

The Effect of Peer Teaching Education on Diabetes Self-Care in Patients with Gestational Diabetes: A Quasi-Experimental Study

Lina Oktavia^{1*}, Willy Astriana², M. Agung Akbar²

¹ Public Health Study Program, STIKes Al-Ma'arif Baturaja, Indonesia

² Diploma of Midwifery Study Program, STIKes Al-Ma'arif Baturaja, Indonesia

² Diploma of Nursing Study Program, STIKes Al-Ma'arif Baturaja, Indonesia

Corresponding Author Email: linaoktavia342@gmail.com

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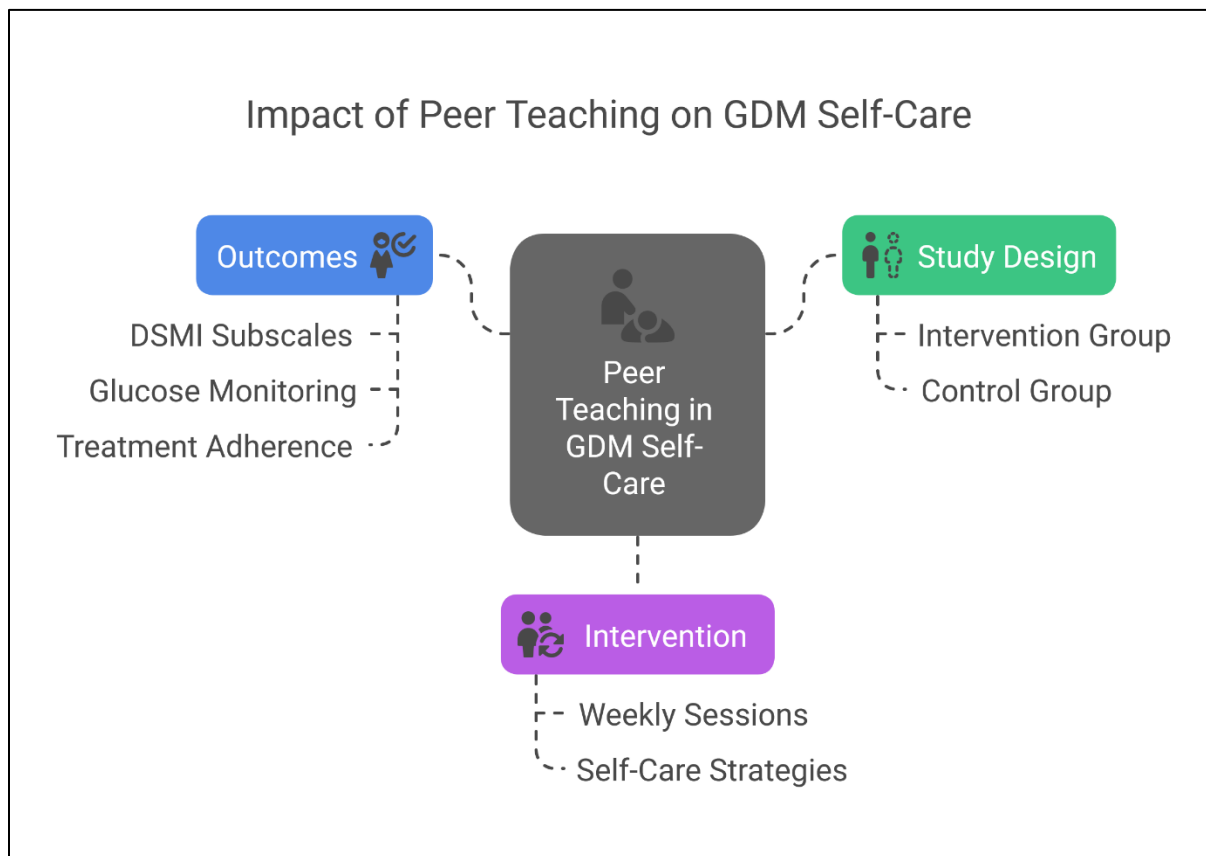
ABSTRACT

Gestational diabetes mellitus (GDM) is a global health concern requiring effective self-care, yet barriers such as limited social support and education persist. Peer teaching has emerged as a potential strategy to enhance self-care in GDM patients, though evidence of its effectiveness remains scarce. This quasi-experimental study aimed to evaluate the impact of peer teaching on diabetes self-care behaviors among GDM patients. The study involved 80 pregnant women with GDM, divided into an intervention group (receiving peer teaching) and a control group (receiving standard care). The intervention consisted of weekly 90-minute peer-led sessions over four weeks, focusing on practical self-care strategies. Self-care behaviors were assessed using the Diabetes Self-Management Instrument (DSMI) at baseline and post-intervention. Results revealed significant improvements in all DSMI subscales (self-integration, self-regulation, interaction with healthcare providers, self-monitoring, and adherence to therapy) in the intervention group ($p < 0.001$), with no comparable changes observed in the control group. The findings demonstrate that peer teaching effectively enhances self-care practices in GDM patients, particularly in glucose monitoring and treatment adherence. These results support integrating peer-led education into routine antenatal care for GDM, especially in resource-limited settings. Future research should explore long-term outcomes and scalability to strengthen implementation strategies.

