Research Article

Papaya Fruit (Carica papaya L.) and Its Effectiveness on Menstrual Patterns in Women Using Depo Medroxyprogesterone Acetate (DMPA): A Quasi-Experimental Study

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Abstract

Objective: To determine the effectiveness of administering papaya (Carica papaya L.) in women using Depo Medroxyprogesterone Acetate (DMPA) on menstrual patterns at PMB Patmawati.

Methods: This study was conducted at PMB Patmawati in 2023. It employed a quasi-experimental design with a posttest-only control group approach. The intervention consisted of administering papaya fruit (Carica papaya L.), followed by observation of menstrual cycle patterns. Sampling was performed by selecting respondents who met the inclusion criteria within a specified period, resulting in a total sample of 32 women 16 in the intervention group and 16 in the control group determined using Federer's formula. The measurements in the intervention group were then compared with those in the control group, which did not receive papaya fruit.

Results: There was a significant difference in menstrual pattern changes between women who consumed papaya and those who did not (p = 0.001). Additionally, significant improvements in menstrual patterns were observed before and after papaya consumption in the intervention group (p = 0.001).

Conclusion: Regular and consistent consumption of papaya fruit (Carica papaya L.) among DMPA users demonstrated a beneficial effect, improving menstrual patterns from previously irregular to regular.

Keywords: DMPA, Menstrual Cycle, Papaya Fruit**.**

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INTRODUCTION

Family planning is one of the government's strategies to reduce maternal mortality, especially among mothers with the 4T conditions: giving birth too young, too old, too close together, or too many times specifically, giving birth under 20 years of age, too frequently, with short birth intervals, or above 35 years of age.[1] The number of family planning (KB) participants continues to increase over time; in 2016, approximately 74.8% of reproductive-age women in Indonesia were family planning users.[2] Approximately 49.7% of new and active family planning participants in Indonesia choose hormonal injectable contraceptives, including DMPA.[3]

Currently, the most widely used contraceptive method worldwide is the DMPA injectable contraceptive.[4] DMPA ranks among the top contraceptive choices for pregnancy prevention. It is known as a highly effective contraceptive, with a pregnancy rate of only 0.3% during the first five years of use,[5,6] and it is recommended for women who wish to delay pregnancy.[6]

The side effects of contraceptive methods are important considerations when deciding whether to continue their use. Changes in the menstrual cycle are among the most frequently reported side effects of Depo-Medroxyprogesterone Acetate injections. DMPA may alter normal menstrual patterns, leading to amenorrhea, regular bleeding, spotting, or changes in

menstrual frequency, duration, and volume.[7]

According to research conducted over eight years,[8] there was a significant difference in the average duration of the shortest and longest menstrual cycle days between users of one-month hormonal injections (combined) and three-month hormonal injections (DMPA) ($p < 0.001$). Clinically, both the shortest and longest menstrual cycles were longer in the DMPA group compared to the combined-injection group (60 vs. 28 days, and 90 vs. 35 days, respectively).

Another study [9] examining the side effects of DMPA found that 22 acceptors (44%) experienced serious side effects, with most side effects occurring in those who had used DMPA for more than 3 months to 1 year (60%). There was a significant relationship between the duration of DMPA use and the occurrence of side effects ($\rho = 0.000 < 0.05$). This study concluded that the duration of DMPA use strongly influences the likelihood of experiencing side effects.

Additional research[10] also showed a relationship between hormonal contraceptive use and menstrual cycle abnormalities. Acceptors of progestin-only contraceptives had a 1.6-times greater risk of experiencing menstrual cycle irregularities compared to acceptors of combined hormonal contraceptives. Most respondents using progestin-only contraceptives (36; 85.7%) and more than half of those using combined contraceptives (20; 52.6%) experienced menstrual cycle disorders.

