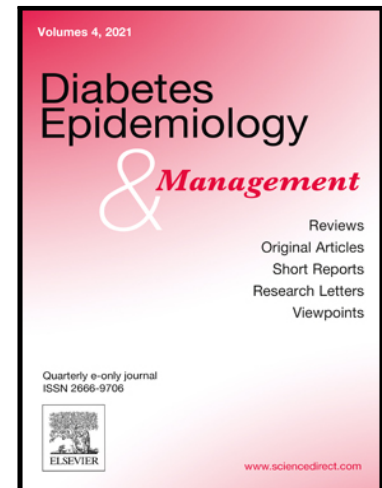


Journal Pre-proof

Prevalence of anxiety and depression among pregnant women with diabetes and their predictors

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Highlights

- Mental health of diabetic pregnant women might increase the chance of obstetric complications.
- Anxiety and depression were reported by 74.9% and 79.4% of all participants.
- Anxiety and depression were significantly higher in pre-existing compared to gestational diabetes.
- Self-efficacy and spouse's social support were significant predictors of anxiety and depression.
- Diabetic pregnant women should be evaluated for anxiety and depression during prenatal visit.

Journal Pre-proof

Prevalence of anxiety and depression among pregnant women with diabetes and their predictors

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Abstract

Background: Addressing mental health of diabetic pregnant women is important as it might increase the chance of obstetric complications, preterm birth, and neonatal complications.

Aim: The present study investigated the prevalence of anxiety and depression among pregnant women with diabetes and their predictors.

Methods: A cross-sectional study was conducted in 2023. The sample comprised 350 pregnant women with diabetes (pre-pregnancy or gestational) referred to comprehensive health centers in Qazvin Province, Iran. Fertility and demographic characteristics, anxiety, depression, partner social support, self-efficacy, medication adherence and fear of hypoglycemia were assessed.

Results: Among the sample, 28.9% had pre-pregnancy diabetes and 71.1% had gestational diabetes. Anxiety and depression were reported by 74.9% and 79.4% of all participants (significantly higher among those with pre-existing diabetes compared to gestational diabetes). Self-efficacy (OR: 0.91 [95% CI: 0.86; 0.96]) and spouse's social support (OR: 0.68 [95% CI: 0.56; 0.82]) were significant predictors of abnormal anxiety. Fear of hypoglycemia (OR: 1.06 [95% CI: 1.02; 1.09]), medication adherence (OR: 1.05 [95% CI: 1.01; 1.09]), self-efficacy (OR: 0.86 [95% CI: 0.82; 0.91]), partner social support (OR: 0.62 [95% CI: 0.49; 0.78]), diabetes type (pregnancy vs. pre-pregnancy diabetes; OR: 0.26 [95% CI: 0.09; 0.77]), perceived family economic status (fair vs. good; OR: 3.08 [95% CI: 1.12; 8.49]), and diabetes treatment (insulin vs. diet; OR: 0.21 [95% CI: 0.08; 0.55]) were significant predictors of abnormal depression.

Conclusion: Diabetic pregnant women should be evaluated for anxiety and depression during their prenatal visit. Improving self-efficacy, increasing medication adherence, reducing the fear of hypoglycemia, and improving the spouse's social support might all be helpful in reducing anxiety and depression among pregnant women with diabetes.

Keywords: Anxiety, depression, pregnancy, diabetes, gestational diabetes

Introduction

Diabetes is one of the most common metabolic diseases during pregnancy and comprises three groups (type 1 diabetes, type 2 diabetes, and gestational diabetes) [1]. While type 1 and type 2 diabetes are well known, gestational diabetes (GDM) is a form of carbohydrate intolerance which can lead to hyperglycemia, and which is diagnosed during pregnancy for the first time [2]. The prevalence of diabetes in pregnancy [both gestational and preexisting] vary in different populations [3]. Based on World Health Organization criteria, the prevalence of hyperglycemia among pregnant women is 16.9% [4]. Despite the low pooled prevalence rates of pre-existing type 1 and type 2 diabetes among pregnant women (0.3% and 0.2% respectively), the prevalence rates have doubled in the past 30 years [5]. The worldwide pooled prevalence rate of GDM is estimated to be 14%, with different prevalence rates in different country income groups: high-income (14.2%), middle-income (9.2%), and low-income (12.7%) [6].

