

Health literacy and diabetes control in pregnant women

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ABSTRACT

Background: Low health literacy (HL) is associated with an extensive range of health outcomes. **Objective:** The present study was performed to inquire about the relationship between HL and glycemic control in gestational diabetes in order to design interventional future preventing programs. **Methods:** This cross-sectional study was performed on 104 Iranian pregnant women with gestational diabetes mellitus (GDM) referred from urban and rural areas to endocrinology clinic of Hamadan Beheshti Hospital, in 2017. Iranian Health Literacy Questionnaire (IHLQ) and a sociodemographic checklist were distributed among women. Correlation between HL and glycemic control was examined using SPSS. The significance level was set at $P < 0.05$. **Results:** Among women, 48.1% (50) were affected by uncontrolled diabetes and only 22% (11) had an adequate level of HL. An adequate level of HL were 50% and 22% in glycemic controlled and uncontrolled women, respectively. In univariate analysis, there was a significant relationship between diabetes control and adequate HL. So, problematic HL could increase the chance of uncontrolled diabetes more than three times (odds ratio: 3.5; CI: 1.5–8.3; P value: 0.004). Among all related variables, education and being housewife were considered as protective and risk factors for problematic HL, respectively. **Conclusion:** In conclusion, this study has provided evidence of limited HL and its relationship with low glycemic control in pregnant women with GDM. The problem was more serious in low educated, rural, housekeepers, and older-aged women. This deficit needs to be addressed by health planners and policymakers who are responsible for promoting the health of people and decreasing health inequalities community.

Keywords: Gestational diabetes, health literacy, pregnancy complications

Background

Gestational diabetes mellitus (GDM) is defined as any degree of glucose intolerance with the first recognition during pregnancy.^[1] GDM is one of the most common medical complications during pregnancy and prevalence is increasing all over the world.^[2] The rate differs between 1% and 22% in different countries^[3] and 1.3% and 18.6% in Iran.^[4] This wide range might be because

of different screening methods and heterogeneity of study populations.

The risk of congenital anomalies, macrosomia, neonatal hypoglycemia, neonatal hyperbilirubinemia, and respiratory distress syndrome increases in pregnant women with GDM.^[5] Also, women with GDM have a higher risk of preeclampsia, cesarean, and preterm delivery.^[6]

Social determinants of health (SDH) are considered as main factors in preventing and treating GDM.^[7] Health literacy (HL) among SDH is defined as one's capacity for acquiring, interpreting, and understanding primary health

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information and services required for proper health decision making.^[8]

HL includes functional, interactive, and critical skills. Functional skills are known as the ability to read and understand the text, interpret information, and complete forms. Interactive skills are defined as the ability to communicate with health-related information, and critical skill is the capability to conduct the health care system and help to make proper health decisions.^[8,9]

Low HL is associated with an extensive range of health outcomes.^[10] Different studies show that HL improves a healthy lifestyle and quality of life.^[10] In addition, it can help the mothers pass their critical stage of life with fewer complications.^[11]

Objectives

Regarding the importance of GDM, the present study was performed to inquire about the relationship between HL and glycemic control in gestational diabetes. Obviously, if HL is considered as a factor related to glucose control in pregnant women, designing and implementing some interventions to enhance HL in this vulnerable group health programs might be helpful in future preventing programs in order to gestational glycemic control.

Methods

This cross-sectional study was performed on 104 pregnant women with GDM referred from urban and rural areas to the endocrinology clinic of Beheshti hospital in Hamadan, Iran, in 2017.

Sampling method was consecutive sampling and contained all eligible pregnant women 18-years old or more with gestational diabetes, whose disease was first diagnosed using the fasting blood sugar (FBS), oral glucose tolerance test (OGTT) or glucose challenge test (GCT) tests, as per the criteria of the World Health Organization.^[12] The exclusion criteria consisted of having other physical or mental comorbidities such as cardiac, renal, and thyroid disorders and unwillingness to participate in the study.

The data collection tools comprised the Iranian Health Literacy Questionnaire (IHLQ) and a sociodemographic checklist which were distributed among women. They were asked to complete them. If the patient was illiterate, the researcher completed the questionnaire via interview. The validity and reliability of IHLQ were confirmed by Haghdoost *et al.* in 2014. The 53-item IHLQ contains 9 subscales, including access to health information access, health information use, reading skills, comprehension skills, assessment and judgment skills, decision making and communication skills, health knowledge, individual empowerment, and social empowerment.^[13] The primary outcome measure of adherence to diabetes medicines was determined using a modified version of the six items, self-reported Morisky medication adherence scale.^[14] Glycemic

control was defined as FBS below 95 mg/dL and 1 and 2 h postprandial below 140 and 120 mg/dL, respectively.^[15] All eligible women wanted to complete the questionnaires and to ask from trained collaborative if there was any ambiguity about questions. Women were interviewed to see if they were illiterate.

