

Evidence Based Care Journal

<http://ebcj.mums.ac.ir/>

Health Literacy and Adherence to Dietary Regimen among Women with Gestational Diabetes under Nutrition Therapy

Mahla Salarfard, Maryam Moradi

The online version of this article can be found at

http://ebcj.mums.ac.ir/article_17936.html

Evidence Based Care Journal 2021 10:32 originally published
online 9 June 2021

DOI: 10.22038/ebcj.2021.53206.2406

Online ISSN: 2008-370X

Address: Mashhad Nursing and Midwifery School, Ebn-e-Sina St., Mashhad, Iran

P.O.Box: 9137913199

Tel.: (098 51) 38591511-294

Fax: (098 51) 38539775

Email: EBCJ@mums.ac.ir





Health Literacy and Adherence to Dietary Regimen among Women with Gestational Diabetes under Nutrition Therapy

Mahla Salarfard^{1,2}, Maryam Moradi^{3,4*}

Received: 22/11/2020

Accepted: 01/05/2021

Evidence Based Care Journal, 10 (4): 32-39

Abstract

Background: Treatment adherence in diabetics is an important challenge in controlling diabetes. Health literacy is a great determinant of health. Future studies need to address determinants of adherence, as this may be crucial.

Aim: Determining the association between health literacy and treatment adherence to the treatment regimen in women with gestational diabetes.

Method: The present cross-sectional study was conducted on 260 women with gestational diabetes receive nutrition therapy from September to January 2019. The subjects were selected by multistage sampling methods from ten health centers and Imam Reza, Ghaem, and Ommolbanin Hospitals of Mashhad. Data were collected by the brief Test of Functional Health Literacy in Adults (TOFHLA), and a researcher-made questionnaire of adherence to the treatment regimen (diet, exercise, and blood sugar monitoring) with verified validity and reliability. Data were analyzed using SPSS 16.

Results: Spearman's rank correlation coefficient indicated significant direct relationships between health literacy and the score of dietary adherence ($P<0.001$, $r=0.314$), blood sugar monitoring ($P<0.001$, $r=0.241$), exercise adherence ($P=0.009$, $r=0.162$) with total adherence to the treatment regimen ($P<0.001$, $r=0.356$).

Implications for Practice: Promoting health literacy through educational interventions in mothers with gestational diabetes is essential according to its relation to raise dietary adherence (diet, exercise, blood sugar monitoring).

Keywords: Diet therapy, Gestational diabetes mellitus, Health literacy, Treatment adherence

1. MSc in Midwifery, School of Nursing and Midwifery, Mashhad University of Medical Sciences, Mashhad, Iran
2. Instructor of Midwifery, Department of Midwifery, School of Nursing and Midwifery, Birjand University of Medical Sciences, Birjand, Iran
3. Assistant Professor of Reproductive Health, Nursing and Midwifery Care Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
4. Department of Midwifery, School of Nursing and Midwifery, Mashhad University of Medical Sciences, Mashhad, Iran

* Corresponding author, Email: MoradiM@mums.ac.ir

Introduction

Gestational diabetes is a common metabolic disorder as glucose intolerance with a variable intensity that is first diagnosed during pregnancy (1). Its prevalence is increasing annually from 1.3% to 18.6% in Iran despite the treatments (2). This disease can lead to many maternal and fetal complications (1,3). Adherence in patients with diabetes is a major challenge in controlling this disease (4).

Treatment adherence is defined as changing behavior including medication, diet, and a new lifestyle to accepted recommendations of health staff. Poor treatment adherence includes not prepare drugs, error in the consumption time, drug dose frequency, spontaneous discontinuation of the drug, not follow the dietary guidelines, and not perform the recommended sports activities (5). Adhering to self-care strategies and accepting medical recommendations including diet and exercise are leading to a prediction of diabetic complications and blood sugar control (6). Adherence to instructions for medication and care (diet, blood sugar monitoring, and exercise) is not fully done despite the importance of following these instructions.

In some studies, non-adherence to medications among diabetic patients undergoing between 23% to 93%, and one-third to three-quarters of diabetics in some other studies (7). In total, 50% and 33% of diabetics show poor dietary adherence and exercise, respectively(4). Studies have also indicated a low level of dietary adherence in pregnant women with gestational diabetes (8). Poor adherence from a clinical point of view is a warning sign for both patients and health care providers which is reducing the beneficial effects of treatment and symptoms, increasing complications, or even leading to death. Therefore, conducting further research on determinants of adherence is essential (9).

A person's ability and desire for adhering to a treatment regimen may be based on many psychological factors such as the patients' desires and beliefs as well as difficult social conditions. Dealing with financial and care barriers such as the patients' education and income are the other factors that affect the adherence. In addition, patients with psychiatric problems and cognitive impairments may have many problems in dietary adherence (4).

Health literacy is a main determinant of health(10). Four main factors have been identified for health literacy: 1) disease self-management knowledge; 2) disruptive behaviors; 3) Preventive care visits; and 4) treatment planning. According to the results of previous studies, health literacy is an important factor in determining self-management indicators such as adherence to medication, diet, and exercise regimens (11). Adequate levels of health literacy are associated with taking more responsibility for self-health (12). Mehrtak et al. (2017) found a significant relationship between health literacy and adherence to both diet and exercise (13). Seyedoshohadaee et al. (2016) failed to detect a significant relationship between health literacy and the total score of self-care (14).

