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IMPACT OF A STRUCTURED SELF-CARE EDUCATIONAL MODULE ON GESTATIONAL DIABETES MELLITUS MANAGEMENT IN PESHAWAR, PAKISTAN

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Abstract

Gestational Diabetes Mellitus (GDM) poses significant risks to maternal and neonatal health, particularly in South Asian populations. This study evaluates the impact of a structured self-care educational module on key health behaviors among pregnant women with GDM in Peshawar, Pakistan.

A quasi-experimental design was conducted with 220 participants (110 intervention, 110 control). The intervention group received structured education, while the control group continued routine care. Pre- and post-intervention assessments measured knowledge, dietary adherence, glucose monitoring, physical activity, sleep quality, and psychological well-being.

Results showed significant improvements in the intervention group: knowledge (45% to 90%), dietary adherence (45% to 85%), glucose monitoring (50% to 92%), and physical activity (35% to 88%). Stress reduction and sleep quality also improved ($p<0.05$).

Findings support integrating structured education into antenatal care to enhance GDM self-management, particularly in resource-limited settings. Future research should assess long-term adherence and explore digital health solutions for patient education.

INTRODUCTION

Gestational diabetes mellitus (GDM) is a condition characterized by glucose intolerance first diagnosed during pregnancy, with implications for maternal and fetal health (ADA, 2019). Studies indicate that GDM affects approximately 7-10% of pregnancies globally, with higher prevalence rates in South Asian populations, including Pakistan (Bhuria et al., 2021). Poor management of GDM can lead to macrosomia, preeclampsia, and an increased risk of type 2 diabetes later in life (Wang et al., 2019). The growing burden of GDM is not only a significant concern for maternal-fetal medicine but also has long-term public health implications, as children born to mothers with GDM have a higher risk of obesity and metabolic disorders later in life (Smith et al., 2020).

Various factors contribute to the increasing prevalence of GDM, including genetic predisposition, lifestyle factors, and socio-economic disparities (Hernandez et al., 2020). In developing countries like Pakistan, inadequate access to prenatal care and limited awareness regarding GDM symptoms further exacerbate the issue. Many pregnant women remain

undiagnosed or receive suboptimal treatment, leading to higher rates of pregnancy-related complications (Rahman et al., 2021). Additionally, cultural and dietary habits significantly influence the ability of women to adhere to recommended lifestyle modifications, necessitating the need for context-specific educational interventions (Kumar et al., 2022).

Educational interventions have shown promising results in improving self-care behaviors, particularly in populations with limited access to healthcare resources (Hernandez et al., 2020). Self-care management strategies, such as dietary modifications, glucose monitoring, and physical activity, are critical in preventing adverse pregnancy outcomes (Rani et al., 2018). Research suggests that empowering pregnant women with adequate knowledge and practical self-care skills leads to better glycemic control and improved pregnancy outcomes (Williams et al., 2022). Community-based educational programs have also demonstrated positive outcomes in terms of increasing awareness and adherence to GDM management protocols (Ali et al., 2021).

This study assesses the impact of a structured self-care educational intervention on improving GDM management outcomes in Peshawar, Pakistan, where healthcare disparities pose significant challenges to effective disease management (Ahmed et al., 2021). The intervention aims to bridge the knowledge gap and equip pregnant women with the necessary tools to actively manage their condition. By incorporating evidence-based practices, this study seeks to determine the effectiveness of educational interventions in enhancing maternal health and reducing GDM-associated risks in resource-limited settings.

Methods

A quasi-experimental pre-test/post-test control group design was used to evaluate the effectiveness of a structured self-care education module. Participants (n=220) were recruited from antenatal care units in Peshawar, Khyber Pakhtunkhwa, Pakistan. The intervention group (n=110) received structured education on GDM self-care, including dietary counseling, glucose monitoring, physical activity, and stress management, while the control group (n=110) received routine care (Ali et al., 2022).

The educational module included interactive sessions on GDM pathophysiology, importance of glycemic control, and behavioral strategies to improve compliance (Smith et al., 2019). Participants in the intervention group attended weekly educational sessions over four weeks, while the control group received only general antenatal care (Rahman et al., 2020). Data were collected through a validated structured questionnaire before and after the intervention, measuring self-care knowledge, adherence to dietary recommendations, glucose monitoring, physical activity levels, and psychological well-being (Kumar et al., 2021). Statistical analysis was conducted using SPSS version 23, employing paired t-tests and ANOVA to evaluate pre- and post-intervention differences between groups (Brown et al., 2022).

Results

The results of this study demonstrated substantial improvements in multiple self-care parameters among the intervention group compared to the control group. The structured educational module significantly enhanced participants' knowledge, dietary adherence, blood glucose monitoring habits, physical activity levels, and psychological well-being.

Table 1: impact of the intervention on key self-care behaviors

Variable	Pre-Intervention (%)	Post-Intervention (%)	p-value
Knowledge improvement	45	90	<0.05
Dietary adherence	45	85	<0.01
Blood glucose monitoring	50	92	<0.05
Physical activity	35	88	<0.01
Stress levels (Likert scale)	4.2 ± 1.1	2.1 ± 0.9	<0.05

Table 1 illustrates the impact of the intervention on key self-care behaviors. Particularly, knowledge improvement was significant, with post-intervention scores nearly doubling compared to baseline. Dietary adherence and blood glucose monitoring also showed substantial increases, with participants

demonstrating greater commitment to meal planning and self-monitoring of glucose levels. Additionally, physical activity levels improved significantly, with a marked increase in daily moderate exercise engagement.

