

Adherence and Related Factors in Pregnant Women With Gestational Diabetes

Shiva Borzouei¹, Mohammad Eslahchi², Farzaneh Esna-Ashari^{2,3}, Azar Pirdehghan^{2,3}

¹ Department of Internal Medicine, Shahid Beheshti Hospital, Hamadan University of Medical Sciences, Hamadan, Iran

² Department of Community Medicine, School of Medicine, Hamadan University of Medical Sciences, Hamadan, Iran

³ School of Public Health and Research Center for Health Sciences, Hamadan University of Medical Sciences, Hamadan, Iran

Received: 16 Feb. 2021; Accepted: 21 Jul. 2021

Abstract- Gestational diabetes is a metabolic disease that can have multiple maternal and fetal complications. Therapeutic adherence can help controlling blood sugar and reducing its complications. This study investigates the medication adherence among pregnant women and the effective factors on it. This cross-sectional study was conducted on 104 pregnant women with gestational diabetes who were referred to the endocrinology clinic of Shahid Beheshti hospital in Hamadan, Iran, in 2018. Input criteria were those over 18 years of age, and output criteria included heart, kidney, and thyroid disorders. Medication adherence was evaluated using Morisky's 6-question questionnaire (MMAS-6). Analyzes were conducted using SPSS version 21 at the significance level of less than 0.05. Based on the results, 77.9% of the women lived in the city, 65.4% had a college education, and 73.1% were housewives. 58.7% of them had good medication adherence. There was a significant relationship between adherence and glycemic control. Address and level of education had a significant relationship with medication adherence. People with higher levels of health literacy had significantly higher medication adherence. Low education level, rural residence, and low health literacy level are determinants of poor medication adherence in pregnant women with gestational diabetes, which indicates the need for more training for these people.

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Acta Med Iran 2021;59(9):550-554.

Keywords: Adherence; Pregnant women; Gestational diabetes

Introduction

Gestational diabetes Mellitus (GDM) is one of the major health and growing problems that affect women in low-income communities of different races and ethnicity disproportionately (1). This disease is known as glucose intolerance, which is first seen during pregnancy (2). Gestational diabetes mellitus is a metabolic and endocrine disease and is caused by inadequate pancreas function in the pregnant mother to overcome the gestational diabetic conditions (3) and can lead to high-risk pregnancy outcomes (4). Macrosomia, shoulder dystocia, bone fractures, neurological paralysis, reducing blood sugar and increasing bilirubin, hypocalcemia, and respiratory failure are neonatal and embryonic complications of gestational diabetes. Maternal complications include the increasing appearance of preeclampsia, cesarean, and the possibility of the appearance of type 2 diabetes in the

future (5).

The prevalence of gestational diabetes is increasing all over the world, and its range is from 1-22% in different countries (6) and 1-18.6% in Iran (7). The widespread of this disease may be due to different screening methods and heterogeneity of the populations under study.

The most important risk factors for GDM include old age, family history of type 2 diabetes in the classy relatives, glucose tolerance disorder, obesity, hypomobility, history of hypertension, history of polycystic ovary syndrome (PCOD), the birth baby with macrosomia, previous history of gestational diabetes and intrauterine fetal death (IUF) (8).

One of the principles of gestational diabetes management is the adherence of patients to the prescribed therapeutic diet, which helps improve blood sugar control and can reduce the complications and costs of the disease (9). Adherence to a therapeutic diet is daily essential for

Corresponding Author: A. Pirdehghan

Department of Community Medicine, School of Medicine, Hamadan University of Medical Sciences, Hamadan, Iran
Tel: +98 8138380572, Fax: +98 8138380208, E-mail addresses: pirdehghan93@gmail.com

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pregnant women because observing a therapeutic diet plays a major role in improving their health and quality of life (10).

However, few studies are available about the effective factors on adherence of therapy for women with gestational diabetes, so this study investigates the demographic, midwifery, clinical, and health literacy level of people factors on adherence to the therapeutic diet.

Materials and Methods

This cross-sectional study was conducted on 112 pregnant women with gestational diabetes who were referred to the endocrinology clinic of Shahid Beheshti hospital in Hamadan, Iran in 2018 after approval by the ethics committee of Hamadan University of Medical Sciences (ID: IR.UMSHA.REC.2018.286).

Sequential sampling was conducted among pregnant women 18 years and older that their disease had been diagnosed using FPG and OGTT tests according to American Diabetes Association (11). Output criteria included heart, kidney and thyroid disorders and unwillingness to participate in the study.

