Original Article

A Quasi-Experiment of Self-Weight Combined with Dietary and Physical Activity to Reduce Postpartum Weight Retention

Abstract

Background: The failure to lose postpartum weight retention (PPWR) can impact obesity in later life, making programs aimed at reducing PPWR crucial. The study aimed to assess the effect of a self-weight approach combined with dietary and physical activity interventions to reduce PPWR. **Materials and Methods:** This quasi-experimental study employed a three-group, pretest–posttest design. The study recruited 178 postpartum mothers who attended a 6-week postpartum check-up at a university hospital in Chiang Mai, Thailand, from 2018 to 2020. Data was collected using a self-administered questionnaire. The intervention groups received dietary counseling combined with self-weighting (D) and diet and physical activity counseling combined with self-weighting (DP), while the control group received standard care. Analysis of covariance was used for data analysis, with pre-pregnancy weight as the covariance. **Results:** PPWR was 3.39 kg for the D group, 3.20 kg for the DP group, and 4.14 kg for the control group ($F_{(2,174)}$ =1.91, $p > 0.05$). At 6 months postpartum, on comparing self-weighting and non-self-weighting groups, it was found that PPWR was 2.88 and 3.99 kg for the self-weighting and non-self-weighting groups, respectively (t_{176}= –2.28, p = 0.024). **Conclusions:** The study results indicated that dietary or combined dietary and physical activity counseling for postpartum mothers is necessary. For optimal success, postpartum mothers should be encouraged to undertake daily or weekly self-weighing to reduce PPWR.

Keywords: *Body weight, body weights and measures, diet, exercise, weight gain*

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Introduction

Postpartum Weight Retention (PPWR) is defined as the difference between postpartum and pre-pregnancy weight. Women who can lose the weight gained during pregnancy by 6 months postpartum have a lower body mass index (BMI) at 6 years postpartum.[1,2] Thus, addressing PPWR is important for reducing long-term negative impacts.[3,4] Previous interventions often focused narrowly on diet and exercise without considering broader behavioral aspects. A meta-analysis suggested that interventions using behavior change techniques such as behavior goal setting, outcome goal setting, and self-monitoring have the potential to reduce sedentary behavior in adults.[5] Furthermore, the self-weighting approach is a necessary component.[6] Self-weighing aligns with self-regulation rooted in social cognitive theory. This approach emphasizes the importance of monitoring and controlling one's own behaviors to achieve desired outcomes. Self-regulation strategies, such as goal setting and self-monitoring, are critical components in interventions designed to reduce sedentary behavior and promote weight management.[7] It involves continuous self-monitoring, fostering awareness and empowerment in postpartum women. Studies have demonstrated the effectiveness of self-weighing in sustained weight management, emphasizing its role in improving motivation and goal setting.[8,9] However, adherence rates among women differ substantially during and after pregnancy. About 80% of women consistently self-weigh during pregnancy, but this rate drops to 57% in the postpartum period, suggesting a diminished perceived value of weight monitoring after childbirth.[10] This intervention creates a holistic strategy for addressing PPWR by integrating traditional counseling with a self-weighting approach combined with diet and physical activity. Unlike previous interventions that often focused narrowly on diet or exercise alone, our method

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incorporates self-weighting to enhance self-monitoring and behavioral regulation. This study evaluates the efficacy of this integrated method through a quasi-experimental design, hypothesizing that it will lead to a significant reduction in PPWR.

Materials and Methods

This study employed a quasi-experimental, three-group, pretest–posttest design with a total of 192 participants. The participants were breastfeeding women at 6 weeks post-delivery, recruited from university hospitals in Chiang Mai, Thailand, from January 2018 to January 2020.

The sample size was calculated using G*Power 3.1.9.4 for a two-tailed *t*-test. The calculation was based on a power of 0.80, a significance level of 0.05, and an effect size (d) of 0.55, obtained from a previous study that assessed diet and physical activity intervention at 6 months postpartum.[11] The required sample size was 53 participants per group. To account for a 20% attrition rate, the final sample size was increased to 64 per group, resulting in a total of 192 participants across the three groups (64 × 3).