Uncontrolled diabetes during pregnancy [irrespective of type] has specific maternal, fetal, and neonatal risks including (among others) spontaneous abortion, fetal abnormalities, pre-eclampsia, fetal loss, macrosomia, neonatal hypoglycemia, and neonatal hyperbilirubinemia. In addition, gestational diabetes may increase the risk of obesity and type 2 diabetes among their offspring [7]. Physical complications are not the only important complications of diabetes during pregnancy. Women with diabetes during pregnancy are a high-risk group for mental health problems, and has attracted the worldwide attention [8].

Physiological hormonal changes related to pregnancy as well as suffering from a chronic conditions like diabetes may contribute to emotional distress experienced by pregnant women, especially those with diabetes [9, 10]. Pregnant women can experience different forms of emotional distress such as diabetes-specific emotional distress [negative emotions or fear related to living with diabetes during pregnancy and coping with it] [11], anxiety, and depression [10, 12].

Anxiety disorders are common among diabetic pregnant women and factors such as first pregnancy, history of cesarean section, low education, and low income are among the contributing factors [13]. The prevalence of anxiety disorders among diabetic pregnant mothers has been reported to range from 9% to 59%, but was not statistically significant in meta-analyses [10, 13]. Depression during pregnancy is another mental health problem, and is higher among pregnant women with diabetes

[14]. It is associated with factors such as unplanned pregnancy, low education, socio-economic status, history of abortion, and being of older age while pregnant [14]. According to a recent systematic review and meta-analysis, gestational diabetes can lead to a 22% to 43% increase in the probability of depression disorders [10, 14].

It is important to address mental health issues during pregnancy especially among diabetic women, due to the bi-directional association between diabetes and anxiety/depression [15]. The presence of anxiety and depression itself can be a prelude to the onset of gestational diabetes, and the possibility of pregnancy complications is higher among diabetic pregnant mothers who have depression and anxiety [8]. Also, depression and anxiety can lead to hyperactivity of the hypothalamus and pituitary axis leading to increased insulin resistance and improper control of blood sugar [16], as well as worsening maternal health, increasing the chance of obstetric complications, preterm birth, and neonatal complications [17, 18].

While a growing body of literature suggests an association between GDM and development of mental health symptoms (including depression and anxiety) [7, 19], the results are inconsistent. Another noteworthy consideration is that most previous studies have focused on either GDM or pre-existing diabetes in pregnancy separately, and mental health of individuals with these two conditions have not been compared. Moreover, the prevalence of these mental health states regarding their type and their predictive factors has been much less investigated. Given this gap in the literature, the aims of the present study were to investigate the (i) prevalence of anxiety and depression among pregnant women with regard to diabetes type, (ii) predictors of anxiety among pregnant women with diabetes, and (iii) predictors of depression among pregnant women with diabetes.

Methods

Study design and setting

A cross-sectional study was conducted in 2023 in Qazvin province, Iran. Qazvin has six counties (Abyek, Alborz, Avaj, Buin Zahra, Takestan, and Qazvin). Overall, there are 109 comprehensive health centers in Qazvin Province. Comprehensive health centers affiliated to Qazvin University of Medical Sciences operate under the supervision of County Main Health Center. These centers were selected as the study setting because of their high coverage of providing prenatal care. In 2021, approximately 85% of pregnant women in Qazvin Province received their prenatal care in comprehensive health centers.

Participant eligibility

Pregnant women with any type of diabetes (pre-pregnancy or gestational) were included irrespective of their age and diabetic treatment (i.e., insulin, diet only or simultaneous treatment with both insulin and diet). Their diabetic status as pre-pregnancy or gestational diabetes was confirmed by a specialist. If they did not consent to participate, they were excluded from the study.

Sample size estimation

Sample size was estimated based on a previous estimated prevalence of 28.7% depression among Iranian pregnant women [20]. Considering the prevalence of 28.7% for depression, first type error (α) of 0.05, and the estimation error equal to 0.05, the estimated sample size was 350 pregnant women with diabetes.

