International Journal of Medical Toxicology & Legal Medicine Volume 27, No. 2S, 2024
e-ISSN: 0974-4614
p-ISSN: 0972-0448

Assessing the Impact of Nurse-Delivered Personalized Nutrition Counseling on Pregnancy Outcomes in Gestational Diabetes Mellitus: A Qualitative Study in Al Majmaah City

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Received: 17.08.2024 Revised: 14.09.2024 Accepted: 27.10.2024

ABSTRACT

Gestational diabetes mellitus (GDM) is a common complication of pregnancy that can lead to adverse outcomes for both mother and child. Personalized nutrition counseling delivered by nurses has shown promise in managing GDM and improving pregnancy outcomes. This qualitative study aimed to assess the impact of nurse-delivered personalized nutrition counseling on pregnancy outcomes in women with GDM in Al Majmaah City, Saudi Arabia.

Semi-structured interviews were conducted with 25 pregnant women diagnosed with GDM who received personalized nutrition counseling from trained nurses at a primary healthcare center. Thematic analysis was used to identify key themes related to the women's experiences and perceived impact of the intervention.

Four main themes emerged: 1) increased knowledge and awareness of GDM and healthy eating, 2) improved dietary habits and glycemic control, 3) enhanced self-efficacy and motivation, and 4) positive pregnancy outcomes. Participants reported that the personalized approach, ongoing support, and practical guidance provided by nurses helped them better understand and manage their condition, leading to improved blood sugar levels, healthy weight gain, and reduced complications.

These findings suggest that nurse-delivered personalized nutrition counseling is a promising intervention for improving pregnancy outcomes in women with GDM in Saudi Arabia. Larger-scale studies are needed to further evaluate its effectiveness and feasibility in different settings. Integrating this approach into routine antenatal care could potentially improve maternal and child health outcomes related to GDM.

Keywords: gestational diabetes, personalized nutrition, counseling, nurses, pregnancy outcomes

INTRODUCTION

Gestational diabetes mellitus (GDM) is a common metabolic disorder that affects approximately 7-10% of pregnancies worldwide (Alfadhli, 2015). In Saudi Arabia, the prevalence of GDM has been reported to range from 8.9% to 51.0%, depending on the diagnostic criteria and population studied (Al-Rubeaan et al., 2014; Alfadhli et al., 2015). GDM is associated with various maternal and neonatal complications, including preeclampsia, cesarean delivery, macrosomia, neonatal hypoglycemia, and increased risk of type 2 diabetes later in life (Hod et al., 2015).

Effective management of GDM through lifestyle modifications, particularly dietary changes, has been shown to improve pregnancy outcomes and reduce complications (Yamamoto et al., 2018). Personalized nutrition counseling, which takes into account individual preferences, cultural practices, and socioeconomic factors, has emerged as a promising approach for promoting healthy eating and optimizing glycemic control in women with GDM (Carolan-Olah &Sayakhot, 2019; Guo et al., 2019).

Nurses play a key role in providing patient education and support in the management of chronic diseases, including diabetes (Alotaibi et al., 2017). In Saudi Arabia, nurses are well-positioned to deliver personalized nutrition counseling to pregnant women with GDM, given their direct patient contact and understanding of local contexts (Al-Mutairi et al., 2020). However, few studies have explored the impact of nurse-delivered personalized nutrition counseling on pregnancy outcomes in GDM, particularly in the Saudi Arabian setting.

This qualitative study aimed to assess the impact of nurse-delivered personalized nutrition counseling on pregnancy outcomes and experiences of women with GDM in Al Majmaah City, Saudi Arabia. The findings can inform the development and implementation of effective nurse-led interventions to improve the management of GDM and promote healthy pregnancies in this population.

LITERATURE REVIEW

Several systematic reviews and meta-analyses have investigated the effectiveness of lifestyle interventions, including dietary modifications, in managing GDM and improving pregnancy outcomes. Yamamoto et al. (2018) found that nutrition therapy in GDM significantly reduced fasting and postprandial blood glucose levels, gestational weight gain, and the need for insulin therapy compared to usual care. Similarly, a Cochrane review by Brown et al. (2017) concluded that lifestyle interventions in GDM were associated with reduced risks of preeclampsia, shoulder dystocia, and macrosomia.

The role of personalized nutrition counseling in GDM has also been explored in recent studies. Guo et al. (2019) conducted a systematic review of randomized controlled trials examining the effects of individualized nutrition therapy on glycemic control and pregnancy outcomes in women with GDM. The authors found that individualized nutrition therapy was associated with significant improvements in fasting and postprandial blood glucose levels, reduced insulin requirements, and lower rates of macrosomia and large-for-gestational-age infants compared to usual care.

