary dysmenorrhea experienced by teenagers is so uncomfortable that it can cause irritability, irritability, nausea, vomiting, weight gain, bloated stomach, back pain, headaches, tension, lethargy, and depression. Primary dysmenorrhoea has become a condition that is detrimental for many women and has a big impact on their health-related quality of life (Fara & Handayani,

2020). The results of Anurogo's 2016 research stated that dysmenorrhea had an impact on concentration, learning motivation and decreased productivity in adolescents due to the pain experienced by adolescents (Asih et al., 2020).

Efforts to treat menstrual pain (dysmenorrhea) can be done through pharmacological therapy and non-pharmacological therapy. Pharmacological therapy can be done by taking nonsteroidal anti-inflammatory drugs (NSAIDs). These medications include aspirin and ibuprofen formulas. Non-pharmacological therapy includes uterine stimulation and massage, ice and heat therapy, transcutaneous electrical nerve stimulation, distraction, relaxation, imagination and consumption patterns (Febriansyah et al., 2021; Natalia & Astikasari, 2019). Nutrients that can help relieve dysmenorrhea are calcium, magnesium and vitamins A, E, B6 and C which are contained in many dark chocolates (Fara & Handayani, 2020). Several previous studies stated that one non-pharmacological therapy to treat dysmenorrhea is to consume dark chocolate

Dark chocolate is rich in calcium, potassium, sodium, magnesium and vitamins A, B1, C, D and E. The magnesium contained in dark chocolate has a direct effect on vascular pressure and can regulate the entry of calcium into uterine smooth muscle cells, so that magnesium influences contraction and relaxation of uterine smooth muscle. Apart from that, magnesium also functions to enlarge blood vessels, thereby preventing muscle and blood vessel wall spasms and suppressing inflammation by inhibiting the formation of prostaglandins. Some chocolate ingredients such as caffeine, theobromine, methyl-xanthine, and phenylethylalanine are believed to improve mood and reduce fatigue, so they can be used as a medicine for depression. Therefore, magnesium functions to relieve dysmenorrhea (Natalia & Astikasari, 2019; Sriandini, 2021).

Research conducted (Asih et al., 2020) found that there was an influence between pain intensity before dark chocolate therapy and pain after dark chocolate therapy, namely a decrease in menstrual pain. Similar results are that there is an effect of giving dark chocolate on reducing the number of dysmenorrhea pain in young women (Katili et al., 2024).

Based on the results of a preliminary study conducted in April 2022 at the Faculty of Health Sciences, University of Borneo, Tarakan, out of 20 teenage girls, 9 or 45% of teenage girls experienced dysmenorrhea. 66.7% of people used pharmacological methods to deal with pain, namely by taking medicine at a shop that contains analgesics and 33.3% of people used non-pharmacological methods, namely by exercising, drinking herbal medicine and resting. Pharmacological methods such as the use of analgesics are widely used by teenagers as the main way to reduce menstrual pain, however the use of drugs without medical supervision according to Adiana and Maulina in 2022 has the potential to cause long-term side effects such as gastrointestinal and intestinal damage, kidney damage and liver damage if used in excessive doses and without doctor's supervision (Hardiyanti, Apriyani & Pangestu, 2024). Non-pharmacological methods, including exercise (yoga training) (Aprilina et al., 2020), traditional herbal medicine such as boiled water with tamarind turmeric (Amelia, Juwita, & Fajriyah, 2020), (Irman & Yanti, 2020) and relaxation techniques have begun to be studied, but not many studies have specifically examined functional foods such as dark chocolate as an intervention. There are not many studies in Indonesia, especially in border areas such as Tarakan, that evaluate the effectiveness of consuming dark chocolate as a non-pharmacological method for reducing menstrual pain in teenagers. Previous research has focused more on pharmacological interventions or physical techniques such as exercise, rather than on nutrition-based interventions that are easily accessible and preferred by adolescents. There is no local empirical data at the University of Borneo Tarakan that examines the relationship between dark chocolate consumption and reduced menstrual pain. This research uses dark chocolate as a non-pharmacological therapy which has not been widely studied in the local environment. Focus on adolescents' preferences for interventions that are tasty and liked, thereby increasing the potential for consumption compliance. The study was conducted on adolescent girls in border areas, which can be the basis for developing interventions that are contextual and geographically relevant.