Data were collected using a three-part questionnaire. The first part consisted of demographic information, midwifery information, history of diabetes, consuming tobacco, and the second part was 6-question therapeutic adherence questionnaire (MMAS-6) with yes or no answer. A score of 4-6 indicated good adherence and a

score of 0-3 indicated poor adherence. Reliability of this questionnaire obtained in the study of Pirdehghan *et al.*, 0.70 (12). In the third part the, 33-question questionnaire of health literacy assessment was used as a secondary outcome. It should be noted that eight persons were excluded due to incomplete filling of questionnaires, and 104 persons' information was analyzed.

Controlling fasting blood sugar was defined as below 95 mg / dL and 1 and 2 h after eating food below 140 and 120 mg / dL (13).

Analyzes were conducted using *Chi*-square, Mann-Whitney tests, and Logistic Regression model using SPSS version 21. The significance level was considered less than 0.05.

Results

This study investigates 112 mothers with GDM. Of these, eight subjects were excluded for failing to complete the questionnaire. Among 104 assessed women, 81(77.9%) persons were from urban areas, 68(65.4%) with academic education, 76(73.1%) housewife, and 4(3.8%) were addicted to hookah.

Totally, 43(41.3%) of participants had poor, and 61 (58.7%) of them showed the fine level of adherence.

It was notable that only 51.9 % (54) of mothers were counted as diabetes controlled. There was a significant relationship between adherence and glycemic control (Figure 1).

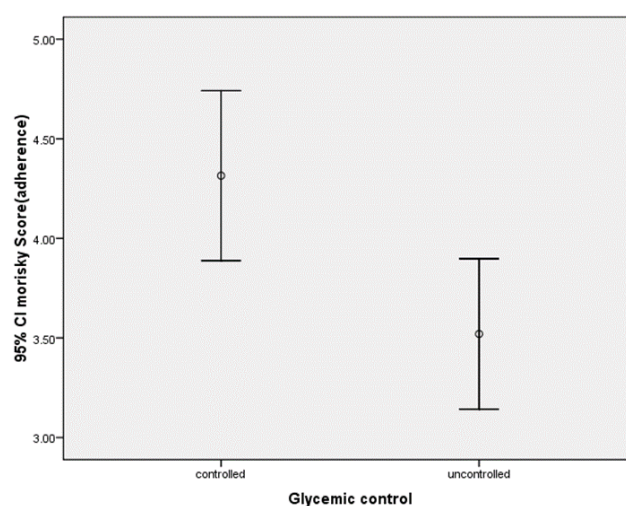


Figure 1. Adherence and glycemic control in pregnant women with GDM

In patients with poor adherence levels, 14(32.6%) were in the diabetic controlled situation, while in mothers

with fine adherence level, 40(65.6%) were considered as controlled gestational diabetes, and univariate analysis

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showed that good adherence could increase the chance of controlled diabetes nearly two times (Odd ratio: 1.7; CI:

1.2-2.5; P :0.001). Adherence in controlled diabetes and uncontrolled was shown in (Table 1).

Table 1. Adherence and diabetes control in pregnant women with GDM

Adherence	Controlled diabetes		Uncontrolled diabetes		P
	N	%	N	%	
Poor	14	32.6	29	67.4	0.001
Fine	40	65.6	21	34.4	

Among assessed variables, there was a significant relationship between adherence and area of life, education, and health literacy level of women with gestational diabetes. So, urban mothers, academic

educated, and women with a higher level of health literacy showed adequate adherence in comparison with others. The details were brought in (Table 2).

Table 2. Characteristics of the pregnant women with GDM stratified with poor and fine adherence

Variables	Adherence		P	
	Poor N (%)	Fine N (%)		
Location	Rural	15(65.2%)	8(34.8%)	0.008
	urban	28(34.6%)	53(65.4%)	
Education	Illiterate or below diploma	19(52.8%)	17(47.2)	0.004
	Diploma	16(55.2%)	13(44.8%)	
Job	Academic education	8(20.5%)	31(79.5%)	0.7
	Housewife	32(42.1%)	44(57.9%)	
Age: mean±SD (years)	Employed	11(39.3%)	17(60.7%)	0.3
Health literacy: mean±SD (score)		32.8±5	31.7±5.2	<0.001

Finally, a multivariate Logistic Regression Analysis based on forwarding Conditional Procedures was performed in order to determine the predicting factors for adequate adherence. Therefore, in the model, we entered

related variables in the univariate analysis included in living area, educational level, and HL. Among them, only having sufficient health literacy could be considered as a significant predictor for fine adherence (Table 3).

