Original Article

Quality of Life and Associated Factors among Mothers with Gestational Diabetes Mellitus by using a Specific GDMQ-36 Questionnaire: A Cross-Sectional Study

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Abstract

Background: Gestational Diabetes Mellitus (GDM) has physical, social, mental, and psychological consequences that can affect mothers' Quality of Life (QOL). This study was conducted with the aim to evaluate the QOL of mothers with GDM and its associated factors using a specific questionnaire. **Materials and Methods:** This cross-sectional study was conducted on 200 mothers with GDM who were referred to clinics affiliated with Shahid Beheshti University and Qom University of Medical Sciences, Iran, in 2019–2020. The specific QOL questionnaire for women with GDM (GDMQ-36) and the demographic questionnaire were completed for participants. Independent variables were entered into the multiple linear regression model and were analyzed. **Results:** The total Mean(SD) score of the QOL of mothers with GDM who participated in the study was 46.83 (11.66) based on percentage. The highest and lowest QOL Mean (SD) scores were obtained on the support 76.50 (14.50) and concerns about a high-risk pregnancy 31.40 (19.80), subscales, respectively. The total QOL score decreased by 7.14 and 5 points on average in mothers treated with medication regimens and mothers who had a pre-high school education, respectively. The support subscale score increased by 5 points in mothers who had a previous history of GDM. **Conclusions:** The present study showed that the QOL of women with GDM had been severely affected by concerns about a high-risk pregnancy. Some individual and social factors can be associated with the QOL of mothers with GDM and its subscales.

Keywords: *Pregnancy, high-risk, gestational diabetes, quality of life*

Introduction

Gestational Diabetes Mellitus (GDM) is the most common medical complication during pregnancy and is defined as different severities of carbohydrate intolerance beginning or diagnosed during pregnancy.[1] GDM affects approximately 14% of pregnancies worldwide, representing approximately 18 million births annually.[2] In one meta-analysis in Iran, the overall prevalence of GDM in 2015 was estimated at about 3.4%.[3] GDM is associated with increased physiological complications in both mother and fetus during pregnancy and in later stages of life.[4] In addition to physiological complications, GDM also has psychological and social consequences. These patients face many obstacles and challenges, including psychological stress and fear of illness. Studies have shown that after a positive screening, these women feel more anxious about the possibility of the persistence of diabetes and their child's health (the effect of insulin or diet on the fetus). These women feel socially isolated and believe that very few people know about GDM and that the disease is an unknown condition. Having GDM carries a stigma for some women, so they are embarrassed to talk about it.[5]

GDM can result in different physical, psychological, and social complications and thus can affect the Quality of Life (QOL) of mothers. The health-related QOL reflects the scale of physical and social activities as well as mental health and is considered an important indicator and component of health.[6] The QOL of mothers with GDM has also been evaluated in various studies. Trutnovsky *et al*. used the WHO-QOL-BREF questionnaire to assess the QOL of mothers with GDM. They found

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that the mothers' mean scores on the psychological, social, and physical subscales of the questionnaire significantly reduced from the middle to the end of pregnancy.[7] In the study by Dalfrà *et al*.,[8] the physical subscale of QOL improved in mothers with GDM. However, in the study by Kopec *et al*.,[9] the QOL of mothers with GDM did not differ significantly compared to that of healthy mothers in terms of physical, psychological, and occupational dimensions based on the SF-8 questionnaire. One of the reasons for the contradictory results in these studies may be that all studies used a general QOL questionnaire to assess the QOL of mothers with GDM. Although general questionnaires may be valid, they may not be appropriate for measuring the QOL of certain populations, such as pregnant women, and they may ignore the unique views of pregnant women with or without complications during pregnancy. Mothers experience specific psychological changes during pregnancy and new concerns due to the presence of the fetus.[10] A specific questionnaire for women with GDM has been developed by the primary researcher.[11]

Thus, it seems that accurate and purposeful assessment of the QOL of women with GDM requires applying a specific QOL questionnaire in these women. Accordingly, this study was conducted with the aim to evaluate the QOL of mothers with GDM and its associated factors using a specific questionnaire.