Sampling

The name and contact information of any pregnant woman with any prenatal complication including diabetes is listed in comprehensive health centers. This list is accessible at the County Main Health Center. At the beginning of the study and after obtaining required permissions, the individuals responsible for maternal health programs including prenatal care (who had access to list of pregnant women with diabetes) at the County Main Health Center was contacted. After explaining the aims of the study, they provided a list of all pregnant women with diabetes (with their names and telephone contact details). Sampling was continued until the required sample size was reached (i.e., 350 pregnant mothers with diabetes). The pregnant women with diabetes were called to explain the study aims and asked to participate. Following this, an appropriate time for a telephone interview was fixed with them. All study measures were completed via a telephone interview.

Measures

The variables assessed in the present study comprised fertility and demographic characteristics, anxiety, depression, partner social support, self-efficacy, medication adherence, and fear of hypoglycemia.

Demographic, fertility, and diabetes characteristics: Data were collected using questions regarding demographic characteristics (age, education level, job, economic status), fertility characteristics (gestational age, gravid [number of pregnancies], history of infertility), and diabetes characteristics (type of diabetes [pre-pregnancy or gestational diabetes], history of hypoglycemia, treatment of diabetes).

Anxiety and depression: This was assessed using the 14-item Hospital Anxiety and Depression Scale (HADS) [21]. Items (e.g., “*I still enjoy the things I used to enjoy*”) are rated on a four-point scale from 0 (*definitely as much*) to 3 (*hardly at all*). Total scores (i.e., the sum of all items) range from 0 to 21 on each subscale (i.e., anxiety or depression). Scores below 7 are categorized as normal, scores from 8 to 10 are categorized as borderline, and scores above 11 are considered as abnormal regarding anxiety or depression [21]. The psychometric properties of the original version [22] and the Persian version [23] of the HADS are good. The internal reliability of the scale in the present study was very good with the Cronbach’s alpha coefficient of 0.88.

Self-efficacy: This was assessed using the 10-item General Self-Efficacy Questionnaire (GSEQ) [24]. Items (e.g., “*I can always manage to solve difficult problems if I try hard enough*”) are rated on a four-point scale from 1 (*not at all*) to 4 (*always*). The total scores range from 10-40 with higher score indicating greater self-efficacy. The psychometrics properties of the Persian version are good [25]. The internal reliability of the scale in the present study was excellent with the Cronbach’s alpha coefficient of 0.96.

Medication adherence: This was assessed using the 10- items Medication Adherence Rating Scale (MARS) [26]. Items (e.g., “*Have you ever forgotten to take your medication?*”) are rated on a 10-point scale from 0 (*never*) to 10 (*always*). The total scores range from 0 to 100 with higher scores indicating lower medication adherence. The psychometrics properties for original version [16] and the Persian version [27] of the MARS are good. The internal reliability of the scale in the present study was very good with the Cronbach’s alpha coefficient of 0.85.

Fear of hypoglycemia (FoH): This was assessed using the Hypoglycemia Fear Survey-II Scale (HFSS-II) [28]. The scale comprises two subscales (i.e., worry and behavior). Each subscale has 18 items assessing related conditions in the past six months. Items (e.g., “*For the past 6 months, I have been worried about not being able to detect hypoglycemia because of the possibility of hypoglycemia*”) are rated on a four-point scale from 0 (*never*) to 4 (*always*). The total scores range from 0 to 72, with higher scores indicating greater FoH [28]. The psychometric properties of Persian HFSS-II are good [29]. In the present study, only the worry subscale with 18 items was used and it had excellent internal reliability (Cronbach’s alpha coefficient of 0.96).

Partner social support during pregnancy: This was assessed using a self-devised one-item question rated on a 10-point scale. The item was: “*How much support do you have from your spouse in*

different life situations especially during your pregnancy (for example, in situations where you feel the need for empathy, like-mindedness, participation in doing things, etc.)?”

Ethics

The study protocol was reviewed and approved by the institutional review board and the ethics committee affiliated to Qazvin University of Medical Sciences (Decree code: IR.QUMS.REC.1402.057). All required permissions were obtained. Informed consent was provided. Prior to the study, information regarding the research objectives were explained, participation was voluntary, and participants were assured that all data collected would be confidential and anonymous.