Table 3. Predicting factors for adequate adherence in pregnant women with GDM

Variables	Odd Ratio	CI (95%)	P^*	
Education	Diploma	Referent		
	Academic education	1.4	0.3-5.4	0.5
	Illiterate or below diploma	1.2	0.4-3.6	0.7
Location	Rural	--	--	
	Urban	2.4	0.6-8.1	0.12
Health literacy	Insufficient	Referent		
	Borderline	0.7	0.2-2.2	0.003
	Sufficient	7.3	1.9-26.9	

*Model: Hosmer and Lemeshow Test: Chi-square (6)=4.4; P =0.6. A total of 67.3% of participants were correctly classified

Discussion

Gestational diabetes mellitus is one of the most common complications of pregnancy and a therapeutic-health problem all over the world that has many effects on the mother and embryo (14).

According to the results of the present study, more

than half of pregnant women had good medication adherence. A study by Kayla *et al.*, (2019) showed that 53% of pregnant women have high medication adherence (15). According to various studies, barriers to medication adherence including lack of notification, low income, cost of therapy, the multiplicity of roles, mental health, lack of patients understanding from the therapy benefits, and the

simplicity or complexity of therapeutic and nutritional diet and medication complications (16,17). The WHO has considered non-adherence to the drug as a multi-factor problem caused by the interaction of 5 patient factors, conditions, and type of prescribed therapy, economic factors, and related factors of the health system (18).

The prevalence of gestational diabetes in Hamadan was reported 39.5% in the study of Borzouei *et al.*, (14). Therefore, it is necessary to manage gestational diabetes in pregnancy period due to its relatively high statistics and its complications and consequences. Numerous studies have shown that high levels of medication adherence lead to greater control of blood sugar (19,20). The findings of the present study are also in accordance with the conducted studies in this area in which patients with more medication adherence had higher mean in controlling blood sugar. So that, good medication adherence increases the chances of blood sugar control 2 times. Patients with higher medication adherence are more aware of diabetes control and management and are always adhering to their medication diet because of fear of undesirable clinical condition. Therefore, blood sugar control is a basic index to reflect the physiological results in people with diabetes. Actually, medication adherence is an obvious need for clinical cares and can have a positive effect on patients in terms of economical and quality of life (19).

One of the notable results of this study was the significant relationship between medication adherence and health literacy of the participants in the study. So, the mean of health literacy was higher in people with desirable medication adherence. Sufficient health literacy could increase the chance of adherence 7 times, too. The present result is in line with the result of a study in Iran (2018) on people with type 2 diabetes (21). In general, patients with type 2 diabetes who have less health literacy and less awareness and adherence to the drug (22,23) and spend more for drugs (23). These patients also have a weaker relationship with the physician and take part less in making decisions (24).

The results of this study indicate there is a significant relationship between poor medication adherence and rural residence and non-university educations.

Approximately 60% of people with diploma or less do not have good medication adherence, while medication adherence is poor in people who have a college education close to 20%. Past studies also indicate that people with higher education are better and more accurate in doing medical advices. For example, Al-Rasheedi (2014) reported that, there is a significant relationship between the level of education and adherence. According to this

study, people with high levels of education are more aware of adherence and adhere to drugs more (25).

This study had some limitations. The answers to the questions on the Morisky scale were self-reported, and their behavior is affected by memory and invisible. Therefore, some patients may not provide real responses about medication adherence, which resulted in an overestimation of medication adherence among pregnant women (12). Secondly, this study has been conducted as a single-center; future studies in several centers can provide more reliable results. Maternal and embryonic outcomes have not been investigated since the study has conducted as cross-sectional so, it is suggested to discuss this issue in a separate study.

41.3% of pregnant women with gestational diabetes had poor medication adherence. This study confirms that medication adherence is associated with low blood sugar control. More training is necessary for people with lower levels of education and rural residents who had lower medication adherence. This study showed that health literacy is a determining factor in medication adherence. Therefore, health care providers, while overall evaluating the pregnant women, should provide suitable information with their health literacy level to prevent from next outcomes of gestational diabetes by increasing medication adherence.

Acknowledgments

We gratefully acknowledge all managers and staff in the endocrinology clinic of Shahid Beheshti hospital in Hamadan province that helped with data collection.