Papaya is a commonly available fruit that grows in tropical regions, including Indonesia. It is a favorite fruit among Indonesians. California papaya is a rich natural source of powerful antioxidants vitamin A and vitamin C as well as fiber, calcium, magnesium, and potassium.[11] Apart from its affordable price, papaya is known for its pleasant and sweet taste.[6,7]

Islam provides clear principles regarding the management of natural resources, such as the concepts of *ihya'ul mawat* (reviving unused land) and *al-imārah* (improving community welfare). These principles emphasize the importance of utilizing natural resources responsibly, as aligned with Islamic teachings.[12] In the context of natural resource utilization, papaya which is high in calcium can be used to help address menstrual disorders.

An initial survey conducted at PMB Patmawati among DMPA acceptors who had used the contraceptive for more than one year showed that most acceptors experienced menstrual disorders such as amenorrhea and spotting, whereas most acceptors who had used DMPA for less than one year did not experience such disorders.

Based on these findings, which indicate a high rate of menstrual disorders among DMPA users, the present study was conducted to evaluate the effectiveness of papaya fruit rich in calcium in helping manage menstrual pattern changes in DMPA acceptors. Previous research also reported that the majority of women experienced menstrual cycle disorders, particularly amenorrhea.[13,14] Therefore, the researchers are interested in examining the effectiveness of papaya (Carica papaya L.) in Depo Medroxyprogesterone Acetate (DMPA) acceptors on menstrual disorder patterns at PMB Patmawati.

METHODS

This study employed an experimental approach using a posttest-only control group design, in which the intervention was administered to the treatment group and outcomes were measured afterward. These results were then compared with those of the control group, which did not receive the intervention. The research was conducted at PMB Patmawati, with data collection carried out from August to November 2023. Ethical approval was obtained from the Health Research Ethics Committee of Universitas Muslim Indonesia under approval number 431/A.1/KEPK-UMI/X/2023.[15,16]

The sample was determined using a non-probability sampling technique, specifically consecutive sampling. Participants who met the inclusion criteria within the specified time frame were selected, resulting in a total of 32 respondents: 16 in the control group and 16 in the intervention group. The sample size was calculated using Federer's formula, which is appropriate for experimental research designs. Eligible participants were DMPA acceptors who experienced menstrual pattern disturbances and were willing to comply with study procedures. Participants with other health problems were excluded.

Potential confounders including age, parity, duration of DMPA use, BMI, and stress level were controlled by evaluating baseline characteristics using secondary data from cohort registration records. These records were systematically documented using a structured checklist to ensure comparability between groups.

The primary data collection technique involved direct observation of the intervention at PMB

Patmawati, following a pre-prepared checklist. Menstrual pattern variables were obtained from respondents' reports regarding menstrual complaints after using DMPA, including amenorrhea, polymenorrhea, hypermenorrhea, hypomenorrhea, metrorrhagia, and spotting.

The intervention consisted of consuming California papaya for 14 days at a dose of 2–3 pieces, three times daily (400–500 g/day) for DMPA acceptors experiencing menstrual pattern changes. Changes in menstrual patterns were recorded using an observation sheet and were evaluated four weeks after the onset of menstruation. Secondary data including age, education, occupation, and parity were obtained from cohort registration records at PMB Patmawati and entered into a structured checklist.

Data analysis to evaluate differences between the two groups was performed using the Mann–Whitney test, while differences before and after the intervention were analyzed using the Wilcoxon Signed Rank Test.[17]

RESULTS

Univariate Analysis Frequency Distribution of DMPA Acceptors

Table 1. Frequency Distribution

Variable	Frequency	%
Age		
<20	0	0
20-35	28	87.5
>35	4	12.5
Education		
Elementary/No School	0	0
Middle/Senior/Vocational	22	68.8
Bachelor/Academy	10	31.3
Occupation		94.1
Housewife/not Working	22	68.8
Working	10	31.3
Parity		
≤2	10	31.25
>2	22	68.75
Length of Use (year)		
<1	19	59.4
>1	13	40.6
Types of Menstrual Disorders		
Spotting	17	53.1
Amenorrhea	15	46.9