The study was started after the approval from the institute's ethical committee (ID: IR.UMSHA.REC.1397.286).

Chi-square test, Mann-Whitney U test, and Spearman correlation were performed in data analysis using the SPSS version. 21. The final multivariable logistic regression model was developed to identify independent predictors of problematic HL based on the variables associated with it in the univariate analysis using a forward conditional model. The significance level was set at $P < 0.05$.

Results

This study investigates 112 mothers with GDM. Of these, 8 subjects were excluded for failing to complete the questionnaire. Among 104 assessed women with a mean gestational age of 25.9 ± 1.4 weeks; min-max: 24-28. Among them, 23 (22.1%) were from rural areas, 36 (34.6%) were having a diploma or lower degree, 76 (73.1%) were housewives, and 4 (3.8%) were addicted to hookah. All characteristics of pregnant women with GDM are mentioned in Table 1.

Totally, 19 (18.3%) of participants had inadequate HL, 47 (45.2%) were borderline, and 38 (36.5%) of them showed an adequate level of HL.

It was considered that 48.1% (50) of mothers were affected by uncontrolled diabetes and only 22% (11) had an adequate level of HL. HL levels of participants stratified by glycemic control are shown in Figure 1. Adequate levels of HL were 50% and 22% in glycemic controlled and uncontrolled women, respectively. In univariate analysis, there was a significant relationship between

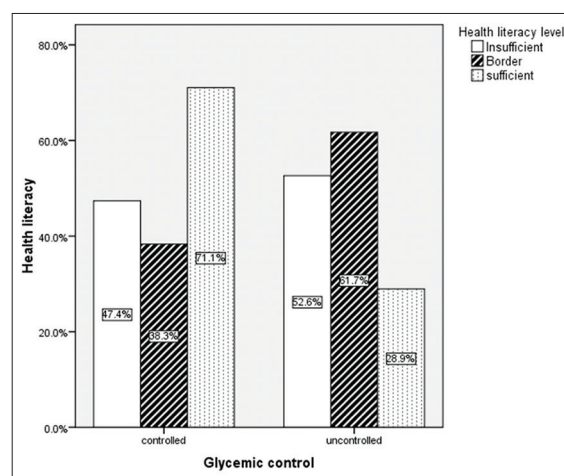


Figure 1: Glycemic control and health literacy in pregnant women with gestational diabetes mellitus (GDM) (n = 104), Iran 2017

Table 1: Characteristics of the pregnant women with gestational diabetes mellitus (GDM) stratified with health literacy level (n=104), Iran 2017

Variables	Health literacy			P	
	Inadequate	Borderline	Adequate		
Age, mean±SD (years)	35.1±6.4	31.8±4.2	31.2±5.1	0.02	
Gestational age, mean±SD (weeks)	25.8±1.41	26±1.45	25.9±1.42	0.95	
Location, n (%)					
	Rural	11 (47.8)	10 (43.5)	2 (8.7)	<0.001
	Urban	8 (9.9)	37 (45.7)	36 (44.4)	
Education, n (%)					
	Illiterate or below diploma	14 (38.9)	18 (50)	4 (11.1)	<0.001
	Diploma	5 (17.2)	20 (69)	4 (13.8)	
	Academic education	0 (0)	9 (23.1)	30 (76.9)	
Job, n (%)					
	Housewife	15 (19.7)	39 (51.3)	22 (28.9)	0.02
	Employed	4 (14.3)	8 (28.6)	16 (57.1)	
Addiction					
	Yes	4 (100)	0 (0)	0 (0)	<0.001
	No	15 (15)	47 (47)	38 (38)	
Abortion history					
	Yes	4 (14.8)	14 (51.9)	9 (33.3)	0.7
	No	15 (19.5)	33 (42.9)	29 (37.7)	
Gravid					
	1	2 (11.1)	5 (27.8)	11 (61.1)	0.012
	2	5 (11.9)	22 (52.4)	15 (35.7)	
	3	6 (21.4)	17 (60.7)	5 (17.9)	
	4 or 5	6 (37.5)	3 (18.8)	7 (43.8)	

diabetes control and adequate HL. So, problematic HL could increase the chance of uncontrolled diabetes more than three times (odds ratio: 3.5; CI: 1.5–8.3; P value: 0.004).

