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KNOWLEDGE, PERCEPTIONS, AND PSYCHOSOCIAL CONCERNS REGARDING METFORMIN THERAPY AMONG WOMEN WITH GESTATIONAL DIABETES MELLITUS

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Abstract

Background: *Gestational Diabetes Mellitus (GDM) is a prevalent pregnancy complication with rising global incidence. Metformin is increasingly used as an oral therapeutic alternative to insulin; however, maternal perceptions and psychosocial concerns regarding its use remain underexplored, particularly in low-resource settings.*

Aim: *This study aimed to assess knowledge, perceptions, and psychosocial concerns regarding Metformin therapy among women with GDM.*

Methods: *This prospective observational study was conducted from January 2025 to May 2025 at Fatima Hospital, Baqai Medical University, Karachi. A total of 54 pregnant women with a confirmed diagnosis of GDM receiving Metformin therapy were enrolled using consecutive sampling. Data were collected using a structured, pretested, interviewer-administered questionnaire covering maternal knowledge, perceptions regarding Metformin safety and acceptance, and psychosocial concerns including anxiety, fear of fetal harm, emotional distress, and need for counselling support. Statistical analysis was performed using statistical package for social sciences (SPSS) version 16, with a p-value <0.05 considered significant.*

Results: *The mean age of participants was 31.4 ± 4.8 years, with 57.4% (n=31) being multigravida and 72.2% (n=39) in the third trimester. Knowledge assessment revealed moderate knowledge in 46.3% (n=25), poor knowledge in 29.6% (n=16), and good knowledge in 24.1% (n=13). Perceived safety of Metformin was reported as confident by 51.9% (n=28), uncertain by 33.3% (n=18), and negative by 14.8% (n=8). Treatment acceptance was positive in 59.3% (n=32), neutral in 25.9% (n=14), and reluctant in 14.8% (n=8). High anxiety regarding pregnancy outcomes was reported by 35.2% (n=19), fear of fetal harm by 38.9% (n=21), and significant emotional distress by 31.5% (n=17). A strong need for counselling support was expressed by 63.0% (n=34). A statistically significant association was found between knowledge level and psychosocial burden (p=0.02), with poor knowledge linked to higher psychological distress.*

Conclusion: *Women with GDM receiving Metformin demonstrate moderate knowledge, uncertain perceptions regarding medication safety, and considerable psychosocial burden. Poor knowledge is significantly associated with greater psychological distress. Structured, patient-centered counselling addressing both clinical and emotional aspects of GDM care is essential to improve treatment acceptance, psychological well-being, and overall pregnancy outcomes.*

INTRODUCTION

Gestational Diabetes Mellitus (GDM) is glucose intolerance first identified during pregnancy and is increasingly recognized as a major contributor to adverse maternal and neonatal outcomes. It is associated with hypertensive disorders, increased cesarean deliveries, fetal macrosomia, and neonatal metabolic disturbances. Beyond pregnancy, affected women face a higher risk of developing type 2 diabetes, highlighting its long-term implications [1,2].

GDM management requires lifestyle modification and pharmacological intervention when glycemic targets are not met. Although insulin remains standard, Metformin is increasingly used due to ease of administration, lower cost, and comparable efficacy. However, its placental transfer and uncertainty regarding long-term offspring outcomes remain debated [3,4]. Treatment success depends not only on pharmacology but also on maternal perceptions, understanding, and psychological response. Women often experience emotional distress, uncertainty, and fear following a GDM diagnosis, affecting treatment engagement and antenatal care [5].

