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Aerobic exercise as a non-pharmacological intervention to reduce weight gain in 3-month injectable contraceptive users

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ABSTRACT

Weight gain is identified as one of the most prevalent side effects among users of 3-month injectable contraceptives (Depot Medroxyprogesterone Acetate/DMPA), which significantly impacts user compliance and long-term health. This study aims to analyze the effect of a structured aerobic exercise intervention on weight reduction among DMPA users. This research employed a quantitative pre-experimental design with a pretest-posttest approach. The study was conducted in Tondomulyo Village, Pati District, Central Java, involving 50 women of reproductive age (15–49 years) who were current users of 3-month injectable contraceptives, selected through purposive sampling. Body weight was measured before and after the intervention using calibrated digital scales. Data were analyzed using a paired sample t-test via SPSS with a significance level of $p < 0.05$. The study found a statistically significant decrease in body weight following the aerobic exercise intervention (p=0.000). The mean body weight decreased from 61.92 kg at pre-intervention to 60.86 kg post-intervention, resulting in a mean difference of 1.06 kg. Most participants engaged in light-intensity exercise (58%), though regular exercise was associated with more optimal metabolic outcomes. Aerobic exercise is an effective non-pharmacological intervention for managing weight gain among DMPA users. Incorporating structured physical activity into reproductive health programs can serve as a holistic approach to mitigate contraceptive side effects and improve user continuation rates.

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INTRODUCTION

Hormonal contraceptives, including depot medroxyprogesterone acetate (DMPA) injectable contraceptives, remain among the most widely used modern family planning methods worldwide because of their high effectiveness, convenience, and long duration of action (WHO, 2025). In many developing countries, injectable contraceptives constitute a substantial proportion of contraceptive use and play an important role in achieving reproductive health goals. Despite these advantages, hormonal contraceptives are frequently associated with side effects that may influence users'

satisfaction and continuation rates. Among these side effects, weight gain is one of the most commonly reported concerns and has been recognized as an important factor affecting contraceptive acceptance and long-term adherence (Shokoufeh Dianat et al., 2019).

Indonesia demonstrates a similar pattern of contraceptive use. National reports indicate that injectable contraception remains the most frequently used modern contraceptive method among women of reproductive age (BKKBN, 2022; BPS, 2020). This pattern is also observed in Central Java, where the prevalence of injectable contraceptive use remains high among married women aged 15–49 years (BPS Jawa Tengah, 2023). Likewise, in Pati Regency, injectable contraception continues to dominate family planning services because of its accessibility and practicality (Prasetiyo & Arini, 2023). Although this method offers effective pregnancy prevention, prolonged exposure to hormonal contraceptives may increase the likelihood of adverse effects, particularly weight gain, menstrual disturbances, and metabolic changes, which may ultimately reduce contraceptive continuation (Kemenkes, 2021).

Previous studies consistently reported an association between DMPA use and increased body weight. Women receiving 3-month injectable contraceptives frequently experience gradual weight gain during prolonged use, although the magnitude varies among individuals (Antari et al., 2024; Sodikoh & Sutarno, 2024). Randomized and longitudinal studies have also demonstrated that weight gain among DMPA users tends to accumulate over time and is influenced by multiple biological and behavioral factors (Beksinska et al., 2021). Furthermore, systematic evidence indicates that weight gain, together with menstrual irregularities, represents one of the leading reasons for discontinuation of DMPA worldwide (Shokoufeh Dianat et al., 2019).

The mechanisms underlying weight gain among DMPA users are considered multifactorial. Progesterone-based contraceptives may stimulate appetite, alter energy regulation, promote fat deposition, and contribute to fluid retention, resulting in gradual increases in body weight (Le et al., 2009; Lopez et al., 2016). Individual factors such as age, dietary intake, physical activity, metabolic characteristics, and hormonal responses further influence the extent of weight changes experienced by contraceptive users (Niezgoda et al., 2025). Therefore, weight gain cannot be attributed solely to hormonal exposure but should be understood as the result of interactions between hormonal and lifestyle-related factors.

Lifestyle modification has become an important non-pharmacological strategy for preventing excessive weight gain. Regular aerobic exercise increases energy expenditure, improves metabolic regulation, and supports long-term weight management (Fatkhurohmaningtias & Yuliastrid, 2016; Swift et al., 2014; Wiklund, 2016). Exercise interventions have also been shown to improve body composition and facilitate weight maintenance beyond simple weight loss (Alyafei et al., 2025; D'Souza et al., 2022). Among women using hormonal contraceptives, physical activity may help counterbalance metabolic alterations induced by exogenous hormones and contribute to healthier body weight regulation (Elliott-Sale et al., 2020; O'Donoghue et al., 2021).

Although substantial evidence has established the association between DMPA use and weight gain, most previous studies have focused on describing the occurrence of weight changes or identifying associated risk factors (Antari et al., 2024; Sodikoh & Sutarno, 2024; Susiloningtyas et al., 2023). Evidence evaluating structured aerobic exercise as a practical intervention specifically among women using 3-month injectable contraceptives remains limited, particularly in community-based settings in Indonesia. Consequently, there is insufficient local evidence to support the integration of structured physical activity into family planning counseling and services.