Key Messages:

- This study shows that peer teaching interventions significantly improve self-care behaviors in GDM patients, providing an effective alternative to conventional education methods
- This study provides novel evidence supporting the integration of peer teaching into routine antenatal care.

GRAPHICAL ABSTRACT



INTRODUCTION

Gestational diabetes mellitus (GDM) is a growing global health concern, affecting approximately 7-15% of pregnancies worldwide, with significant risks for both maternal and fetal health (1, 2). Poorly managed GDM can lead to adverse outcomes, including macrosomia, neonatal hypoglycemia, and increased cesarean delivery rates (2). Additionally, women with GDM face a higher risk of developing type 2 diabetes later in life, emphasizing the need for effective self-care strategies during pregnancy (3). Current management primarily involves dietary modifications, physical activity, and glucose monitoring, yet adherence remains suboptimal due to limited patient education and support (4). Peer teaching, where individuals with similar conditions share knowledge and experiences, has emerged as a potential strategy to enhance self-care in chronic diseases (5).

The concept of peer teaching is rooted in social learning theory, which posits that individuals learn effectively through observation, imitation, and shared experiences (6). In diabetes care, peer-led education has shown promise in improving self-care among patients with type 2 diabetes, fostering empowerment and accountability (7). Studies suggest that peer support can enhance glycemic control, medication adherence, and lifestyle modifications by providing relatable role models and practical advice (8). Despite these benefits, research on peer teaching in GDM is scarce, leaving a gap in evidence-based interventions tailored for pregnant women (5). Given the unique physiological and psychological challenges of GDM, peer teaching may offer a culturally sensitive and accessible approach to improving self-care (9, 10). This study seeks to address this gap by evaluating the impact of peer teaching on GDM self-care.

Existing interventions for GDM often rely on healthcare professionals, which may be limited by time constraints and standardized approaches that fail to address individual patient needs (11). Peer teaching, by contrast, leverages lived experiences, creating a more personalized and empathetic learning environment (12, 13). Previous studies in non-gestational diabetes have demonstrated that peer-led programs improve self-efficacy and reduce feelings of isolation, which are common among GDM patients

(8, 13). However, the transient nature of GDM lasting only during pregnancy poses unique challenges, as patients must rapidly adapt to new self-care routines (14). This urgency underscores the need for innovative, scalable interventions like peer teaching that can deliver timely and relatable education.

Despite the recognized importance of self-care in GDM, many patients struggle with implementing recommended lifestyle changes due to a lack of confidence or social support. Traditional education methods, such as one-on-one counseling or group classes, may not fully address these barriers, particularly in low-resource settings (15). Peer teaching offers a cost-effective and scalable alternative, potentially bridging the gap between clinical advice and real-world application. For instance, peers can share practical tips on meal planning, glucose monitoring, and stress management that resonate more deeply than generic instructions (16).

The current evidence on peer teaching in diabetes management is largely derived from studies on type 1 or type 2 diabetes, limiting its generalizability to GDM (17, 18). Pregnant women with GDM face challenges such as fluctuating hormones, dietary restrictions, and concerns about fetal health, which impact their self-care practices (19). Peer teaching may help patients manage these challenges by offering relatable advice and emotional support. Peer teaching could mitigate these challenges by fostering a sense of community and accountability among participants (20). Peer teaching aligns with this paradigm by empowering patients to take an active role in their health through shared decision-making and mutual support (16). However, the lack of structured peer education programs tailored for GDM in these settings underscores the need for scalable and culturally adaptable models. This quasi-experimental study aims to evaluate the effect of peer teaching education on diabetes self-care in patients with GDM.

METHODS

This study employed a quasi-experimental design with an intervention and control group to evaluate the effect of peer teaching education on diabetes self-care in patients with gestational diabetes mellitus (GDM). The intervention group received structured peer education, while the control group received standard care. A pre-test and post-test assessment were conducted to measure changes in self-care behaviors. This design was selected due to ethical and logistical constraints that prevented random assignment. The study was conducted over a 12-week period, aligning with the critical window for GDM management during pregnancy (21).