Materials and Methods

This cross-sectional study was conducted on 200 mothers with GDM who referred to clinics affiliated with Shahid Beheshti University, Tehran, Iran, and Qom University of Medical Sciences in Qom, Iran, from 2019 to 2020. The inclusion criteria included a singleton pregnancy, Iranian citizenship, the passage of at least two weeks since the diagnosis of the disease, and lack of any other mental and physical disorders according to the information provided in the pregnancy records. Mothers who did not want to participate in the study were excluded. The 75 g glucose tolerance test was used to screen and diagnose GDM at 24–28 weeks of gestation. The diagnosis of GDM was made if at least one of the three numbers was equal to or above the normal range (fasting blood sugar ≥92, and blood sugar 1 hour after a meal ≥180 and 2 hours after a meal ≥153).[12] This information was recorded in the mother's prenatal records.

In this research, a multi-stage random sampling method was used. First, clinics in the Eastern, Western, Northern, and Southern regions of Tehran and Qom, affiliated to Shahid Beheshti University and Qom University of Medical Sciences, were classified into four categories. The number of prenatal clinics in each category and the population of pregnant mothers covered by each clinic were listed based on the number of available files. In the second stage, based on the covered population, a number of clinics (clusters) were randomly selected from each category. Next, from each cluster, the sample was selected based on convenience sampling in proportion to the cluster weight. Considering an alpha of 0.05 and an effect size of 0.16, the sample size was initially estimated at 180, taking into account a 10% drop in the data collection phase, the final sample size was calculated at 200.

The researcher referred to the clinics in person and informed the mothers of the study objectives and assured them of the confidentiality of their data. Then, they were asked to sign written informed consent forms and fill out GDMQ-36 and the demographic questionnaire. If mothers were illiterate, the questionnaires were completed with the help of the researcher. The demographic questionnaire included items on the women's age, gestational age, pre-pregnancy BMI, education, occupation, history of hospitalization in the current pregnancy due to GDM, type of treatment (diet or medical), history of risk factors for the development of GDM (history of GDM, family history of diabetes, history of polycystic ovary syndrome, etc.), and midwifery history (parity, previous history of intrauterine fetal death, and previous history of abortion). The GDMQ-36 includes 36 questions in five subscales that measure the QOL of mothers with GDM. These five subscales include concerns about high-risk pregnancy (11 questions), perceived constraints (8 questions), GDM complications (6 questions), support (5 questions), and medication and treatment (6 questions). The questions are scored based on a 5-point Likert scale ranging from 1 to 5 (strongly agree to strongly disagree). Except for the area of support and item 29 of the area of medication and treatment (I adjust my insulin dose based on my blood sugar), all areas were scored reversely. Thus, the total score of the questionnaire ranges from 36 to 180, with higher scores indicating a higher QOL. As each area has a different number of questions, for easier interpretation, the total score of the questionnaire, as well as the score for each area, was calculated to be 0 to 100. Thus, the best QOL in each area was 100 points and the worst QOL was 0.[11]

Data were analyzed in SPSS software (version 21; IBM Corp., Armonk, NY, USA). Descriptive statistics were used to report individual and social characteristics of the mothers with GDM. In order to determine the predictors of the QOL score of mothers with GDM and its subscales, the independent variables were introduced into the multiple linear regression model and were analyzed.

Ethical considerations

Ethics approval (IR.IAU.QOM.REC.1398.020) was obtained from the Ethics Committee of the Faculty of Medical Science, Qom Branch, Islamic Azad University. Informed written consent was obtained from all participants.

Results

In this study, the mean (SD) age of the mothers was 31.85 (5.34) years. The education level of the majority

of mothers was pre-high school education (39.5%). Most cases of pregnancy were wanted, but 25.5% of mothers stated that their pregnancy was unwanted. Moreover, 27.5% of participants had a previous history of GDM, and 60.5% of participants received medication to treat GDM. The individual and social characteristics of the women participating in this study are presented in Tables 1 and 2.