Therefore, this study aimed to evaluate the effect of aerobic exercise on body weight among women using 3-month injectable contraceptives. We hypothesized that participation in a structured aerobic exercise program would significantly reduce body weight compared with participants' baseline measurements.

RESEARCH METHOD

This quantitative study employed a pre-experimental one-group pretest–posttest design to evaluate the effect of aerobic exercise on body weight among women using 3-month depot medroxyprogesterone acetate (DMPA) injectable contraceptives. The study was conducted from November to December 2025 in Tondomulyo Village, Pati District, Central Java, Indonesia. The study population consisted of 100 women of reproductive age (15–49 years) who were current users of 3-month injectable contraceptives. The sample size was determined using the Slovin formula with a 10% margin of error, resulting in 50 participants selected through purposive sampling.

Participants met the following inclusion criteria: women aged 15–49 years, current users of 3-month injectable contraceptives, willing to participate by providing informed consent, and physically able to perform aerobic exercise. Participants with physical conditions that contraindicated exercise or who did not complete the intervention were excluded. The intervention consisted of low-impact moderate-intensity aerobic exercise, performed three times per week for four weeks, with 45 minutes per session. Body weight was measured before (pretest) and after (posttest) the intervention using a calibrated digital weighing scale under standardized measurement procedures. Participant adherence to the exercise program was monitored using an observation checklist throughout the intervention period to ensure consistency.

Data were analyzed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics were used to summarize participant characteristics, while differences in body weight before and after the intervention were analyzed using a paired sample t-test with a significance level of $p < 0.05$.

RESULTS AND DISCUSSIONS

Characteristics of Respondents

The characteristics of respondents in this study include age and duration of contraceptive use. These variables are important to describe the demographic profile of participants and provide context for interpreting the results.

Table 1. Characteristics of respondents

Characteristics	Frequency (n)	Percentage (%)
Age		
≤ 30 years	6	12.0
> 30 years	44	88.0
Duration of Contraceptive Use		
< 1 year	14	28.0
≥ 1 year	36	72.0
Total	50	100.0

The analyses indicate that most of the respondents were above 30 years of age (88%) and only a few participants occurred in ≤30 (12%). Most of the participants were in the mature reproductive age group, which can affect hormonal responses and metabolic processes.

Contraceptive use duration most of the respondents (72%) were using injectable contraceptives for one year and above, while 28% had used less than one year. Longer exposure to hormonal effects, such as weight gain due to contraceptive use, makes this variable of interest for interpreting the effect of aerobic exercise as an intervention.

Distribution of Aerobic Exercise

Table 2. Frequency distribution of aerobic exercise

Aerobic Exercise	Frequency	Percentage (%)
Low Exercise	9	18.0

Aerobic Exercise	Frequency	Percentage (%)
Light Exercise	29	58.0
Regular Exercise	12	24.0
Total	50	100.0

Most of the participants (58%) did light aerobic exercise, (24%) did regular aerobic exercise and finally low aerobic exercise. This indicates that the majority of the subjects took part in moderate physical activity with the next proportion engaging in exercise at a higher intensity.

Respondents in the low exercise category means minimal body activity, which can limit weight reduction effects. On the other hand, respondents performing regular aerobic exercise are likely to have better outcomes due to more energy expenditure and improved muscle metabolism (Bellicha et al, 2021).

Effect of Aerobic Exercise on Body Weight

Table 3. Differences in body weight before and after intervention

Variable	Mean (kg)	Std. Deviation	Mean Difference	t-value	p-value
Pre-Intervention	61.92	10.76			
Post-Intervention	60.86	10.94	1.06	4.33	0.000

The paired sample t-test results that were conducted on all the above-mentioned variables indicate a p-value of 0.000 ($p < 0.05$) before and after intervention, implying a significant difference in body weight post-intervention sessions as compared to pre-intervention values. This result shows that aerobic exercise significantly affected body weight in users of injectable contraceptives at three months. The positive mean difference suggests that the post-intervention body weight was less than the pre-intervention one, meaning that the aerobic exercise intervention helped in reducing weight.

The present study demonstrated a statistically significant reduction in body weight following a four-week aerobic exercise intervention among women using 3-month depot medroxyprogesterone acetate (DMPA) injectable contraceptives. Participants experienced an average weight reduction of 1.06 kg after the intervention. Although the magnitude of weight loss was modest, the findings suggest that structured aerobic exercise may contribute to body weight management among DMPA users. Because this study employed a one-group pretest–posttest design without a comparison group, the observed reduction should be interpreted as an association rather than definitive evidence of causality. Nevertheless, the results indicate that aerobic exercise has potential as a supportive non-pharmacological strategy for women experiencing weight gain during DMPA use.