Statistical analysis

Data were analyzed using IBM SPSS Statistics for Windows version 26 (Armonk, New York: IBM Corp). Categorical variables were described using frequencies and percentages. Continuous variables were described with their means and standard deviations (SDs). The significance level was set as $p < 0.05$. For assessing the univariable association between anxiety and depression with study variables, one-way analysis of variances (ANOVAs) and chi-square (χ^2) tests were used. Significant variables in the univariable analysis were entered into the multivariable analysis. Multivariable multinomial logistic regression models were used to determine the predictors of borderline and abnormal anxiety and depression symptoms.

Results

In the present study, 350 pregnant women with diabetes with an average age of 30 years and an average gestational age of 30 weeks participated. Of these, 101 participants (28.9%) had pre-pregnancy diabetes and 249 participants (71.1%) had gestational diabetes.

The prevalence rates for anxiety and depression among the total sample were 52% for borderline anxiety, 22.9% for abnormal anxiety, 22.3% for borderline depression, and 57.1% for abnormal depression. Diabetic status (pre-pregnancy or gestational) had a significant relationship with both anxiety and depression. Borderline and abnormal anxiety was reported by 84.2% of pre-gestational diabetes patients and 71.1% of gestational diabetes patients. Borderline and abnormal depression was reported by 94.1% of pre-gestational diabetes patients and 73.5% of gestational diabetes patients (Table 1). Therefore, anxiety and depression were significantly higher among pregnant women with pre-pregnancy diabetes compared to pregnant women with gestational diabetes.

Participants' mean scores were 15.70 (out of 72) for fear of hypoglycemia ($SD=13.66$), 30.94 (out of 100) for medication adherence ($SD=16.25$), 24.37 (out of 40) for self-efficacy (7.62), and 6.69 (out of 10) for partner social support ($SD=2.62$). These variables were significantly associated with anxiety and depression (Table 2). Moreover, the associations of anxiety and depression with demographic and reproductive characteristics were assessed using ANOVA and chi-square univariable analysis (Table 2). Anxiety had a significant association with educational status, job, perceived family economic status, gravid, and diabetes. Depression had a significant association with participants' age, gestational age, educational status, job, perceived family economic status, gravid and diabetes treatment, and hypoglycemic history. These variables with significant associations with anxiety and depression were entered as independent variable in multivariable multinomial logistic regression model.

The results of multivariable multinomial logistic regression models to determine significant independent predictors of borderline and abnormal states of anxiety and depression among pregnant women with diabetes are presented in Table 3. Self-efficacy and spouse's social support were significant predictors of borderline and abnormal anxiety. With the increase of each unit on the GSEQ, borderline anxiety decreased by 8% and abnormal anxiety decreased by 9%. With the increase of each point score on the spouse's social support item, borderline anxiety decreased by 28% and abnormal anxiety 32%.

Variables predicting borderline depression included fear of hypoglycemia (6% increase per unit increase on the HFSS-II), self-efficacy (6% decrease in borderline depression per unit increase on the GSEQ), spouse's social support (33% decrease in borderline depression per unit increase on the spouse's social support item), type of diabetes (73% lower chance of borderline depression among those with gestational diabetes compared to those with pre-pregnancy diabetes), and type of diabetes treatment (70% lower chance of borderline depression among those controlling their diabetes with insulin compared to those controlling their diabetes through diet).

Variables predicting the abnormal depression included fear of hypoglycemia (6% increase in abnormal depression per unit increase on the GSEQ), medication adherence (6% increase in abnormal depression per unit increase on the MARS), self-efficacy (14% decrease in abnormal depression per unit increase on the GSEQ), spouse's social support (38% decrease in abnormal depression per unit increase on the spouse's social support item), perceived family economic status (3.1 times higher chance of abnormal depression among participants with fair economic status compared to those with good economic status), type of diabetes (74% lower chance of abnormal

depression among those with gestational diabetes compared to those with pre-pregnancy diabetes), and type of diabetes treatment (79% lower chance of abnormal depression among those controlling their diabetes with insulin compared to those controlling their diabetes through diet).

Discussion

The present cross-sectional study aimed to estimate the prevalence of anxiety and depression among diabetic pregnant women (pre-existing and gestational diabetes) and their predictors. Overall, the results indicated high prevalence rates of both anxiety and depression among pregnant women with diabetes (irrespective of type). These findings are consistent with previous literature [10, 13, 14, 30-33] although prevalence rates differ among different populations.