The results showed that there was a statically significant correlation between HL and medication adherence (Spearman's rho: correlation coefficient = 0.54; P value < 0.001). This correlation is visible in the scatter dot plot [Figure 2].

Considering the importance of HL as a strong predictor for glycemic control in pregnant women, a multivariate analysis was performed in order to determine the predicting factors for problematic HL. Therefore, in the model, we entered related variables in a univariate analysis including age, living area, educational level, job, and history of addiction. Among them, academic education as a protective factor and being a housewife as a risk factor was considered as predictors for problematic HL. The results are shown in Table 2.

Discussion

Gestational diabetes is considered an important disorder during pregnancy and its control might be affected by different factors including lifestyle and HL.^[11,16,17]

The present study showed that nearly half of the mothers with GDM were under pressure by uncontrolled diabetes which was significantly related to their HL. In addition, it was estimated that only one-third of those pregnant women had an adequate

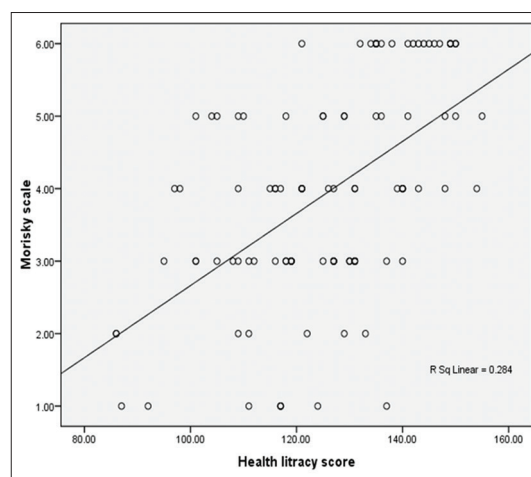


Figure 2: Health literacy and medication adherence in pregnant women with GDM (n = 104), Iran 2017

level of HL. So, HL of pregnant mothers is considered as an important issue that can affect the pregnancy complications and health of mothers and their children.

In recent studies, HL has been mentioned as a related factor with some issues in diabetic patients such as HbA1C,^[18,19] self-reported hypoglycemia,^[20] some behavioral indicators such as knowledge about diabetes^[21,22] and self-care in those patients,^[23,24] and glycemic control.^[25] The results of our study were consistent with those studies in which an association between HL and glycemic control was mentioned. Additionally, HL had a significant

Table 2: Logistic regression analysis for determining the predictors of problematic health literacy based on forwarding conditional procedures in pregnant women with GDM (n=104), Iran 2017

Variables	Odd ratio	CI (95%)	P*
Education			
Diploma	Referent		
Academic education	0.04	0.01-0.16	<0.001
Illiterate or below diploma	0.98	0.2-4.6	0.98
Job			
Housekeeper	3.5	1.03-11.8	
Employed	Referent		0.04

*Model: Hosmer and Lemeshow test: Chi-square (3) = 0.4; P=0.9. A total of 83.7% of participants were correctly classified

relationship with adherence to medication which is poor in nearly one-third of the patients^[26] and has an important role in diabetes control.^[27]

In the present study, we showed that nearly two-thirds of the participants had an inadequate level of HL which could be a serious warning to the health administrators and this problem was more considerable in illiterate or less educated, rural, and housewives who were in older ages.

Despite the importance of HL, even in developed countries, almost half of the adults do not have enough HL^[28] and its distribution is different across countries (29–62%). For instance, the European HL survey in 2015 showed that almost one out of two (47%) persons had limited (insufficient or problematic) HL which was correlated with financial deprivation, low social status, low education, and older ages.^[28]

Conclusion

In conclusion, this study has provided evidence of limited HL and its relationship with low glycemic control in pregnant women with GDM. The problem was more serious in less educated, rural, housewives, and older-aged women. This deficit needs to be addressed by health planners and policymakers who are responsible for promoting the health of people and decreasing health inequalities in the community.

However, some limitations should be acknowledged. First, the cross-sectional design only expressed associations; therefore, conclusions regarding causation cannot be made and longitudinal cohort studies in order to determine the role of HL in glycemic control are needed. Second, we didn't interpret the data from women referred to a private clinic with different socioeconomic classes, so, we can't generalize the results to all pregnant women with GDM.

Ethics statements

The study was started after approval from the institute's ethical committee of Hamadan University of Medical Sciences, Hamadan, Iran (ID: IR.UMSHA.REC.1397.286°).

Declaration of patient consent

Consent to participate was obtained from all participants before collecting data.

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Conflicts of interest

There are no conflicts of interest.

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