Weight gain among DMPA users is a multifactorial process involving hormonal, metabolic, and behavioral mechanisms. Progesterone exposure has been associated with increased appetite, alterations in energy regulation, enhanced fat deposition, and fluid retention, all of which may contribute to gradual increases in body weight (Le et al., 2009; Lopez et al., 2016; Manurung, 2018). In addition, prolonged hormonal exposure may influence metabolic homeostasis through changes in energy balance and eating behavior (Shamseddin et al., 2021). However, hormonal effects alone cannot fully explain individual variability in weight changes because age, dietary intake, habitual physical activity, and metabolic characteristics also influence body weight regulation (Niezgoda et al., 2025). These mechanisms support the rationale for incorporating lifestyle interventions alongside contraceptive counseling.

The reduction in body weight observed in this study is biologically plausible because aerobic exercise increases total energy expenditure and helps maintain a negative energy balance when performed regularly. Moderate-intensity aerobic exercise has been shown to improve body composition, increase caloric expenditure, and support long-term weight management (Rocha et al., 2015; Swift et al., 2014). Beyond reducing body weight, regular physical activity contributes to

improved metabolic regulation and healthier lifestyle behaviors, both of which are important for preventing excessive weight gain (Wiklund, 2016). Evidence also suggests that exercise facilitates long-term weight maintenance through physiological and behavioral adaptations rather than through short-term energy expenditure alone (Alyafei et al., 2025; D'Souza et al., 2022). Although metabolic variables were not measured in the present study, these mechanisms may partially explain the observed reduction in body weight after the intervention.

The findings are generally consistent with previous studies examining physical activity among women using hormonal contraceptives. Elliott-Sale et al. (2020) reported that regular exercise may help minimize the physiological consequences associated with hormonal contraceptive use while maintaining physical performance. Likewise, O'Donoghue et al. (2021) demonstrated that structured aerobic exercise effectively improves body composition in adults with overweight and obesity, supporting the role of aerobic activity in weight management. In addition, Abdelkadera et al. (2022) found that aerobic exercise influenced several physiological responses among women using hormonal contraceptives, indicating that structured exercise may complement reproductive health interventions (Abdelkadera et al., 2022). Although differences in study populations, intervention duration, and outcome measures limit direct comparison, the consistency of these findings strengthens the evidence supporting aerobic exercise as an adjunctive lifestyle intervention.

The respondent characteristics observed in this study may also have influenced the intervention outcomes. Most participants were older than 30 years and had used DMPA for at least one year, suggesting prolonged exposure to exogenous progestins. Previous research has shown that weight gain associated with DMPA tends to increase progressively with continued use (Beksinska et al., 2021). Observational studies conducted in Indonesia similarly reported significant associations between long-term DMPA use and increased body weight (Antari et al., 2024; Sodikoh & Sutarno, 2024). Furthermore, hormonal contraceptive users frequently report weight gain and menstrual disturbances as major reasons for discontinuing contraception (Kemenkes, 2021; Shokoufeh Dianat et al., 2019). Therefore, integrating structured physical activity into family planning counseling may provide practical support for women concerned about weight changes during contraceptive use.

Several limitations should be considered when interpreting the findings. First, the absence of a control group limits the ability to attribute the observed weight reduction exclusively to the aerobic exercise intervention. Second, the intervention duration was relatively short, and only body weight was assessed; other factors such as dietary intake, body mass index, waist circumference, body fat percentage, physical fitness, and hormonal profiles were not evaluated. Third, the study involved participants from a single community with a relatively small sample size, which may limit the generalizability of the findings to broader populations. Despite these limitations, the study provides preliminary evidence regarding the feasibility of implementing structured aerobic exercise as a non-pharmacological intervention within community-based family planning services.

Future studies should employ randomized controlled trial designs with larger and more diverse populations to strengthen causal inference. Longer intervention periods and comprehensive outcome measures, including dietary assessment, body composition, physical fitness, and metabolic indicators, would provide a more complete understanding of the effects of aerobic exercise among DMPA users. Such evidence would contribute to the development of evidence-based recommendations for integrating lifestyle interventions into reproductive health and family planning programs.

CONCLUSION

This study demonstrated that a four-week low-impact moderate-intensity aerobic exercise program was associated with a statistically significant reduction in body weight among women using 3-month depot medroxyprogesterone acetate (DMPA) injectable contraceptives. The mean body

weight decreased by 1.06 kg following the intervention, indicating that structured aerobic exercise may contribute to body weight management in this population.

Although the observed weight reduction was modest, these findings suggest that aerobic exercise may serve as a practical non-pharmacological strategy to support women using DMPA who experience weight gain. Given the quasi-experimental one-group pretest–posttest design, the findings should be interpreted with caution and should not be considered definitive evidence of causality.

Further studies employing randomized controlled trial designs, larger sample sizes, longer intervention periods, and additional outcome measures such as dietary intake, body composition, and metabolic indicators are recommended to strengthen the evidence regarding the effectiveness of aerobic exercise in managing weight among DMPA users.

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