According to the results of this study, the total score of the QOL of mothers with GDM who participated in the study was 46.83 (11.66) from the total of 100. Mothers who participated in the study obtained the highest score on the support subscale 76.52 (14.57) and the lowest score on the concerns about a high-risk pregnancy subscale 31.46 (19.82) [Table 3].

Table 1: Demographic characteristics of mothers with gestational diabetes

Characteristics	GDM* (*n*=200) Frequency (%)
Education	
College	48 (24.00)
High school	73 (36.50)
Pre-high school	79 (39.50)
Occupational status	
Employment	23 (11.50)
Homemaker	177 (88.50)
Economic status	
Poor	74 (37.00)
Moderate	98 (49.00)
Good	28 (14.00)
Parity	
Nulliparous	59 (29.50)
Multiparous	141 (70.50)
Treatment	
Diet	79 (39.50)
Medical	121 (60.50)
Previous history of GDM	55 (27.50)
Previous history of PCOS**	35 (17.50)
Previous infant weight of 4.5 kg	24 (12.00)
Previous history of IUFD***	11 (5.50)
Family history of diabetes mellitus	57 (53.50)
Unwanted pregnancy	51 (25.50)
Marital satisfaction	152 (76.00)
Hospitalization in the current pregnancy	83 (41.50)
Previous history of abortion	50 (25.00)

* GDM: Gestational diabetes mellitus;**PCOS: polycystic ovary syndrome; ***IUFD: intrauterine fetal death

Table 2: Demographic characteristics of mothers with gestational diabetes

Characteristics	*n*	Mean (SD)
Age (year)	200	31.85 (5.34)
Gestational age (weeks)	200	29.64 (3.41)
Pre-pregnancy BMI* (kg/m^2)	200	25.94 (3.26)

*BMI: Body mass index

The multiple linear regression analysis was used to assess the potential to predict the QOL [Table 4] and its subscales using individual and social factors among mothers with GDM [Table 5]. The results showed that the maternal education and the type of treatment are two important predictors of total QOL and its three subscales including the concerns about a high-risk pregnancy, perceived constraints, and the medication and treatment.

The total QOL score of mothers with GDM decreased by 7.14 points on average in mothers treated with medication regimens such as insulin and metformin compared to those who were treated with diet alone. Furthermore, the total QOL score decreased by five points on average in mothers who had pre-high school education compared to those with a high school diploma.

The score of the concerns about a high-risk pregnancy, perceived constraints, and medication and treatment subscales decreased, respectively, by 10.58, 5.6, and 7.85 points on average in mothers treated with medication regimens such as insulin and metformin compared to those who were treated with diet alone. Moreover, the scores of the concerns about a high-risk pregnancy and perceived constraints subscales declined by 7.11 and 5.86 points on average in mothers who had pre-high school education compared to those with a high school diploma.

The results indicated that previous history of GDM had the potential to predict the support subscale score. Indeed, the score of the support subscale of the GDMQ-36 increased by 5.34 points on average in mothers who had a previous history of GDM compared to those without this history.

Discussion

The present study was conducted with the aim to evaluate the QOL of mothers with GDM and its associated factors using a specific questionnaire.

In this study, the total score of the QOL was less than the middle score. In addition, mothers who participated in the study received the highest score on the support subscale and the lowest score on the concerns about a high-risk pregnancy subscale. The results of the present study are generally similar to other studies which showed that the mean score of the QOL of pregnant women decreased after the diagnosis of GDM. Kutowska *et al*.[13] found that the QOL score decreased by an average of 2.5 points in most pregnant mothers after they were diagnosed with diabetes and treated. Trutnovsky *et al*.[7] used the WHOQOL-BREF questionnaire to assess the QOL of mothers with GDM. They found that the mean scores of the physical, psychological, and social subscales and the total score decreased significantly from mid-pregnancy to late pregnancy.