The study recruited postpartum mothers who met the inclusion criteria at the end of their postpartum visit. Inclusion criteria were primiparous postpartum women over 18 years of age within six (±2) weeks after birth, having more than 5 kg of PPWR, and able to breastfeed. Exclusion criteria included conditions of a subsequent pregnancy that could impact their weight beyond the 6-week mark.

Data collection was conducted at the postpartum service unit, which operated on Mondays and Tuesdays each week at X Hospital. Pseudo-random categorization using a random number via cubic dice was applied on the morning of data collection, resulting in three groups. When a cubic dice was rolled, a random number from 1 to 6 was obtained: 1 and 4 = dietary counseling combined with self-weighting (D), 2 and 5 = dietary and physical activity counseling combined with self-weighting (DP), 3 and 6 = control group (C). All participants on that day received the same intervention.

Participants in the D group received a welcome and preparation session of approximately 45–50 min, which covered the importance of weight management, goal setting to return to pre-pregnancy weight, and potential long-term risks of remaining PPWR. The session also introduced food-based dietary guidelines, including nine Thai dietary guidelines.[12,13] It was recommended that weight reduction should be approximately 0.50 kg, but not more than 1 kg per week. The DP group received the same preparation session as the D group along with additional guidelines for appropriate physical activity. The physical activity model recommended brisk walking for at least 45 min about 4 days/week. Both intervention groups were provided with digital weighing scales. Participants in the D and DP groups were instructed to perform self-weighing and send their weight records to the research team via the LINE application. The control group received standard care. At 6 months postpartum, participants attended a well-baby clinic session, where they spent 10–15 min discussing their behaviors, frequency of self-weighting, and measuring their current weight.

Data collection tools included: 1) a demographic questionnaire documenting participants' age, education, sleep adequacy, breastfeeding practice, type of birth, and pre-pregnancy BMI; 2) a PPWR record documenting weight reduction throughout the study period[14]; and 3) an electronic scale measuring weight to the nearest 0.10 kg (Digital Shaper HD9380). The researcher team measured weights at 6 weeks and 6 months to prevent inaccuracies associated with self-reported weight.

PASW statistics version 18 was used for all analyses. Fisher's exact test and the Chi-square test were performed to compare demographic data between groups. PPWR classified by intervention and self-weight approach was computed using analysis of covariance with pre-pregnancy weight as a covariate and independent *t*-test. The significance level was set at $P < 0.05$.

Ethical considerations

The study protocol was approved by the Faculty of Nursing Chiang Mai University Institutional Review Board (Approval No. 125-2017) and the Institutional Review Board of the Faculty of Medicine, Chiang Mai University (Approval No. 2557-02374). The research team asked postpartum women if they were willing to participate in the study. Those who agreed were asked to sign an informed consent and complete the demographic questionnaire.

Results

Of the 192 women who entered the study, 178 (92.71%) completed the 18-week program from 6 weeks to 6 months postpartum, divided into 59 (92.19%) in the D group, 60 (93.75%) in the DP group, and 59 (92.19%) in the control group. The mean age was 28.02 (4.94) years. Participants were not statistically different in demographic characteristics ($p > 0.05$), as seen in Table 1.

As shown in Table 2, on comparing PPWR at 6 weeks and 6 months postpartum, it was found that PPWR of the three groups was not significant before intervention ($F_{(2,174)} = 1.15$, $p = 0.317$) at 6 weeks, whereas at 6 months, PPWR of the DP group was the lowest and PPWR of the control group was the highest. However, the differences were not statistically significant ($F_{(2,174)} = 1.91$, $p = 0.151$). Furthermore, some participants did not adhere to the self-weighing approach of the research protocol. Among the participants in the intervention group, 37 (62.71%) in the diet group and 29 (48.33%) in the diet and physical activity group followed the self-weighing protocol. On

Table 1: Number, percentage, Mean, and SD of characteristics, classified by experimental group (D and DP) and control group (C) (*n*=178)