In the present study using the HADS, borderline anxiety was reported by 52% of all participants and abnormal anxiety was reported by 22.9% of all participants. Individuals with pre-existing diabetes had significantly higher (combined) borderline and abnormal anxiety (84.2%) compared to those with GDM (71.1%). Different prevalence rates of anxiety disorders has been reported among pregnant women with diabetes. Fu et al. reported a prevalence rate of 59.7% anxiety among 386 pregnant mothers with GDM using the Pregnancy-related Anxiety Scale [13]. In a study conducted by Lee et al., 39.9% of diabetic pregnant mothers (N=526) had anxiety [30]. Also, based on a recent meta-analytic review, the pooled prevalence of anxiety disorders among pregnant mothers with GDM was 9% and was not statistically significant among individuals from Black, Asian and Minority ethnic backgrounds [10]. Using the HADS, Ásbjörnsdóttir et al. reported a 40% prevalence rate for anxiety and/or depression symptoms in early pregnancy among women with type 2 diabetes compared to 7% among pregnant women without diabetes [31]. Also using the HADS, Do et al. reported a prevalence of 22% and 17% anxiety in early and late pregnancy among 137 pregnant women with type 1 or type 2 diabetes [32].

In present study using the HADS, borderline depression was reported by 22.3% of all participants, and abnormal depression was reported by 57.1% of all participants. Individuals with pre-existing diabetes had significantly higher (combined) borderline and abnormal depression (79.4%) compared to those with GDM (73.5%). Different prevalence rates for depression among pregnant women with GDM or pre-existing diabetes have been reported in different studies. According to a recent meta-analytic review of ten studies, pregnant women with gestational diabetes had a 43% increased risk of having antepartum depression compared to pregnant women without diabetes [14]. In a study conducted by Lee et al. among diabetic pregnant mothers (N=526), 12.5% of the

participants had symptoms of depression [30]. According to a systematic review by Ross et al. comprising 48 studies, depressive disorders ranged from 4.1% to 80% among diabetic pregnant mothers compared to a range of 0% to 1.6% among the general population of pregnant women in the studies reviewed [33]. However, they did note that the overall quality of the studies was poor.

A high prevalence of both anxiety and depression among diabetic pregnant women was reported in the present study compared to the aforementioned previous studies. There may be various reasons for this. One reason might be the difference in the psychometric scales used to assess anxiety and depression symptoms such as the Pregnancy-related Anxiety Scale [13], the HADS [31, 32], or the 21-item Depression and Anxiety Scale (DASS-21) [30]. Differences in items, scoring, and interpretation might be a possible source of heterogeneity. Another reason may be cultural differences because such differences can play a significant role in mental health. Every individual's cultural beliefs, values, and norms shape their mental health. Also culture can influence the individual's understanding of mental illness, their coping mechanisms, help-seeking behaviors, and received support [34, 35].

Both anxiety and depression were higher among pregnant women with pre-existing diabetes in the present study. Also, diabetes type (gestational diabetes vs. pre-pregnancy diabetes) was one of independent predictors of depression in the present study (i.e., lower anxiety and depression was experienced by those with GDM). To best of the present authors' knowledge, the prevalence of anxiety and depression by diabetes type has not been examined in previous studies. Moreover, it is notable that compared to the general population worldwide, the prevalence of depression among individuals with type 1 diabetes is up to three times higher and among individuals with type 2 diabetes is two times higher [36]. One probable reason for higher prevalence of anxiety and depression among pregnant women with pre-existing diabetes might be due to this fact that being pregnant experiencing type 1 and 2 diabetes means more probable fetal, maternal and neonatal dangers [37, 38], so this might lead to more anxiety among pregnant women with preexisting diabetes.

Based on the results of the multivariate analysis, lower self-efficacy and lower support from the spouse were predictors of anxiety and depression. According to Fu et al., lower self-efficacy and lower social support were factors affecting the level of anxiety among diabetic pregnant women [13]. Self-efficacy is a positive psychological construct that refers to the ability, judgment, and beliefs that are used in a specific situation to achieve a specific goal [39]. Higher self-efficacy among individuals with gestational diabetes is associated with higher self-confidence to overcome

anxiety and take preventive measures [40]. Social support might affect diabetic patients' mental health both directly and indirectly by influencing their self-efficacy and clinical outcomes including glycemic control [41, 42].