The results of the present study showed that the type of treatment, maternal education, and previous history of GDM could affect the QOL, which are discussed below.

Table 3: The mean score and the mean score based on 100 of the quality of life questionnaire for mothers with gestational diabetes mellitus and its subscales

Subscale	Mean score		Mean score based on 100	
	Score range	Mean (SD)	Score range	Mean (SD)
Concerns about a high-risk pregnancy	11-55	24.84 (8.72)	0-100	31.46 (19.82)
Medication and treatment	5-25	13.37 (3.09)	0-100	42.79 (15.47)
Perceived constraints	8-40	21.69 (5.63)	0-100	41.85 (17.61)
GDM* complications	8-30	19.17 (5.45)	0-100	50.77 (24.80)
Support	6-30	24.36 (3.49)	0-100	76.52 (14.57)
Total	36-180	103.44 (16.79)	0-100	46.83 (11.66)

*GDM: Gestational diabetes mellitus

Table 4: Multiple linear regression relationship between total quality of life of mothers and gestational diabetes and individual and social factors

Total score	Unstandardized coefficients B	Std. Error	Standardized coefficients B	*t*	*p*
Constant	66.44	6.59		10.07	< 0.001
History of GDM**	-1.65	1.83	-0.06	-0.89	0.37
Education (Diploma*)					
Pre-high school education	-4.78	1.75	-0.20	-2.72	0.007
College	2.26	2.00	0.08	1.12	0.26
Pregnancy (wanted*)	-3.83	1.88	-0.14	-2.03	0.06
Type of treatment (diet*)	-7.45	1.63	-0.31	-4.55	<0.001
Hospitalization	0.85	1.61	0.03	0.52	0.59

*Reference group; R=0.43; R2=0.18; Adjuster R2=0.16. **GDM: Gestational diabetes mellitus

The results of the present study indicated that mothers who used medication to control their blood sugar had a lower QOL. The results of the present study are in line with the results of some previous studies. Bień *et al*.[14] reported that GDM mothers who were treated with diet alone had a higher QOL. Moreover, in a retrospective study, the QOL SF-36 questionnaire and the demographic questionnaire were completed for mothers with negative and positive glucose tolerance tests. The QOL score was lower in women treated with insulin compared to those treated with diet alone.[15] Nevertheless, in another study on 27 diet-treated and 18 insulin-treated women, the results did not show a significant difference in the QOL scores between the treatment groups.[7] One possible explanation could be that the services and training provided to mothers with GDM in different countries are different and that mothers have different awareness and attitudes toward insulin. Some women reach lower and more stable blood sugar levels with insulin, so their worries diminish and the type of treatment may not affect their QOL.

The results of the present study indicated that the maternal education had a significant relationship with the total score of the questionnaire and the score of the concerns about a high-risk pregnancy subscale. This is consistent with the results of a study conducted on people with diabetes, which showed that illiterate people or people with primary education had a lower QOL.[16] However, in the study by Halkoaho *et al*.,[17] the education of mothers with GDM did not significantly correlate with the scores of a 15-subscale general QOL questionnaire. The reason for the discrepancy between the results of their study and those of the present study may arise from the lack of a questionnaire specifically related to the QOL of mothers with GDM in their study.

The results of the present study revealed that the support subscale score of the GDMQ-36 increased in mothers who had a previous history of GDM compared to those without such a history. There has been no study on the effect of a history of GDM on the QOL of individuals with diabetes. Nevertheless, some qualitative studies have examined the experiences of mothers with GDM and a history of diabetes in previous pregnancies. In a qualitative study, most mothers with GDM stated that a previous experience of GDM could reduce maternal stress and lead to better diabetes control.[18] However, in a Grounded Theory study, the diagnosis of GDM was unexpected and stressful for some mothers, although they knew that they were at risk of diabetes because of their history of GDM.[19] As these studies were qualitative, and qualitative studies are not generalizable, more quantitative studies should be conducted to investigate the relationship between a history of GDM and QOL.