References

1. Practice Bulletin No. 137: Gestational diabetes mellitus. *Obstet Gynecol* 2013;122:406-16.
2. Kleinwechter H, Demandt N. Diabetes in pregnancy-type 1/type 2 diabetes mellitus and gestational diabetes mellitus. *Dtsch Med Wochenschr* 2016;141:1296-303.
3. Gilmartin A, Ural SH, Repke JT. Gestational diabetes mellitus. *Rev Obstet Gynecol* 2008;1:129-34.
4. Zarrabi R, Rahmatnezhad L, Bastani F. Investigating health locus of control among women with gestational diabetes and its relationship with demographic variables. *Nurs Midwifery J* 2013;11:1-11.
5. Hong J, Rumbold AR, Willson KJ, Crowther CA. Borderline gestational diabetes mellitus and pregnancy outcomes. *BMC Pregnancy Childbirth* 2008;8:31.
6. Galtier F. Definition, epidemiology, risk factors. *Diabetes Metab* 2010;36:628-51.

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- Jafari-Shobeiri M, Ghojzadeh M, Azami-Aghdash S, Naghavi-Behzad M, Piri R, Pourali-Akbar Y, et al. Prevalence and risk factors of gestational diabetes in Iran: a systematic review and meta-analysis. *Iran J Public Health* 2015;44:1036-44.
- National Institute for Health and Care Excellence. Diabetes in pregnancy. (Accessed 2016, at <https://www.nice.org.uk/guidance/qs109>.)
- International Diabetes Federation. Gestational diabetes. (Accessed 2017, at <https://www.idf.org/our-activities/care-prevention/gdm>.)
- Mahmoud NM, yousef Mohammed N, Essa RM. The Relationship between Health Belief Model and Compliance with Therapeutic Regimen Among Diabetic Pregnant Women. *Int J Res Health Sci Nurs* 2018;4:40-63.
- Association AD. 12. Older adults: standards of medical care in diabetes—2019. *Diabetes Care* 2019;42:S139-47.
- Pirdehghan A, Poortalebi N. Predictors of adherence to type2 diabetes medication. *J Res Health Sci.* 2016;16:72-5.
- Management of Diabetes in Pregnancy: Standards of Medical Care in Diabetes. *Diabetes Care* 2019;42:S165-72.
- Borzouei S, Rabiei S, Esna Ashari F, Zareeighane Z, Biglari M. The Relationship between Gestational Diabetes and Risk Factors in Pregnant Women in Hamadan. *Pajouhan Sci J* 2018;17:30-6.
- Lash K, Garcia L, Salazar-Laso X, Chahine K, Hotra J, Blackwell S, et al. Medication adherence in women with gestational diabetes and its effect on pregnancy outcomes. *Am J Obstet Gynecol MFM* 2019;220:S270.
- García-Pérez L-E, Álvarez M, Dilla T, Gil-Guillén V, Orozco-Beltrán D. Adherence to therapies in patients with type 2 diabetes. *Diabetes Ther* 2013;4:175-94.
- Taha NM, El-Azeaz MA, El-Razik BGA. Factors affecting compliance of diabetic patients toward therapeutic management. *Med. J. Cairo Univ* 2011;79:211-18.
- Mohd MMA-H, Phung H, Sun J, Morisky DE. Improving adherence to medication in adults with diabetes in the United Arab Emirates. *BMC Public Health* 2016;16:857.
- Jannoo Z, Khan NM. Medication Adherence and Diabetes Self-Care Activities among Patients with Type 2 Diabetes Mellitus. *Value Health Reg Issues* 2019;18:30-5.
- Cani CG, Lopes LdSG, Queiroz M, Nery M. Improvement in medication adherence and self-management of diabetes with a clinical pharmacy program: a randomized controlled trial in patients with type 2 diabetes undergoing insulin therapy at a teaching hospital. *Clinics (Sao Paulo)* 2015;70:102-6.
- Mehrtak M, Hemmati A, Bakhshzadeh A. Health Literacy and its Relationship with the medical, dietary Adherence and exercise in Patients with Type II Diabetes mellitus. *J Health Lit* 2018;3:137-44.
- Powell CK, Hill EG, Clancy DE. The relationship between health literacy and diabetes knowledge and readiness to take health actions. *Diabetes Educ* 2007;33:144-51.
- Osborn CY, Cavanaugh K, Wallston KA, Kripalani S, Elasy TA, Rothman RL, et al. Health literacy explains racial disparities in diabetes medication adherence. *J Health Commun* 2011;16:268-78.
- Mantwill S, Monestel-Umaña S, Schulz PJ. The relationship between health literacy and health disparities: a systematic review. *PLoS One* 2015;10:e0145455.
- Al-Rasheedi AAS. The role of educational level in glycemic control among patients with type II diabetes mellitus. *Int J Health Sci (Qassim)* 2014;8:177-87.