Lower medication adherence was one of predictors of depression in present study. Having poor adherence to medical treatment has been associated with depression in previous studies [43-45]. In a systematic review of 196 published studies, lower adherence was associated with concomitant depression [44]. Moreover, in a large-scale study among 4,463 patients with diabetes, major depression was associated with unhealthy diet, lower levels of physical activity, and lower adherence to hypoglycemic medications [45].

Fear of hypoglycemia (which was another predictor of depression among diabetic pregnant women) is a psychological concern of diabetic patients and is defined as a degree of fear related to the occurrence of hypoglycemia and its complications [46]. High fear might lead to emotional stress and constant anxiety which can consequently cause a significant reduction in self-rated quality of life assessments. This may initiate or increase depressive symptomology [47]. The results of present study are consistent with previous studies regarding the association between the fear of hypoglycemia with both anxiety and depression [11, 48, 49].

Type of diabetes treatment was another predictor of depression in present study with lower rates of depression among participants who controlled their diabetes with insulin (compared to those who controlled their diet through diet). The association between insulin use and depression has been found to be inconsistent in previous studies. Consistent with present study, several studies have reported less depression or fewer depressive symptoms among diabetic patients who received insulin treatment [50-52], while others have reported higher depression rate among such individuals [53-55].

In relation to perceived economic status, those who said they had a fair economic status was a predictor of higher depression among diabetic pregnant women (compared to those with a good economic status). The existence of a social gradient or dose-response relationship between socioeconomic status (SES) and health outcomes, with weaker health outcomes among those with lower SES, has been discussed in the extant literature [56, 57]. Based on previous studies, depression is more prevalent at lower levels of SES among different populations [58-60] including diabetics patients [50], which concurs with the findings of the present study.

Limitations

The findings of present study should be interpreted considering some limitations. These include the cross-sectional nature of the study (meaning that causality between the variables could not be determined), the use of self-report measures (which are subject to known methodological biases such as social desirability), and sampling from one province of Iran (which limits generalizability of findings to other Iranian pregnant women from other areas or to non-Iranian pregnant women).

Conclusion

In the present study, the frequency of both anxiety and depression were considerable among pregnant women with diabetes. Women with pre-pregnancy diabetes were at higher risk for both borderline and abnormal depression and anxiety compared to those with gestational diabetes. Therefore, pregnant women with diabetes should be evaluated for depression and anxiety in their first prenatal visit. Improving spousal social support as well as self-efficacy among pregnant women with diabetes may have significant protective roles in reducing anxiety. Improving self-efficacy, increasing medication adherence, reducing the fear of hypoglycemia, and improving the spouse's social support are modifiable variables that may reduce depression among pregnant women with diabetes.

Declaration:

Ethics approval and consent to participate: All methods were performed in accordance with the relevant guidelines and regulations. The study protocol was reviewed and approved by the institutional review board and the ethics committee affiliated to Qazvin University of Medical Sciences (Decree code: IR.QUMS.REC.1402.057). All required permissions were obtained. Informed consent was provided. Prior to the study, information regarding the research objectives were explained, participation was voluntary, and participants were assured that all data collected would be confidential and anonymous.

Consent for publication: Not applicable.

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manuscript. All authors revised the manuscript, agreed to be fully accountable for ensuring the integrity and accuracy of the study, and read and approved the final version of the manuscript to be published. All the authors met the criteria for authorship, and they are listed as co-authors on the title page.

Guarantor: Corresponding author (ZA) is guarantor of this work.

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Table 1. Frequency of anxiety and depression among pregnant women with diabetes based on their diabetes type

Variable	Categories	Total	Pre pregnancy	Gestational	χ^2 statistics (<i>p</i> -value)
		N (%)	diabetes	diabetes	
		350 (100)	101 (28.9)	249 (71.1)	
Anxiety	Normal	88 (25.1)	16 (15.8)	72 (28.9)	7.34 (0.025)
	Borderline	182 (52.0)	56 (55.4)	126 (50.6)	
	Abnormal	80 (22.9)	29 (28.8)	51 (20.5)	
Depression	Normal	72 (20.6)	6 (5.9)	66 (26.5)	18.61 (<0.001)
	Borderline	78 (22.3)	27 (26.7)	51 (20.5)	
	Abnormal	200 (57.1)	68 (67.4)	132 (53)	