Qualitative studies indicate that women frequently report concerns about Metformin safety due to its ability to cross the placenta. Many express anxieties about potential harm to the fetus, fearing unknown developmental or metabolic consequences. These concerns are often compounded by misinformation from family, friends, or unverified online sources. Limited counseling from healthcare providers and deeply rooted cultural beliefs about medication use during pregnancy further contribute to therapy hesitancy or heightened anxiety [6,7]. Psychosocial adaptation is a key determinant of maternal well-being during GDM. Women often describe feelings of loss of control over their bodies and pregnancy, along with stigma associated with being labeled "high risk." The constant burden of glucose monitoring, strict dietary restrictions, and fear of fetal complications add significant daily stress. These psychological burdens may negatively influence treatment adherence, reduce self-efficacy, and diminish the overall pregnancy experience [8,9].

Health literacy and patient-provider communication play a pivotal role in shaping perceptions of Metformin therapy. Women who receive clear, empathetic, and thorough counseling are more likely to accept treatment and experience reduced anxiety. Conversely, inadequate understanding of the medication's purpose and safety fosters fear, doubt, and misinterpretation of pharmacological treatment, which can undermine trust in healthcare providers and treatment plans [10]. Despite growing Metformin use for GDM, limited evidence exists from low- and middle-income settings on patient perceptions and psychosocial concerns. Understanding these dimensions is essential for patient-centered care, treatment acceptance, and maternal mental well-being. Therefore, this study aims to assess knowledge, perceptions, and psychosocial concerns regarding Metformin therapy among women with GDM.

METHODOLOGY

This prospective observational study was conducted over a period of eight months, from January 2025 to August 2025, following approval from the Institutional Research and Ethical Review Board at Baqai Medical University, Karachi. The study was carried out in the out-patient department of Fatima Hospital, Karachi. Written informed consent was obtained from all participants prior to enrolment, and confidentiality and anonymity of participant information were strictly maintained throughout the study process.

A total of 54 pregnant women with a confirmed diagnosis of GDM and currently receiving Metformin therapy were enrolled. Participants were recruited using a consecutive sampling technique, wherein every eligible woman attending the antenatal clinics during the study period and meeting the inclusion criteria was included.

Women with pre-existing type 1 or type 2 diabetes mellitus, those managed exclusively with insulin therapy, and individuals with severe obstetric or medical conditions unrelated to GDM were excluded to ensure homogeneity of the study population. Data were collected using a structured questionnaire administered through face-to-face interviews by trained data collectors. The tool was developed after an extensive review of relevant literature and pilot tested on a small subset of participants to assess clarity, comprehension, and relevance. Feedback obtained during pilot testing was used to refine the final version of the questionnaire prior to full-scale data collection.

The questionnaire was organized into three sections. The first section captured demographic and obstetric information, including age, educational status, occupation, parity, and gestational age. The second section evaluated maternal knowledge regarding GDM and Metformin therapy, focusing on awareness of the condition, associated risk factors, possible complications, dietary guidance, and understanding of pharmacological treatment. The third section assessed perceptions and psychosocial concerns related to Metformin use and GDM diagnosis, including emotional reactions, fear of fetal harm, treatment safety beliefs, anxiety regarding pregnancy outcomes, and concerns about medication use during pregnancy. Knowledge and psychosocial responses were scored using structured items and Likert-scale responses where appropriate.

Each correct response received one point, and total scores were converted to percentages. Knowledge was categorized as poor (≤50%), moderate (51–75%), or good (>75%) based on predefined cut-offs from similar KAP studies. Perceptions regarding Metformin therapy were evaluated using Likert-scale items. Overall perception scores were converted to percentages and categorized as confident (≥75%), uncertain (50–74%), or negative (<50%). Treatment acceptance was classified as positive (≥75%), neutral (50–74%), or reluctant (<50%). Trust in physician advice was similarly categorized as high (≥75%), moderate (50–74%), or low (<50%). All thresholds were predefined and applied consistently across analyses.

Statistical analysis was performed using statistical packages for social sciences (SPSS) version 16. Categorical variables were summarized as frequencies and percentages, while continuous variables were expressed as mean and standard deviation. Associations between study variables were evaluated using appropriate statistical tests, and a p-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 54 pregnant women with GDM receiving Metformin therapy were included in the study. The mean age of participants was 31.4 ± 4.8 years. The majority of participants were multigravida (31, 57.4%), while 23 (42.6%) were primigravida. Most women were in the third trimester of pregnancy (39, 72.2%), whereas 15 (27.8%) were in the second trimester (Table 1).