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The advantages of this research include using an intervention approach that is cheap, easily accessible, and socially accepted by adolescents (dark brown), providing relevant local data for policy makers in the fields of adolescent health and education. Contribute to the development of safe and natural methods of menstrual pain management among adolescents, especially in border areas. Based on prevalence data which states the high incidence of dysmenorrhea in teenagers and the existence of non-pharmacological therapy which has an influence on menstrual pain and if consumed it tastes good and is liked by many teenagers, namely dark chocolate. The aim of this study was to determine the effectiveness of dark chocolate consumption in reducing pain levels among adolescents with dysmenorrhoea at the University of Borneo Tarakan in 2022.

RESEARCH METHODS

This type of research is a descriptive case study with a midwifery care approach. The research aims to evaluate the effectiveness of dark chocolate therapy intervention for complaints of menstrual pain (primary dysmenorrhea) in two groups of subjects, namely: Case group: teenage girls who were given intervention in the form of consuming dark chocolate. Control group: adolescent girls with dysmenorrhea who did not receive dark chocolate intervention. The population in this study were midwifery students at the University of Borneo Tarakan who experienced primary dysmenorrhea. The sample consisted of two 19 year old female teenagers who experienced primary dysmenorrhea. The sampling technique used a purposive sampling approach, with inclusion criteria namely adolescents who experienced primary dysmenorrhea, were willing to take part in the intervention, and had no contraindications to consuming chocolate.

Data collection methods include: Assessment of subjective and objective data through interviews and examination of vital signs, measurement of pain intensity using the NRS scale (Numeric Rating Scale) before and after the dark chocolate intervention. Documentation of the development of pain during the three days of intervention, from 1 to 3 August 2022. Data analysis was carried out descriptively qualitatively, by comparing pain levels on days 1, 2, and 3 in each group to evaluate the effectiveness of the intervention. Research ethics have been taken into account by providing informed consent to all participants before carrying out the action, explaining the benefits and procedures of the intervention, and ensuring data confidentiality and participant comfort during the process. This research also received permission from the Faculty of Health Sciences, University of Borneo Tarakan as part of integrated midwifery care practices and the development of evidence-based practice**.**

RESULT

Table 1. Comparison of results of assessment, diagnosis and midwifery care interventions.

Component	**Ms. I (case group)**	**Ms. D (control group)**
Identity	19 years old, Muslim, Banjar tribe, UBT Midwifery Student	19 years old, Muslim, Bugis, UBT Midwifery Student
Chief Complaint	Lower abdominal pain & back pain since the previous night	Lower abdominal pain since the first day of menstruation, also felt before menstruation
Disease History	There are no infectious/decreasing/chronic diseases; no history of surgery	There are no infectious/decreasing/chronic diseases; no history of surgery
Drug Allergies	There isn't any	There isn't any
Menarche	Age 12 years	Age 12 years
Menstrual Cycle	Regularly, 5–7 days	Regularly, 5–7 days
Psychological Status	Anxious and worried	Anxious and worried
TTV (1 August 2022)	BP: 110/70 mmHg, N: 84x/min,	BP: 120/70 mmHg, N:

	R: 22x/min, S: 36.7°C	80x/min, R: 20x/min, S: 36.6°C
BB / TB	50 kg / 158 cm	55 kg / 160 cm
Physical examination	Head-to-toe: normal	Head-to-toe: normal
Initial Pain Scale (NRS)	7 (severe pain)	7 (severe pain)
Obstetric assessment/diagnosis	Primary dysmenorrhoea	Primary dysmenorrhoea
Intervention Day 1 (August 1)	Education + 35 gr dark chocolate therapy + NRS post: 6	Education & counseling, NRS post: 7
Intervention Day 2 (2 August)	Dark chocolate 35 gr, NRS:	Re-counseling, NRS:
Intervention Day 3 (August 3)	6 → 4	7 → 6