Variable	Group D[a] (*n*=59) Number (%)	Group DP[b] (*n*=60) Number (%)	Group C[c] (*n*=59) Number (%)	*p*
Age (years)				
18–35	58 (98.30)	55 (91.67)	53 (89.83)	0.138[d]
>35	1 (1.70)	5 (8.33)	6 (10.17)	
Level of education				
Elementary	1 (1.69)	0 (0.00)	2 (3.39)	0.126[d]
High school	10 (16.95)	2 (3.33)	9 (15.25)	
School/diploma	18 (30.51)	15 (25.00)	12 (20.34)	
Diploma	28 (47.46)	40 (66.67)	33 (55.93)	
Bachelor's degree	2 (3.39)	3 (5.00)	3 (5.09)	
Sleep				
Not adequate	36 (61.02)	32 (53.33)	35 (59.32)	0.671[e]
Adequate	23 (38.98)	28 (46.67)	24 (40.68)	
Breastfeeding				
Exclusive	45 (76.27)	36 (60.00)	42 (71.19)	0.145[e]
Partial	14 (23.73)	24 (40.00)	17 (28.81)	
Birth type				
Vaginal delivery	52 (88.14)	55 (91.67)	53 (89.83)	0.815[e]
Cesarean section	7 (11.86)	5 (8.33)	6 (10.17)	
Pre-pregnancy BMI mean (SD)=21.04 (2.77)				
<18.5	6 (10.17)	8 (13.33)	12 (20.34)	0.399[d]
18.5–24.9	49 (83.05)	45 (75.00)	44 (74.57)	
≥25	4 (6.78)	7 (11.67)	3 (5.09)	
Self-weight approach				
Daily	30 (50.85)	19 (31.67)	0 (0.00)	<0.001[d]
Weekly	7 (11.86)	10 (16.67)	0 (0.00)	
Non-self-weight	22 (37.29)	31 (51.66)	59 (100.00)	

[a]D=dietary counseling combined with self-weighting. [b]DP=dietary and physical activity counseling combined with self-weighting. [c]C=control. [d]Fisher's exact test. [e]Chi-square test. BMI=body mass index, SD=standard deviation

Table 2: Mean and SD of postpartum weight retention at 6 weeks and at 6 months classified by intervention and self-weight approach (*n*=178)

Group	PPWR at 6 weeks			PPWR at 6 months		
	$\bar{X}$ (SD)	F[a]	*p*	$\bar{X}$ (SD)	F[a]	*p*
	$\bar{X}$ (SD)=7.79 (3.11)			$\bar{X}$ (SD)=3.57 (3.19)		
Intervention						
Dietary group (*n*=59)	7.40 (2.42)	1.15	0.317	3.39 (2.92)	1.91	0.151
Self-weight (*n*=37)	7.42 (2.63)			3.07 (3.29)		
Non-self-weight (*n*=22)	7.37 (2.09)			3.93 (2.13)		
Diet and PA (*n*=60)	8.41 (3.87)			3.20 (3.69)		
Self-weight (*n*=29)	8.69 (4.45)			2.63 (3.59)		
Non-self-weight (*n*=31)	8.15 (3.31)			3.74 (3.77)		
Control group (*n*=59)	7.55 (2.80)			4.14 (2.84)		
Self-weight approach	$\bar{X}$ (SD)	*t*[b]	*p*	$\bar{X}$ (SD)	*t*[b]	*p*
Self-weight (*n*=66)	7.98 (3.57)	0.61	0.545	2.88 (3.41)	−2.28	0.024
Non-self-weight (*n*=112)	7.68 (2.82)			3.99 (2.99)		

[a]ANCOVA, covariate: pre-pregnancy weight. [b]*t*=independent *t*-test. ANCOVA=analysis of covariance, PA=physical activity, PPWR=postpartum weight retention, SD=standard deviation

comparing those who adhered to self-weighing to those who did not, the results showed that the self-weighing group showed significant reduction in PPWR compared to the non-self-weighting group (t_{176}= –2.28, P = 0.024).

Discussion

PPWR at 6 months was highest in the control group, indicating that dietary and physical activity advice may help reduce PPWR, even though the differences were not statistically significant. While the intervention groups (diet and diet plus physical activity) showed lower PPWR compared to the control group, the result did not reach statistical significance, suggesting that other factors may influence weight retention postpartum.