Table 1: Baseline participant characteristics (n = 54)

Variable	Category	N	%
Age	Mean ± SD	31.4 ± 4.8	–
Parity	Primigravida	23	42.6
	Multigravida	31	57.4
Gestational age	<28 weeks	15	27.8

Variable	Category	N	%
	≥28 weeks	39	72.2

Knowledge assessment revealed that 25 participants (46.3%) had moderate knowledge regarding GDM and Metformin therapy. Poor knowledge was observed in 16 women (29.6%), while 13 (24.1%) demonstrated good knowledge. Overall, more than one-quarter of participants had inadequate knowledge, indicating significant gaps in awareness and understanding of the condition and its treatment (Table 2).

Table 2: Maternal knowledge levels (n = 54)

Knowledge level	N	%
Poor (≤50%)	16	29.6
Moderate (51–75%)	25	46.3
Good (>75%)	13	24.1

Regarding perceived safety of Metformin, 28 participants (51.9%) were classified as confident, 18 (33.3%) as uncertain, and 8 (14.8%) as negative. Treatment acceptance was positive in 32 women (59.3%), while 14 (25.9%) were neutral and 8 (14.8%) were reluctant. Trust in physician advice was high in 30 participants (55.6%), moderate in 17 (31.5%), and low in 7 (13.0%) (Table 3).

Table 3: Perceptions regarding Metformin therapy (n = 54)

Domain	Category	N	%
Perceived safety	Confident (≥75%)	28	51.9
	Uncertain (50–74%)	18	33.3
	Negative (<50%)	8	14.8
Treatment acceptance	Positive	32	59.3
	Neutral	14	25.9
	Reluctant	8	14.8
Trust in physician	High	30	55.6
	Moderate	17	31.5
	Low	7	13.0

Psychosocial assessment showed that 19 participants (35.2%) experienced high anxiety regarding pregnancy outcomes, while 23 (42.6%) reported moderate anxiety and 12 (22.2%) low anxiety. Fear of fetal harm related to Metformin use was reported by 21 women (38.9%). Emotional distress following diagnosis was significant in 17 participants (31.5%), while 22 (40.7%) reported mild distress and 15 (27.8%) reported no distress. A strong need for counselling support was expressed by 34 participants (63.0%) (Table 4).

Table 4: Psychosocial concerns among participants (n = 54)

Psychosocial domain	Level	N	%
Anxiety	High	19	35.2
	Moderate	23	42.6
	Low	12	22.2
Fear of fetal harm	Present	21	38.9
	Absent	33	61.1
Emotional distress	Significant	17	31.5
	Mild	22	40.7
	None	15	27.8
Counselling need	High	34	63.0
	Low/Moderate	20	37.0

A statistically significant association was observed between maternal knowledge level and psychosocial burden ($p = 0.02$). Women with poor knowledge had a disproportionately higher level of psychological distress compared to those with good knowledge, indicating that lower awareness was associated with increased anxiety and emotional concerns (Table 5).

Table 5: Association between knowledge and psychosocial concerns (n = 54)

Knowledge level	High concern	Low/Moderate concern	p-value
Good	3	10	0.02*
Moderate	11	14	
Poor	15	1	

Note: p-value < 0.05 was considered statistically significant.

Discussion

This study evaluated maternal knowledge, perceptions, and psychosocial concerns among women with GDM receiving Metformin therapy. Overall, the findings demonstrated moderate knowledge levels, generally positive but uncertain perceptions regarding Metformin, and a considerable psychosocial burden characterized by anxiety, fear of fetal harm, and a strong need for counselling support. Importantly, poor knowledge was significantly associated with higher psychological distress, highlighting the interplay between cognitive understanding and emotional adaptation during pregnancy.