Table 2. Comparison of Midwifery Care Results

Variable	Midwifery Care Results Midwifery Care Results					
	Day 1		Day 2		Day 3	
	Pre	Post	Pre	Post	Pre	Post
Intervention	7	6	6	4	4	2
Without Intervention	7	7	7	6	6	5

Tab the results of observations of the level of dysmenorrhea pain in young women with dark chocolate therapy, it is known that during the 3 day observation there was a decrease in the level of pain. In clients who received intervention in the form of dark chocolate on the first day of observation, the client's pain scale was at 7 (severe pain) and after being given intervention in the form of 35 grams of dark chocolate and measuring the pain intensity 2 hours later, the client's pain intensity decreased to 6 (moderate pain). On the second day, a decrease in pain intensity also occurred, namely the pain scale before the intervention was 6 (moderate pain) and after the intervention was given by consuming 35 grams of dark chocolate, the pain intensity became 4 (moderate pain). On the last day, the client's pain scale before the intervention was 4 (moderate pain) and after the intervention was 2 (mild pain).

The results of observing the intensity of pain in clients who experienced dysmenorrhea without intervention and were only given counseling, namely that on the first day the client's pain scale was 7 (severe pain) and after being given counseling and measuring the pain intensity again 2 hours later, the results showed no change in the pain scale, namely remaining on a scale of 7 (severe pain). On the second day, the pain intensity was 7 (severe pain) and after being given counseling and measuring the pain intensity again 2 hours later the result was that the pain intensity was on a scale of 6 (moderate pain). On the last day of observation, the client's pain intensity before counseling was 6 (moderate pain) and after counseling it decreased to 5 (moderate pain).

DISCUSSION

Effectiveness of Dark Chocolate Therapy in reducing the intensity of dysmenorrhea pain in adolescent girls

Based on the research results, it showed that the dysmenorrhea intensity scale before being given dark chocolate was 7 (severe pain) and after being given intervention in the form of dark chocolate for 3 days, the respondent's pain intensity scale decreased to 2 (mild pain). Dysmenorrhea is pain felt in the stomach, which originates from uterine cramps and occurs during menstruation. Primary dysmenorrhea appears since the first menstruation and will recover on its own over time, precisely when the body's hormones are more stable.

This is in line with research conducted by Wahyuni, (2018) that dark chocolate makes a significant difference in reducing the level of dysmenorrhea pain. Giving dark chocolate will increase serotonin secretion, resulting in transmission to the dorsal horn (where peripheral pain sensory fibers end) which will inhibit pain transmission. Serotonin will also keep the gates of

pain closed, a lack of serotonin will increase sensitivity to pain, to increase serotonin levels you can stimulate the body (Larasati, & Alatas, 2016; Wahyuni, 2018).

During menstruation the exfoliated endometrial cells release prostaglandins. Prostaglandins stimulate the uterine muscle of the uterus and affect the blood vessels, causing uterine ischemia through myometrial contraction and vasoconstriction. Elevated prostaglandin levels are found in the endometrial fluid of women with dysmenorrhea and are associated with the degree of pain. A 3-fold increase in endometrial prostaglandins occurs in the follicular to luteal phase, with a further increase occurring during menstruation. The increase in prostaglandins in the endometrium which follows the decrease in progesterone at the end of the luteal phase causes an increase in myometrial tone and excessive uterine contractions (Febriansyah et al., 2021) .

The intervention carried out in this research was by giving dark chocolate to young women who experienced dysmenorrhea. Dark chocolate contains magnesium which functions to enlarge blood vessels thereby preventing spasms in muscles and blood vessel walls. The chemical content of magnesium is able to block excess prostglandin so that it can reduce dysmenorrhea during menstruation. Magnesium is also useful for relaxing muscles and can provide a feeling of relaxation that can control mood (Faizah & Mukhoirotin, 2020; Febriansyah et al., 2021; Larasati, & Alatas, 2016).