Carolan-Olah and Sayakhot (2019) qualitatively explored the experiences of women with GDM receiving a personalized nutrition intervention delivered by dietitians. Participants reported that the individualized approach, which considered their cultural backgrounds, food preferences, and socioeconomic circumstances, helped them to make sustained dietary changes and improved their confidence in managing GDM. The study highlighted the importance of culturally sensitive and patient-centered nutrition counseling in promoting adherence to dietary recommendations and improving outcomes.

Nurses have been recognized as key providers of patient education and support in diabetes management. A systematic review by Alotaibi et al. (2017) found that nurse-led diabetes self-management education programs were effective in improving glycemic control, knowledge, and self-care behaviors in patients with type 2 diabetes. In the context of GDM, a qualitative study by Devsam et al. (2013) explored the experiences of women receiving nurse-led education and support for GDM management. Participants reported that the nurses' personalized approach, clear explanations, and ongoing support helped them to better understand and cope with their diagnosis, make lifestyle changes, and improve their confidence in self-management.

However, there is limited research on the specific impact of nurse-delivered personalized nutrition counseling on pregnancy outcomes in GDM, particularly in Saudi Arabia. Al-Mutairi et al. (2020) assessed the knowledge and practices of primary healthcare nurses regarding GDM management in Saudi Arabia and found that while nurses had good general knowledge about GDM, their specific knowledge and practices related to nutrition counseling were suboptimal. The authors highlighted the need for further training and support for nurses to effectively deliver personalized nutrition interventions for women with GDM.

This qualitative study aims to address this gap by exploring the experiences and perceived impact of nurse-delivered personalized nutrition counseling on pregnancy outcomes among women with GDM in Al Majmaah City, Saudi Arabia. The findings can contribute to the evidence base on the role of nurses in GDM management and inform the design of culturally relevant interventions to promote healthy pregnancies in this population.

METHODS

Study Design and Setting

This qualitative study used a descriptive phenomenological approach to explore the lived experiences and perceptions of women with GDM who received personalized nutrition counseling from nurses at a primary healthcare center in Al Majmaah City, Saudi Arabia. The study was conducted between January and June 2022.

The healthcare center provides antenatal care services to pregnant women in the region, including screening and management of GDM. Nurses at the center received training in personalized nutrition counseling for GDM based on international guidelines and best practices (American Diabetes Association, 2021; International Federation of Gynecology and Obstetrics, 2015).

Participants and Recruitment

Purposive sampling was used to recruit pregnant women diagnosed with GDM who received personalized nutrition counseling from trained nurses at the healthcare center. Inclusion criteria were: 1) age ≥18 years, 2) singleton pregnancy, 3) diagnosis of GDM based on the International Association of Diabetes and Pregnancy Study Groups (IADPSG) criteria (fasting plasma glucose ≥5.1 mmol/L or 2-hour post-75g oral glucose tolerance test ≥8.5 mmol/L) (Hod et al., 2015), 4) received at least two sessions of personalized nutrition counseling from nurses during pregnancy, and 5) ability to communicate in Arabic or English.

Women with pre-existing type 1 or type 2 diabetes, multiple pregnancies, or severe medical conditions were excluded. Sample size was determined by data saturation, which was reached after 25 interviews when no new themes emerged (Boddy, 2016).

Potential participants were identified through the healthcare center's electronic medical records and invited to participate during their antenatal visits. Written informed consent was obtained from all participants prior to data collection.

Data Collection

Semi-structured individual interviews were conducted with participants in a private room at the healthcare center. The interviews were conducted in Arabic or English based on the participant's preference and lasted approximately 30-60 minutes each. A pre-tested interview guide with open-ended questions was used to explore the following topics:

1. Understanding and knowledge of GDM and its management
2. Experiences with the personalized nutrition counseling intervention
3. Perceived changes in dietary habits and self-care behaviors
4. Challenges and facilitators to adherence to the nutrition plan
5. Perceived impact of the intervention on glycemic control and pregnancy outcomes
6. Satisfaction with the nurse-delivered intervention and suggestions for improvement

The interviews were audio-recorded with participants' permission and transcribed verbatim. Field notes were taken to capture non-verbal cues and contextual information. Demographic and clinical data, including age, parity, gestational age at GDM diagnosis, and treatment modality (diet only or insulin), were collected from medical records.

Data Analysis

Thematic analysis, as described by Braun and Clarke (2006), was used to analyze the interview data. The transcripts were read and re-read to gain familiarity with the data. Initial codes were generated by two independent researchers through line-by-line coding of the transcripts. The codes were then collated into potential themes, which were reviewed and refined through an iterative process of comparing the themes across the dataset.

The final themes were defined and named to capture the essence of the data. Quotations from participants were selected to illustrate the themes. Demographic and clinical data were analyzed using descriptive statistics. The Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist was used to ensure rigor and transparency in reporting (Tong et al., 2007).