In the present study, most participants demonstrated moderate knowledge, while nearly one-third had poor understanding of GDM and its treatment. Only a minority showed good knowledge, indicating persistent gaps in awareness. These findings are consistent with previous studies where women with GDM often demonstrate incomplete understanding of their condition and treatment, contributing to increased psychological burden during pregnancy [11]. Inadequate health literacy and inconsistent counselling remain major barriers to effective disease understanding and self-management [12]. The knowledge deficits observed in our population may be attributed to late antenatal presentation, limited access to structured education, and sociocultural factors that affect health-seeking behaviours. Addressing these gaps through early and repeated counselling could significantly improve maternal understanding and treatment engagement.

More than half of the participants perceived Metformin as safe and accepted its use; however, a significant proportion remained uncertain. Concerns regarding fetal safety and medication transfer across the placenta continue to influence maternal decision-making. Previous research has shown that illness perceptions in GDM are strongly shaped by emotional interpretation of risk and perceived medication safety [13]. Additionally, communication between healthcare providers and patients plays a crucial role in shaping acceptance of pharmacological therapy, particularly Metformin [14]. Although trust in physicians was relatively high in this study, persistent uncertainty highlights the need for structured, empathetic counselling that addresses specific maternal concerns. Healthcare providers should dedicate time to explain the rationale for Metformin use, its safety profile, and potential benefits, thereby reducing apprehension and fostering treatment adherence.

A major finding of this study was the significant psychosocial burden among participants, including anxiety, fear of fetal harm, and emotional distress. These findings are consistent with prior evidence showing that GDM is associated with increased psychological stress during pregnancy [15]. Continuous glucose monitoring, dietary restrictions, and fear of fetal complications are key contributors to distress [16]. The constant vigilance required for disease management can lead to feelings of loss of control and diminished quality of life. Furthermore, psychosocial needs are often unmet in routine antenatal care, leading to persistent emotional strain [17]. This highlights the importance of integrating mental health screening and support into standard GDM care protocols to address the holistic needs of affected women.

This study demonstrated a significant association between knowledge level and psychosocial burden. Women with poor knowledge experienced higher anxiety and emotional distress compared to those with better knowledge. Similar findings have been reported in the literature, where diabetes-related distress is strongly linked with health literacy and disease understanding [18]. Better illness perception is associated with improved emotional control and reduced perceived disease threat [19]. The observed association underscores the need for comprehensive patient education that not only conveys factual information but also addresses emotional responses and misconceptions. When women understand their condition and treatment rationale, they are better equipped to manage their health and cope with the psychological demands of GDM.

Strengths, Limitations and Future Recommendation

Strengths include the prospective design, use of a pretested questionnaire, and focus on an

understudied population. Limitations include the small sample size (n=54), single-center setting, cross-sectional design, and reliance on self-reported perceptions, which may introduce bias. Future research should employ larger, multicenter, longitudinal designs with objective measures and qualitative approaches to explore cultural influences and evaluate structured counseling interventions.

Conclusion

This study demonstrates that maternal knowledge, perceptions, and psychosocial concerns significantly influence treatment experience among women with GDM receiving Metformin. Moderate knowledge, uncertainty about Metformin safety, and high psychosocial burden were prevalent, with poor knowledge linked to greater distress. These findings underscore the need for structured, patient-centered counselling that addresses both clinical and emotional aspects of care. Strengthening education, routine psychosocial assessment, and early referral for mental health support can improve treatment acceptance, psychological well-being, and ultimately maternal and neonatal outcomes.

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Author's Contribution

MN: Data collection, interpretation and wrote the manuscript
NW: Conceived and designed the study, supervised the study, interpretation of results, and critical review, and was responsible for data integrity.
RN: Data analysis, Interpretation, and manuscript revision
EA: Reviewed, edited, and approved the manuscript
IAS: Critical review and approval of the final manuscript

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