Bivariate Analysis

Table 2. Effectiveness of Papaya Fruit on Changes in Menstrual Patterns in DMPA Acceptors at PMB Patmawati

Group	Changes in Menstrual Patterns	Total	*P-value*
	Changed (F, %)	Unchanged (F, %)	F
Consume papaya fruit	12 (75)	4 (25)	16
Do not consume papaya fruit	0 (0)	16 (100)	16

Mann–Whitney Test

Table 3. Effectiveness of Papaya Fruit on Types of Menstrual Disorders in DMPA Acceptors at PMB Patmawati

Group	Types of Menstrual Disorders	Total	*P-value*
	Spotting (F, %)	Amenorrhea (F, %)	Normal (F, %)
before consuming papaya	10 (62.5)	6 (37.5)	0 (0)
after consuming papaya	1 (6.3)	3 (18.8)	12 (75)

Wilcoxon Test

Based on Table 1, the frequency distribution shows that the majority of respondents were aged 20–35 years (28 respondents; 87.5%). Most had middle/senior/vocational education (22 respondents; 68.8%), were housewives (22 respondents; 68.8%), had parity >2 (22 respondents; 68.8%), and had used DMPA for less than one year (19 respondents; 59.4%). The most common menstrual disorder was spotting (17 respondents; 53.1%).

Based on Table 2, it is shown that 12 respondents (75%) who consumed papaya experienced changes in their menstrual patterns. The Mann–Whitney test revealed a significant difference between those who consumed papaya and those who did not ($\rho = 0.001 < 0.05$), indicating rejection of H_0 and acceptance of H_1.

Based on Table 3, before papaya consumption, 10 respondents (62.5%) experienced spotting and 6 respondents (37.5%) experienced amenorrhea.

After consuming papaya, only 1 respondent (6.3%) continued to experience spotting, 3 respondents (18.8%) experienced amenorrhea, and 12 respondents (75%) reported no menstrual complaints.

Regular and consistent consumption of papaya (Carica papaya L.) among DMPA acceptors demonstrated beneficial effects in improving menstrual patterns, particularly by reducing menstrual irregularities commonly associated with DMPA use. These improvements may be attributed to the nutritional composition of California papaya, which contains important micronutrients such as calcium, vitamin A, and vitamin C. Calcium supports uterine smooth muscle contractility and facilitates menstrual blood flow. Vitamin A contributes to endometrial regeneration and hormonal regulation, while vitamin C enhances iron absorption, strengthens endometrial blood vessel integrity, and assists in steroid hormone synthesis. Additionally, dietary fiber, magnesium, and potassium in papaya support metabolic and circulatory function. Therefore, papaya consumption may serve as a simple nutritional approach to promote better menstrual regulation among DMPA contraceptive users.[11,18]

DISCUSSION

The results of this study indicate that the use of DMPA can cause menstrual complaints and disorders such as amenorrhea and spotting, which are associated with microvascular changes in the endometrium. This finding forms the basis for examining the side effects of long-term DMPA use on menstrual cycle disturbances. The menstrual process primarily involves changes in the endometrium, and physiological alterations occur within this tissue during menstruation. Through hormonal mechanisms involving estrogen and progesterone, necrotic endometrial tissue is shed and expelled with normal bleeding.[19,20] Amenorrhea was one of the menstrual disorders identified in this study, particularly among acceptors who had used DMPA for more than one year.