The theory that supports the facts in research on the effect of dark chocolate on primary dysmenorrhea pain in young women explains that dark chocolate contains more cocoa beans compared to other types of chocolate. The component of dark chocolate is cocoa which contains flavonoids and is rich in antioxidants so it is beneficial for health. The content and benefits of dark chocolate for young women who experience primary dysmenorrhea pain are carbohydrates which can provide a source of energy when young women feel tired, protein to relax nerves, antioxidants to fight free radicals, theobromine and caffeine to relieve nausea and magnesium to relax uterine smooth muscles (Faizah & Mukhoirotin, 2020; Larasati, & Alatas, 2016).

The decrease in pain intensity in respondents who were given intervention with dark chocolate, apart from showing the meganesium content, also showed that the decrease in the intensity of menstrual pain experienced by respondents after giving dark chocolate had an analgesic effect because chocolate contains copper which is used in the body to synthesize collagen and neurotransmitters, namely endorphins. Endorphins are substances released by the body that inhibit pain impulses. The endorphin hormone will be a natural analgesic and sedative so that it can reduce the intensity of pain such as menstrual pain (Natalia & Astikasari, 2019; Sriandini, 2021).). Endorphin hormones have an influence on pain, the body can create feelings of comfort and pleasure with the presence of endorphin hormones so that the pain felt will be reduced (Radulima et al., 2021).

Giving dark chocolate will trigger the release of endorphins, which are substances that transmit excitation to the brain's analgesia system. These endorphins will inhibit the cyclooxygenase enzyme so that PGG2 is not formed, where PGG2 will form PGF2 alpha which is a pain mediator. It is possible that there is synergy between endorphins and serotonin, namely the presence of carbohydrates which play a role in increasing serotonin levels and the biofeedback mechanism of increasing serotonin to increase the uptake of carbohydrates in the body, these carbohydrates play a role in triggering the release of endorphins (Fara & Handayani, 2020; Febriansyah et al., 2021).

Based on this description, researchers assume that dark chocolate is a non-pharmacological alternative that can be used to reduce dysmenorrhea in adolescent girls. In this study, the respondent's dysmenorrhea pain scale after being given dark chocolate experienced a change, namely a decrease in the perceived pain intensity scale from a severe pain scale to a mild pain scale. Thus, if there is a decrease in menstrual pain, teenagers will have a healthy physique, which will affect their learning activities (Setiawan, & Lestari, 2018).

This research still has many limitations, namely: it only involved two subjects (Ms. I and Ms. D) so the results obtained cannot be generalized to a wider population. The dark chocolate therapy intervention was only carried out for three days, which may not be enough to assess long-term effectiveness in reducing primary dysmenorrhea pain. Measuring pain intensity using the NRS scale is very dependent on the client's personal perception, which can vary depending

on mood, stress, or other influences that cannot be controlled and the use of interventions using only one type of chocolate (alpine chocolate) is used without comparison with other types or magnesium content, so it is not known whether the results are similar for other types of chocolate.

CONCLUSION

Based on observations, the effectiveness of dark chocolate therapy in reducing dysmenorrhea pain in adolescent girls shows that the most effective reduction in pain occurred on the third day of intervention. In the group given dark chocolate therapy, the pain scale decreased significantly from scale 7 (severe pain) on the first day to scale 2 (mild pain) on the third day. In contrast, in the group without dark chocolate therapy, the reduction in pain occurred more slowly and was not significant, namely from a scale of 7 (severe pain) on the first day to a scale of 5 (mild pain) on the third day. This shows that dark chocolate intervention for three days provides more optimal results in reducing the intensity of dysmenorrhea pain compared to no intervention.

Further research with a larger sample size and a quasi-experimental design or randomized controlled clinical trial is needed to statistically confirm the effectiveness of dark chocolate. Apart from that, it is necessary to analyze the content of active substances in dark chocolate, such as magnesium and flavonoids. Lastly, the integration of these complementary therapies can be considered in midwifery care practice as part of a holistic approach to menstrual pain management.

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