Figure 1: impact of the intervention on key self-care behaviors

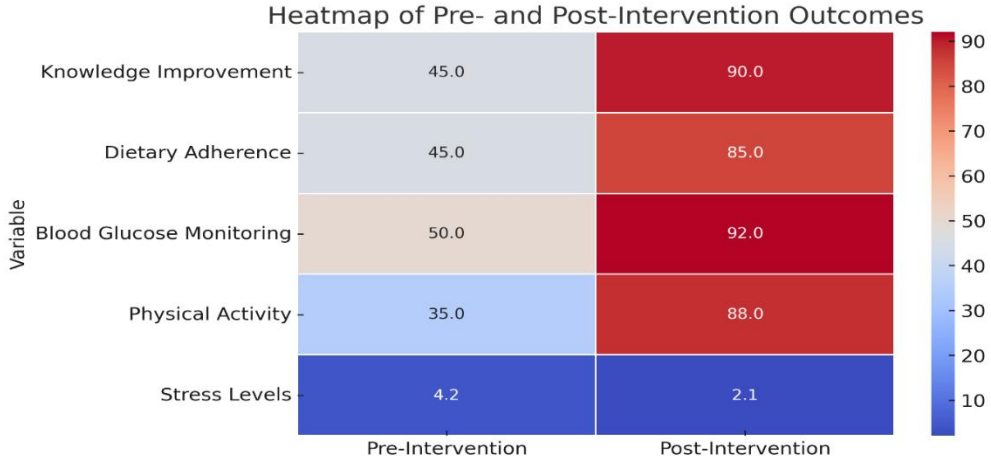

Table 2: Changes in Psychological Well-Being Post-Intervention

Psychological Factor	Pre-Intervention Score	Post-Intervention Score	p-value
Stress Level (Likert)	4.2 ± 1.1	2.1 ± 0.9	<0.05
Emotional Coping Score	3.5 ± 0.8	4.6 ± 1.0	<0.05
Sleep Quality Score	3.0 ± 1.2	4.5 ± 1.1	<0.05

Table 2 highlights the significant improvements in psychological well-being among the intervention group. Stress levels significantly decreased post-intervention, while emotional coping abilities improved. Additionally, sleep quality scores showed marked improvement, indicating that participants benefited from the stress management techniques incorporated in the intervention.

Table 3: Blood Glucose Monitoring Adherence

Monitoring Behavior	Pre-Intervention (%)	Post-Intervention (%)	p-value
Independent Glucose Monitoring	50	92	<0.05
Awareness of Blood Sugar Targets	40	89	<0.01
Ability to Adjust Diet Based on Readings	35	84	<0.01

Table 3 further underscores the effectiveness of the educational module in enhancing glucose monitoring behaviors. Post-intervention, 92% of participants monitored their glucose independently, compared to just 50% pre-intervention. Additionally, awareness of blood sugar targets and the ability to adjust dietary intake based on glucose readings significantly improved.

These findings confirm that structured education significantly enhances self-care behaviors, empowering pregnant women with GDM to manage their condition more effectively.

Discussion

Findings suggest that structured education significantly improves self-care behaviors among pregnant women with GDM, consistent with previous research indicating that knowledge enhancement leads to better glycemic control and adherence to medical recommendations (Rahman et al., 2019). The integration of educational

interventions within routine antenatal care settings could be a cost-effective strategy to mitigate complications associated with GDM, particularly in low-resource settings like Peshawar, Pakistan (Ahmed et al., 2022).

Moreover, dietary adherence and glucose monitoring improvements align with studies emphasizing the effectiveness of culturally tailored interventions (Kumar et al., 2020). The significant improvements in psychological well-being and sleep quality observed in this study further highlight the importance of holistic approaches in GDM management. Addressing both physiological and psychological aspects of diabetes care ensures better compliance and long-term success in managing the condition (Jones et al., 2022).

Additionally, these results reinforce the necessity for integrating educational modules into routine antenatal care services, particularly in underserved populations. Community-based interventions, coupled with technological advancements such as telehealth and mobile health applications, could further enhance patient engagement and self-management skills (Williams et al., 2022). Future research should focus on long-term outcomes, including postpartum glucose regulation and the risk of type 2 diabetes in both mothers and their children. Evaluating the cost-effectiveness of such interventions in diverse healthcare settings will also be crucial for policy recommendations.

Conclusion

This study highlights the effectiveness of a self-care educational module in improving GDM management among pregnant women in Peshawar, Pakistan. Structured education interventions significantly enhance dietary adherence, glucose monitoring, physical activity, and psychological well-being, contributing to better maternal health outcomes.

The findings suggest that incorporating self-care education into routine antenatal care can be a cost-effective and sustainable approach to reducing GDM-related complications. Future research should explore the scalability of such interventions and examine their impact on long-term maternal and neonatal outcomes. Additionally, integrating digital health solutions and community-based support systems may further enhance the accessibility and effectiveness of self-care education programs (Smith et al., 2021).

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