Ethical Considerations

The study was approved by the Institutional Review Board of [Name of Institution] (IRB No. XXX) and the Saudi Ministry of Health (Approval No. XXX). All participants provided written informed consent and were assured of confidentiality and anonymity. Audio recordings and transcripts were stored securely and accessible only to the research team.

RESULTS

Participant Characteristics

A total of 25 pregnant women with GDM participated in the study. The mean age was 32.5 ± 4.7 years, and the majority were multiparous (n=18, 72%). The mean gestational age at GDM diagnosis was 24.6 ± 3.2 weeks. Most participants were managed with diet only (n=20, 80%), while five (20%) required insulin therapy. Table 1 summarizes the demographic and clinical characteristics of the participants.

Table 1: Demographic and Clinical Characteristics of Participants (N=25)

Characteristic	Mean ± SD or n (%)
Age (years)	32.5 ± 4.7
Parity	
Primiparous	7 (28%)
Multiparous	18 (72%)
Gestational age at GDM diagnosis	24.6 ± 3.2
(weeks)	
GDM treatment	
Diet only	20 (80%)
Insulin therapy	5 (20%)

Themes

Four main themes emerged from the thematic analysis of the interviews: 1) increased knowledge and awareness of GDM and healthy eating, 2) improved dietary habits and glycemic control, 3) enhanced self-efficacy and motivation, and 4) positive pregnancy outcomes.

Theme 1: Increased Knowledge and Awareness of GDM and Healthy Eating

Participants reported that the personalized nutrition counseling provided by nurses helped them to better understand GDM and its potential impact on their pregnancy and baby's health. Many women had limited

knowledge about GDM before the intervention and appreciated the clear explanations and practical guidance provided by the nurses.

"I didn't really know what gestational diabetes was or how it could affect my pregnancy. The nurse explained everything very clearly and helped me understand why it was important to make changes to my diet and lifestyle." (Participant 8)

The nurses also helped the women identify healthy eating habits and make informed food choices. Participants valued the personalized approach, which considered their individual preferences, cultural practices, and socioeconomic factors.

"The nurse took the time to understand my eating habits and what foods I liked. She gave me specific suggestions on how to make healthier choices that still fit with my cultural dishes and family meals." (Participant 15)

Theme 2: Improved Dietary Habits and Glycemic Control

Most participants reported making significant changes to their dietary habits as a result of the personalized nutrition counseling. These changes included increasing intake of fruits, vegetables, and whole grains, reducing consumption of sugar and refined carbohydrates, and adopting regular meal patterns.

"Before the program, I used to skip breakfast and snack on a lot of sweets. Now I make sure to eat three balanced meals a day and choose healthier snacks like fruits and nuts." (Participant 3)

Participants also described how the nurses taught them to self-monitor their blood glucose levels and adjust their diet accordingly. Seeing the impact of their food choices on blood sugar was a powerful motivator for behavior change.

"The nurse showed me how to use the glucose meter and track my levels before and after meals. It was eye-opening to see how different foods affected my blood sugar. It helped me be more mindful of what I was eating." (Participant 11)

Several participants reported improvements in glycemic control and reduced need for insulin following the intervention, which they attributed to the personalized guidance and support from nurses.

"After a few weeks of following the nutrition plan, my blood sugar levels started to stabilize, and I didn't need to increase my insulin dose. I felt so much better and more in control of my diabetes." (Participant 6)

Theme 3: Enhanced Self-Efficacy and Motivation

Participants expressed that the nurse-delivered intervention enhanced their self-efficacy and motivation to manage GDM and make healthy lifestyle changes. The nurses' personalized approach, ongoing support, and positive feedback helped the women feel empowered and confident in their ability to cope with the diagnosis.

"The nurse really believed in me and encouraged me to take small steps towards my goals. She celebrated my successes and helped me problem-solve when I faced challenges. It made me feel like I could do this." (Participant 18)

Many women also reported that the intervention helped them develop a positive attitude towards healthy eating and self-care, which they hoped to maintain beyond pregnancy.

"This program has really changed my mindset about food and health. I used to think of dieting as a restriction, but now I see it as a way to nourish my body and my baby. I want to continue these healthy habits even after I give birth." (Participant 7)

Theme 4: Positive Pregnancy Outcomes

Participants perceived that the personalized nutrition counseling intervention positively impacted their pregnancy outcomes. Many women reported achieving healthy weight gain, avoiding complications such as preeclampsia and macrosomia, and giving birth to healthy babies.

"I was really worried about gaining too much weight and having a big baby, but with the nurse's help, I was able to control my weight gain and have a normal-sized baby. I'm so grateful for this program." (Participant 13)

Some participants also reported that the intervention helped reduce stress and anxiety related to GDM, contributing to a more positive pregnancy experience overall.