A study conducted in 2008 examined the effects of long-term progestin exposure on the endometrium using a mouse model, focusing on changes in endometrial tissue and blood vessel structure. Silastic implants containing Medroxyprogesterone Acetate (MPA) or Levonorgestrel (LNG) were administered to normal cycling mice and removed after 1, 3, or 6 weeks. The study demonstrated that long-term progestin use altered microvascular structures in the endometrium, including changes in blood vessel density, stromal cell density, epithelial cell height, and VEGF immunoreactivity. These findings highlight the need for further studies to investigate the physiological mechanisms through which progestins influence endometrial microvascular changes and bleeding patterns.[21]

The findings of this study are consistent with previous research.[14] A retrospective comparative study conducted from January 2013 to December 2015 involving 237 subjects examined users of injectable hormonal contraceptives (DMPA or Noristerat). Information such as body weight, menstrual cycle characteristics, and side effects were collected at intervals of 3, 6, and 12 months for DMPA users, and at 2, 4, and 12 months for Noristerat users. The study found that 10% of DMPA users and 7% of Noristerat users experienced no menstrual changes, while 60% of DMPA users and 57% of Noristerat users experienced amenorrhea after one year of use, demonstrating an increasing incidence of amenorrhea with prolonged DMPA exposure.

California papaya (Carica papaya L.) is a nutrient-rich fruit available year-round. It is known to contain powerful antioxidants such as vitamin A and vitamin C, along with fiber, calcium, magnesium, and potassium. Each 76 g serving of papaya contains approximately 22 IU of vitamin A, 47 mg of vitamin C, 2 g of fiber, 18 mg of calcium, 8 mg of magnesium, and 1 mg of potassium.[11,18] This study demonstrated the effectiveness of papaya consumption among DMPA users experiencing menstrual disorders such as amenorrhea and spotting. After consuming papaya for 14 days, many acceptors experienced an improvement in their menstrual patterns, returning to normal or regular cycles.

The results also show that the calcium content in papaya provides health benefits when consumed consistently, supporting the rationale for exploring papaya as a potential intervention for menstrual disorders.[22,23] Numerous studies have highlighted the benefits of papaya and its relatively high calcium content. Physiologically, the menstrual process is influenced by the hormones estrogen and progesterone, whose synthesis involves calcium-dependent pathways.[5,24-27] Therefore, papaya being a fruit rich in calcium was selected as the intervention in this study. The findings align with previous

research on the effects of papaya consumption on menstrual regularity among adolescent girls, which demonstrated significant improvements in menstrual smoothness.[22]

The results of this study further show that providing papaya to DMPA acceptors with menstrual complaints offers notable benefits when consumed consistently. Some respondents did not experience changes in their menstrual patterns and remained in their initial condition. Further examination revealed that these respondents did not consume the papaya regularly or consumed only small amounts, which likely influenced the outcomes. Additionally, some respondents with amenorrhea did not experience improvement after papaya consumption. This may be explained by the nature of amenorrhea, which involves the absence of menstruation and is closely related to hormonal alterations. Because hormonal regulation in women is influenced by numerous internal and external factors, resolving menstrual disorders particularly amenorrhea may require more than 14 days of nutritional intervention with papaya.

CONCLUSIONS

Consuming papaya fruit (carica Papaya L) regularly and consistently in DMPA acceptors showed a beneficial effect in changing menstrual patterns from previously irregular to regular and regular menstrual disorders in DMPA acceptors.

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AUTHOR CONTRIBUTION

Nurhayati contributed to the study conceptualization, methodology design, data collection, intervention administration, statistical analysis, manuscript drafting, and final approval of the version to be published. Suhermi contributed to supervision of the research process, validation of the methodology, critical review and editing of the manuscript, and approval of the final version for publication.

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LIMITATIONS of the STUDY

This study has several limitations. First, the sampling technique used was purposive sampling with a relatively small sample size, which may limit the generalizability of the findings. Second, the intervention period was short (14 days), which may not fully capture long-term menstrual regulation effects among DMPA acceptors. Third, although potential confounders such as age, parity, BMI, and duration of DMPA use were assessed, residual confounding cannot be fully ruled out due to the use of secondary data and the quasi-experimental design that lacks randomization. In addition, the study relied on self-reported menstrual changes, which may introduce reporting bias. Future studies with larger samples, longer intervention periods, and randomized designs are recommended to validate and strengthen the findings.

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