The research was conducted in Tanjung Baru Community Health Center at Ogan Komering Ulu Regency, South Sumatera, Indonesia serving a diverse socioeconomic population. Eligible participants were pregnant women aged 18–40 years diagnosed with GDM between 24–32 weeks of gestation, with no prior history of diabetes. Exclusion criteria included severe pregnancy complications (e.g., preeclampsia) and communication barriers (e.g., language limitations). A convenience sampling method was used, with 80 participants (40 per group) recruited based on a power analysis ($\alpha = 0.05$, power = 80%, effect size = 0.5).

The peer teaching program included 90-minute weekly sessions for four weeks, focusing on interactive discussions, demonstrations, and goal-setting. Peer educators shared personal experiences and practical tips while reinforcing GDM management guidelines. Sessions were conducted in clinic group rooms, using culturally appropriate materials. Attendance logs and session feedback forms monitored adherence and engagement. The control group received standard one-on-one counseling from healthcare providers, covering similar topics but without peer interaction.

Data were collected using validated instruments. The study employed the Diabetes Self-Management Instrument (DSMI), developed by Lin, Anderson (22). Originally in English, this 35-item questionnaire uses a Likert scale ranging from 1 (never) to 4 (always) across four response options. The DSMI comprises five subscales: self-integration (10 items), self-regulation (9 items), interaction with health professionals and significant others (9 items), self-monitoring blood glucose (4 items), and adherence to recommended therapy (3 items). In this research, the Indonesian adaptation of the DSMI (IDN-DSMI) by Rahayu and Chen (23) was utilized, demonstrating strong reliability with a Cronbach's alpha of 0.96 for the overall instrument and 0.84–0.93 for the subscales.

Statistical analysis was performed using SPSS. Descriptive statistics (means, standard deviations, frequencies) summarized participant characteristics. Paired t-tests compared pre- and post-intervention

changes within groups, while independent t-tests assessed differences between groups. A p-value < 0.05 was considered statistically significant.

Written informed consent was secured from all participants, emphasizing voluntary participation and confidentiality. Data were anonymized, and participants could withdraw at any time without affecting their medical care. Peer educators underwent ethical training to ensure respectful and non-coercive communication. The study adhered to the Declaration of Helsinki principles, ensuring participant safety and welfare.

RESULTS

The study included 80 pregnant women with GDM, divided equally into intervention (n=40) and control (n=40) groups. The mean age of participants was 29.8 ± 4.0 years in the intervention group and 29.2 ± 4.4 years in the control group, with no significant difference between groups ($p=0.512$). Gestational age at enrollment was similar between groups (intervention: 28.5 ± 2.0 weeks; control: 28.1 ± 2.2 weeks; $p=0.401$). The mean BMI was 26.7 ± 3.2 kg/m² in the intervention group and 27.1 ± 3.5 kg/m² in the control group ($p=0.589$). Regarding parity, 37.5% of intervention participants and 42.5% of controls were primiparous, while 62.5% and 57.5% were multiparous, respectively ($p=0.823$). Educational attainment showed comparable distributions, with 55.0% of the intervention group and 47.5% of controls having high school education or less, while 45.0% and 52.5% had college or higher education ($p=0.456$). These results confirm that both groups were well-balanced at baseline for all measured demographic characteristics, as shown in Table 1.

Table 1. Baseline Characteristics of Response

Variables	Intervention Group	Control Group	P-value
Age (years), mean \pm SD	$29,8 \pm 4,0$	$29,2 \pm 4,4$	0,512
Gestational age (weeks), mean \pm SD	$28,5 \pm 2,0$	$28,1 \pm 2,2$	0,401
BMI (kg/m²), mean \pm SD	$26,7 \pm 3,2$	$27,1 \pm 3,5$	0,589
Parity, n (%)			
Primiparous	15 (37,5%)	17 (42,5%)	0,823
Multiparous	25 (62,5%)	23 (57,5%)	
Education, n (%)			
High School or less	22 (22%)	19 (47,5%)	0,456
College or higher	18 (45%)	21 (52,5%)	

Paired t-test results in Table 2 show significant improvements ($p<0.001$) across all DSMI subscales in the intervention group, indicating that the peer-teaching program effectively enhanced self-care behaviors from baseline to post-intervention.

Table 2. Characteristics response of the intervention and control group

DSMI Subscales	Group	Baseline Mean \pm SD	Post-Intervention Mean \pm SD	Within-Group p-value (Paired t-test)	Between-Group p-value (Independent t-test)
Self-Integration	Intervention	$2,14 \pm 0,5$	$3,18 \pm 0,41$	0,001	0,001
	Control	$2,08 \pm 0,56$	$2,12 \pm 0,53$	0,421	
Self-Regulation	Intervention	$2,30 \pm 0,60$	$3,40 \pm 0,50$	0,001	0,001
	Control	$2,20 \pm 0,54$	$2,26 \pm 0,58$	0,387	
Interaction with HCPs	Intervention	$2,10 \pm 0,46$	$3,00 \pm 0,37$	0,001	0,001
	Control	$2,00 \pm 0,50$	$2,06 \pm 0,47$	0,305	
Self-Monitoring	Intervention	$1,55 \pm 0,53$	$3,20 \pm 0,60$	0,001	0,001
	Control	$1,50 \pm 0,58$	$1,58 \pm 0,55$	0,512	
Adherence to therapy	Intervention	$2,17 \pm 0,60$	$3,40 \pm 0,53$	0,001	0,001
	Control	$2,10 \pm 0,63$	$2,13 \pm 0,57$	0,674	