The main strength of the present study was that the QOL of mothers with GDM was measured using a specific QOL questionnaire for mothers with GDM. However, other studies have used a general QOL questionnaire to measure the QOL of mothers with GDM. One of the limitations of the present study was the lack of sufficient sample size to

Table 5: Multiple linear regression relationship between the quality of life subscales and individual and social factors

Concerns about a high-risk pregnancy	**Unstandardized coefficients B**	**Standard Error**	**Standardized coefficients B**	***t***	***p***
Constant	47.51	8.49		5.59	<0.001
Hospitalization	4.95	2.80	-0.12	1.76	0.07
Education					
(Diploma*)	-7.11	3.03	-0.17	-2.34	0.02
Pre-high school	0.36	3.47	0.008	0.106	0.91
College					
Pregnancy (wanted*)	-3.34	3.07	-0.07	-1.09	0.27
Type of treatment (diet*)	-10.58	2.80	-0.26	-3.77	< 0.001
*Reference group; R=0.39; R2=0.152; Adjuster R2=0.130					
Perceived constraints	**Unstandardized coefficients B**	**Standard Error**	**Standardized coefficients B**	***t***	***p***
Constant	55.54	8.15		6.81	<0.001
Hospitalization	-2.44	2.58	-0.06	-0.94	0.34
Education					
(Diploma*)	-5.86	2.82	-0.16	-2.07	0.03
Pre-high school	1.99	3.29	0.04	0.60	0.54
College					
Occupational status (homemaker*)	3.47	3.97	0.06	-0.94	0.34
Type of treatment (diet*)	-6.79	2.60	-0.18	-2.61	0.01
*Reference group; R=0.26; R2=0.07; Adjuster R2=0.048					
Medication and treatment	**Unstandardized coefficients B**	**Standard Error**	**Standardized coefficients B**	***t***	***p***
Constant	47.51	8.49		5.59	<0.001
Hospitalization	2.40	2.20	0.07	1.09	0.27
Education					
(Diploma*)	-3.86	2.37	-0.12	-1.62	0.105
Pre-high school	2.87	2.74	0.07	1.04	0.29
College					
Pregnancy (wanted*)	-3.12	2.39	-0.08	-1.30	0.194
Type of treatment (diet*)	-7.85	2.19	-0.24	-3.5	< 0.001
History of abortion	4.53	2.43	0.127	1.85	0.06
*Reference group; R=0.39; R2=0.157; Adjuster R2=0.131					
Support	**Unstandardized coefficients B**	**Standard error**	**Standardized coefficients B**	***t***	***p***
Constant	67.23	7.40		9.08	0.001
History of GDM**	5.34	2.49	0.16	2.14	0.03
Education					
(Diploma*)	1.81	2.36	0.06	0.76	0.40
Pre-high school	0.20	2.71	0.006	0.07	0.94
College					
Pregnancy (wanted*)	-1.57	2.53	-0.04	-0.62	0.53
Type of treatment (diet*)	0.79	2.14	0.02	0.37	0.71

*Reference group; R=0.186; R2=0.03; Adjuster R2=0.01. **GDM: Gestational diabetes mellitus

assess the QOL of mothers with GDM based on the type of treatment or history of GDM. Moreover, there was a short time interval between the diagnosis of GDM and the completion of the questionnaire.

Conclusion

This study showed that the pregnant women with GDM had many concerns about their pregnancy and received the lowest scores on the concerns about a high-risk pregnancy subscale. Moreover, the highest score was obtained on the support subscale, which indicates that they have sufficient support. Furthermore, the results showed that some individual and social factors such as type of treatment, education, and previous history of GDM can be associated with the QOL of mothers with GDM and its subscales. Indeed, the type of treatment is an important factor in all aspects of the QOL of mothers with GDM, except for the support subscale. Thus, service providers should pay more

attention to people undergoing medication treatment and try to improve their QOL through appropriate interventions.

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Conflict of interest

Nothing to declare.

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