Table 2. Summary of participants' characteristics and their association with anxiety and depression

	Range	Mean (SD)	Results of ANOVA statistics (<i>p</i> -value)	
			Anxiety	Depression
Age (in years)	20-44	31.00 (4.54)	1.164 (0.31)	3.21 (0.04)
Gestational age	16-40	30.09 (4.07)	0.713 (0.49)	3.31 (0.04)
Fear of hypoglycemia	0-72	15.70 (13.66)	7.84 (<0.001)	15.53 (<0.001)
Medication adherence	0-100	30.94 (16.25)	45.65 (<0.001)	120.30 (<0.001)
Self-efficacy	10-40	24.37 (7.62)	37.09 (<0.001)	53.02 (<0.001)
Partner social support	0-10	6.69 (2.62)	40.31 (<0.001)	47.24 (<0.001)
	Variable	No (%)	Results of χ^2 statistics (<i>p</i> -value)	
			Anxiety	Depression
Educational status	Under high school	166 (47.4)	25.16 (<0.001)	23.79 (<0.001)
	Diploma	122 (34.9)		
	High school diploma	62 (17.7)		
Job	Employed	52 (14.9)	6.56 (0.04)	10.08 (0.006)
	Housewife	298 (85.1)		
Perceived family economic status	Poor	82 (23.4)	24.20 (<0.001)	23.23 (<0.001)
	Fair	230 (65.7)		
	Good	38 (10.9)		
Gravid	1	193 (55.1)	47.98 (<0.001)	41.98 (<0.001)
	2	106 (30.3)		
	3	33 (9.4)		
	4 \leq	18 (5.2)		
Infertility history	No	301 (86.0)	0.43 (0.81)	0.63 (0.73)
	Yes	49 (14.0)		

Diabetes treatment	Diet	137 (39.1)		
	Insulin	160 (45.7)		
	Oral hypoglycemic drugs	16 (4.6)	14.34 (0.03)	13.26 (0.04)
Hypoglycemic history	Diet and drug	37 (10.6)		
	No	222 (63.4)	0.71 (0.70)	9.81 (0.007)
	Yes	128 (36.6)		

Table 3. Results of multivariable[#] multinomial logistic regression

Predictors		B	S.E.	<i>p</i>	OR (95% CI)		
Anxiety *	Borderline	Self-efficacy	-0.08	0.02	<0.001	0.92 (0.88; 0.96)	
		Partner social support	-0.33	0.09	<0.001	0.72 (0.60; 0.86)	
	Abnormal	Self-efficacy	-0.10	0.03	0.001	0.91 (0.86; 0.96)	
		Partner social support	-0.39	0.10	<0.001	0.68 (0.56; 0.82)	
	Depression*	Borderline	Fear of hypoglycemia	0.05	0.02	.002	1.06 (1.02; 1.09)
			Self-efficacy	-0.07	0.03	.026	0.94 (0.88; 0.99)
Partner social support			-0.40	0.12	.001	0.67 (0.53; 0.85)	
Diabetes type (pregnancy vs. pre-pregnancy diabetes)			-1.30	0.58	.024	0.27 (0.09; 0.84)	
Diabetes treatment (Insulin vs. diet)			-1.22	0.51	0.016	0.30 (0.11; 0.80)	
Abnormal		Fear of hypoglycemia	0.05	0.02	0.001	1.06 (1.02; 1.09)	
		Medication adherence	0.05	0.02	0.016	1.05 (1.01; 1.09)	
		Self-efficacy	-0.15	0.03	<0.001	0.86 (0.82; 0.91)	
		Partner social support	-0.48	0.12	<0.001	0.62 (0.49; 0.78)	
		Diabetes type (pregnancy vs. pre-pregnancy diabetes)	-1.37	0.56	.015	0.26 (0.09; 0.77)	
	Perceived family economic status (Fair vs. good)	1.123	0.52	.030	3.08 (1.12; 8.49)		
	Diabetes treatment (Insulin vs. diet)	-1.54	0.49	.001	0.21 (0.08; 0.55)		

[#]Significant variables from univariable analysis reported in Table 2 were entered as independent variable in each model.

*Normal group was set as reference

S.E. = Standard error

Declaration of interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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