Meanwhile, the independent t-test results (all between-group $p<0.001$) confirm these changes were substantially greater than the minimal, non-significant fluctuations observed in the control group,

establishing the intervention's superior effectiveness compared to standard care alone. These findings suggest that peer education led to significant improvements in gestational diabetes self-management, surpassing the effectiveness of standard care.

DISCUSSION

The significant improvements observed across all DSMI subscales in the intervention group ($p < 0.001$) align with existing evidence supporting peer education in chronic disease management. However, this study extends these findings to gestational diabetes mellitus (GDM), a population often overlooked in peer-support literature. Peer teaching can address both knowledge gaps and practical barriers, which are critical for effective GDM management. The significant improvements in the intervention group compared to standard care ($p < 0.001$) highlight the limitations of conventional, provider-centric approaches in GDM. While traditional education often focuses solely on information delivery, peer teaching uses relatability and shared experiences to promote behavioral change.

Previous studies in type 2 diabetes have similarly demonstrated that peer-led interventions enhance self-efficacy and adherence to recommended behaviors (24). This finding echoes the work of Azmiardi, Murti (8), who found that peer support improved glycemic control in pregnant women more effectively than didactic sessions alone. We attribute this success to the peer educators' ability to demonstrate real-world problem-solving, such as managing glucose testing during work hours. This practical dimension may explain why our results surpassed those of technology-based self-monitoring interventions (Lee et al., 2022), which often fail to address contextual barriers faced by patients.

However, this study extends these findings to GDM, a population rarely explored in peer-support literature. Some prior studies may not have demonstrated significant effects from similar interventions, possibly due to methodological differences, such as shorter intervention durations or a lack of a holistic approach. In this study, the success of peer teaching may stem from its combination of knowledge dissemination and emotional support, which is often missing in traditional provider-centric approaches (8, 25).

Women with GDM are more receptive to information delivered by peers due to shared experiences and empathy, facilitating the internalization of health messages (26). Additionally, peer teaching reduces psychological barriers such as fear or isolation, encouraging the adoption of healthy behaviors like glucose monitoring and dietary modifications (8, 21). This approach also leverages *role modeling*, where participants observe their peers successfully managing GDM, thereby boosting self-efficacy and motivating behavioral change (27).

Despite these positive findings, several limitations must be acknowledged. The use of convenience sampling may limit generalizability, and the 12-week follow-up period precludes assessment of long-term outcomes. Additionally, social desirability bias could have influenced self-reported DSMI scores. The absence of blinding in the intervention delivery may also have introduced performance bias. Future studies should incorporate randomized designs with longer follow-up to assess sustainability and include qualitative components to explore mechanisms of change.

The implications of this research extend beyond clinical practice to health policy. Our findings suggest that integrating peer teaching into routine antenatal care could help bridge the gap between guideline recommendations and real-world adherence. This approach aligns with WHO's emphasis on task-shifting and community-based strategies for non-communicable diseases.

In conclusion, this study provides robust evidence that peer-teaching education significantly improves self-care behaviors in GDM patients compared to standard care. The intervention's success across multiple domains of diabetes management suggests its potential as a comprehensive, patient-centered approach. While limitations exist, the consistency of our results with broader peer-support literature supports its adoption in diverse healthcare settings. Future research should explore cost-effectiveness and implementation strategies to facilitate widespread integration into maternal health programs.

CONCLUSION

This study shows that peer-teaching education significantly improves self-care behaviors in

patients with gestational diabetes mellitus (GDM) compared to standard care. The intervention led to clinically meaningful improvements in all measured domains, especially in glucose self-monitoring and treatment adherence, with participants shifting from occasional to consistent self-care practices. These findings support the growing body of evidence on peer support's effectiveness in diabetes management while specifically addressing the unique needs of pregnant women, who require rapid adaptation to self-care routines. The results are especially relevant for low-resource settings where access to specialized diabetes care remains limited, suggesting peer education could help bridge existing gaps in GDM management. For clinical practice, healthcare institutions should consider integrating structured peer-education programs into routine antenatal care for GDM patients. Maternal health guidelines should be updated to include peer support as an evidence-based component of GDM management, particularly emphasizing its role in improving self-monitoring behaviors.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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