Dietary counseling based on food-based dietary guidelines or physical activity via brisk walking does not seem sufficient to significantly reduce PPWR. A distinguishing point is that 60%–70% of each group reported exclusive breastfeeding, which requires increased resting time because mothers may wake up multiple times during the night for breastfeeding. These findings are reinforced by nearly 60% of participants in each group reporting inadequate sleep. These factors could potentially impact some mothers' behaviors, such as consuming excessive calories or limiting physical activity, which may explain why interventions like dietary or dietary and physical activity counseling did not effectively reduce PPWR.

This is supported by Baattaiah *et al.*'s[15] study, which found that mothers who experienced postpartum fatigue (PPF) were less physically active than those without PPF. In addition, systematic reviews[16,17] have shown that PPWR did not change significantly in dietary or physical activity intervention groups. Our study results align with those of Palnati *et al*.,[18] who implemented a lifestyle intervention targeting exercise and diet to reduce PPWR from 6 weeks to 6 months and found no statistically significant difference in weight change during these periods.

The research findings provide insightful observations on the role of self-weighing in reducing PPWR. A significant difference was observed between participants who adhered to self-weighing and those who did not. The self-weighing group showed a statistically significant greater reduction in PPWR (t_{176}= −2.28, p = 0.024) compared to their counterparts. However, it is important to consider the adherence rates to the self-weighing protocol in the different intervention groups. In the diet group, only 37 participants (62.71%) adhered to the self-weighing protocol, while in the diet and physical activity group, adherence was observed in 29 participants (48.33%). This variation in adherence rates highlights the challenges faced in implementing self-monitoring practices consistently, especially in a postpartum setting where individuals might be dealing with various physical and emotional adjustments.[19] The difference in adherence rates between the groups suggests that adding physical activity to the dietary intervention may impact the likelihood of participants following through with self-weighing. This could be due to increased time constraints or physical fatigue associated with engaging in both diet modification and exercise routines, making regular self-weighing more challenging to maintain.[15]

According to the Clinical Practice Guidelines for Weight Management in Postpartum Women, behavior-modifying techniques such as goal setting, motivational interviewing, and especially self-monitoring should be adopted during the initiation of interventions and follow-ups. These techniques have been shown to be effective for postpartum weight management and overall well-being.[20] In addition, Geusens *et al*.[8] found that using self-weighting as a standalone strategy did not effectively contribute to weight reduction. However, when combined with a behavioral weight management program, self-weighing led to significant weight loss.

This study contributes valuable insights into the effectiveness of the self-weighing strategy in PPWR. It sheds light on why interventions lacking a self-weighing component have yielded inconsistent results. However, certain limitations should be acknowledged. Only participants in the intervention group received weighing scales, potentially leading to contamination in the control group setup. To mitigate this, a pseudo-randomized approach was employed, where all participants received the same intervention on a given day.

One limitation of this study is that no specific self-weighing frequency was assigned to participants, leading to uneven sample sizes across different categories. A second limitation is the use of pseudo-randomization rather than full randomization. Due to the logistics of collecting data on the same day for both the intervention and control groups, participants in the control group may have questioned why they did not receive digital weighing scales. This led to the study being classified as quasi-experimental, which may affect internal validity.

Conclusion

Our research provides valuable insights into the role of self-weighing in managing PPWR. The study revealed that participants who adhered to a self-weighing regimen, along with dietary or dietary and physical activity counseling, experienced a significantly greater reduction in postpartum weight compared to those who did not follow the protocol. In light of these findings, it is imperative for health programs targeting postpartum weight loss to integrate structured self-monitoring practices, encompassing both dietary adjustments and physical activity. This approach aligns with national guidelines on postpartum care, which emphasize promoting healthy behaviors and weight management among postpartum mothers.

National policies in Thailand, such as those outlined by the Ministry of Public Health, recommend comprehensive postpartum care that includes monitoring weight and providing dietary and physical activity counseling. Integrating self-weighting into these programs addresses practical

challenges and optimizes the potential for effectively reducing PPWR. Tailoring these programs to encourage consistent self-weighing among postpartum mothers could serve as a cornerstone strategy in mitigating the long-term risk of obesity and improving overall maternal health.

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Conflicts of interest

Nothing to declare.

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