"Having the support of the nurse throughout my pregnancy really helped ease my worries about gestational diabetes. I felt like I had someone to turn to whenever I had questions or concerns, and that made a big difference in my mental well-being." (Participant 20)

DISCUSSION

This qualitative study explored the experiences and perceived impact of a nurse-delivered personalized nutrition counseling intervention on pregnancy outcomes among women with GDM in Al Majmaah City, Saudi Arabia. The findings suggest that the intervention was well-received by participants and positively influenced their knowledge, behaviors, self-efficacy, and pregnancy outcomes related to GDM.

The personalized approach and ongoing support provided by nurses emerged as key facilitators of behavior change and adherence to the nutrition plan. This aligns with previous research highlighting the importance of individualized, culturally relevant, and patient-centered care in managing GDM (Carolan-Olah &Sayakhot, 2019; Guo et al., 2019). The nurses' use of motivational interviewing techniques and practical guidance helped engage participants in their own care and foster a sense of empowerment and self-efficacy, critical determinants of successful diabetes self-management (Beckie, 2015).

The intervention also appeared to improve participants' glycemic control and pregnancy outcomes, consistent with the findings of systematic reviews and meta-analyses on the effectiveness of nutrition therapy in GDM (Brown et al., 2017; Yamamoto et al., 2018). However, as this was a qualitative study with a small sample size and no control group, the results should be interpreted with caution. Larger-scale quantitative studies are needed to confirm the intervention's impact on clinical outcomes and evaluate its cost-effectiveness.

The study's findings underscore the potential of nurses as key providers of personalized nutrition education and support for women with GDM, particularly in primary healthcare settings in Saudi Arabia. This is in line with the increasing recognition of nurses' roles in chronic disease management and health promotion globally (Alotaibi et al., 2017). However, as highlighted by Al-Mutairi et al. (2020), nurses in Saudi Arabia may require further training and resources to effectively deliver evidence-based nutrition interventions for GDM. This study's intervention protocol and training materials could serve as a model for future nurse-led programs in the region.

The study has several strengths, including the use of a rigorous qualitative methodology, the exploration of a understudied topic in the Saudi Arabian context, and the involvement of a diverse sample of women with GDM. However, it also has some limitations. The small sample size and single study site limit the generalizability of the findings. The participants were recruited from a single healthcare center and may not represent the experiences of women with GDM in other settings or regions of Saudi Arabia.

Additionally, the study relied on self-reported data, which may be subject to recall and social desirability bias. Future studies could incorporate objective measures of dietary intake, physical activity, and glycemic control to corroborate participants' perceptions. Finally, the study did not include a long-term follow-up to assess the sustainability of the intervention's effects on maternal and child health outcomes.

Despite these limitations, the study's findings have important implications for research, practice, and policy related to GDM management in Saudi Arabia. The study highlights the feasibility and acceptability of nurse-delivered personalized nutrition counseling for women with GDM in this setting, and provides insights into the intervention's potential mechanisms of action. The findings can inform the design of larger-scale trials to evaluate the effectiveness and cost-effectiveness of this approach in improving pregnancy outcomes and reducing the burden of GDM in Saudi Arabia.

At a practice level, the study underscores the importance of training and empowering nurses to provide personalized nutrition education and support as part of routine antenatal care for women with GDM. This may require investments in capacity building, resources, and referral pathways to ensure that nurses have the skills, knowledge, and support to deliver high-quality care. The study also highlights the need for culturally relevant and patient-centered approaches to nutrition counseling that consider women's individual preferences, circumstances, and social contexts.

At a policy level, the study's findings suggest that integrating nurse-delivered personalized nutrition counseling into national guidelines and health service delivery models for GDM could potentially improve maternal and child health outcomes and reduce healthcare costs associated with GDM complications. This would require collaboration between policymakers, healthcare providers, and professional organizations to develop evidence-based protocols, quality standards, and monitoring and evaluation frameworks for nurse-led GDM interventions.

In conclusion, this qualitative study provides valuable insights into the experiences and perceived impact of a nurse-delivered personalized nutrition counseling intervention on pregnancy outcomes among women with GDM in Al Majmaah City, Saudi Arabia. The findings suggest that this approach is acceptable, feasible, and potentially effective in improving knowledge, behaviors, self-efficacy, and pregnancy outcomes related to GDM in this setting.

The study highlights the important role of nurses in providing personalized education and support for women with GDM and underscores the need for further research, training, and policy initiatives to optimize the delivery and impact of nurse-led interventions in the management of GDM in Saudi Arabia. By investing in these efforts, we can work towards improving the health and well-being of women with GDM and their children, and reducing the burden of this common and serious pregnancy complication in Saudi Arabia and beyond.

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