According to studies conducted by the American Health Care Association, individuals with inadequate health literacy are less likely to understand written and spoken information provided by health professionals and follow instructions resulting in poor health status, worse consequences of the disease, and imposing a high cost (15). Few studies are conducted in the field of health literacy in gestational diabetes despite its importance in controlling diabetes which is different from chronic diabetes. Therefore, the present study was conducted to determine the association between health literacy and adherence to treatment regimen in women with gestational diabetes due to the contradictory results of other studies in this field.

Methods

The present study was cross-sectional research which was conducted from September to January 2019. The study aimed to determine the relationship between health literacy and adherence to the treatment regimen in women with gestational diabetes. The subjects were selected from health centers and Imam Reza, Ghaem, and Ommolbanin hospitals of Mashhad. The sample size was estimated through the formula of the relationship between two variables (correlation) based on Ebadi et al. (2016) ($R=0.385$) with a 95% confidence interval and a statistical test power of 80%. The sample size was calculated 256 and 260 participant were studied for more certainty (16).

The study was a multi-stage sampling. Firstly, five health centers were considered and then three ones were randomly selected. Then, ten urban health service centers were randomly selected and the researcher attended each center to select the eligible women according to the inclusion criteria. The sample size assigned to each center was proportional to the population of the pregnant women covered by that center. The researcher (first author) selected the qualified participants by attending the clinics of affiliated public hospitals of Mashhad University of Medical Sciences, Mashhad, Iran

(Ommolbanin, Imam Reza, and Ghaem hospitals). Allocating the necessary time for each center was proportional to the number of research units in that center.

Inclusion criteria included: being Iranian and literate; no psychotropic drug use and alcohol consumption, lack of any medical disease or midwifery problems except gestational diabetes. Tests were performed at 24-30 weeks of gestation. The fasting blood should be equal to or greater than 92 mg/dL, or blood sugar equal to or greater than 180 mg/dL an hour after ingestion of 75 g oral glucose, or equal to or greater than 153 mg/dL two hours after ingestion of 75 g glucose to diagnose gestational diabetes. The type of diabetes was determined according to the results of fasting blood sugar tests and two hours after a meal. Exclusion criteria: having communicational or behavioral disorders to prevent communication with the researcher, overt diabetes, and hospitalization. The questionnaires were completed after explaining the purpose of the study.

Data were collected using three questionnaires: demographic and pregnancy information, a brief Test of Functional Health Literacy in Adults (TOFHLA), and the researcher-made questionnaire of treatment adherence (diet, exercise, and blood sugar monitoring) with verified validity and reliability. The validity of tools was determined using content validity. Also, the research tools were provided for seven experienced professors at the Faculty of Nursing and Midwifery, and their suggested comments were applied.

The validity of the researcher-made questionnaire was confirmed with CVI=0.97 and CVR=0.89. The reliability of the Health Literacy Questionnaire was calculated and confirmed in a study by Koushyar et al. (4). The reliability of questionnaires, the health literacy assessment tools (0.80 calculation section and 0.73 reading section), questionnaire of adherence to diet and exercise as well as blood sugar monitoring (0.83) were calculated using Cronbach's alpha test.

Demographic and pregnancy information included age, education level, occupation, monthly income, first-degree family history of diabetes, history of gestational diabetes, number of pregnancies and abortion, early stillbirth and infertility, and wanted or unwanted pregnancy. The Brief TOFHLA tool was used to measure health literacy with two sections of calculation and reading. The calculation section included four health instructions about prescribed medications, the time to see a doctor, and an example of a medical test result. The score of this section was between zero and 28. In the reading section, the individuals were asked to read two texts. The first text was titled "Preparing for gastrointestinal imaging", and the second one was "Patient rights and responsibilities in the insurance policy". The section had 36 two-points questions which received and were scored from zero to 72. The total score of the questionnaire was obtained by adding scores of two sections with a score of zero to 100. Health literacy was divided into three levels of inadequate (score 0 to 53), marginal (score 54-66), and adequate (67-100). A researcher-made questionnaire was used to measure dietary adherence, exercise, and blood sugar monitoring. The questionnaire included 17 questions on the Likert scale (never, rarely, often, and always) among which 12 questions were related to diet ranging from 0 to 36, and two questions related to the exercise section ranging from 0 to 6; and the adherence to blood sugar monitoring included two self-monitoring sections with scores ranging from 0 to 6 and the venous blood sugar monitoring with scores ranging from 0 to 3. The total score of blood sugar monitoring was from 0 to 9. Finally, the total score of the questionnaire of adherence to diet, exercise, and blood sugar monitoring was from 0 to 51.

Statistical analysis

Data were analyzed using SPSS 16 at a significance level of less than 0.05. Mean and standard deviation (for quantitative variables) and frequency distribution (for qualitative variables) were used to describe the research sample in terms of individual characteristics. Mann-Whitney and Kruskal-Wallis were used to determine the mean of the main variables according to demographic and contextual characteristics. Kruskal-Wallis and then Mann-Whitney U Was used to obtain mean treatment adherence in terms of health literacy. The correlation coefficient of Spearman's test was used to achieve the research objectives.

Ethical considerations

The study was approved by the Ethics Committee of Mashhad University of Medical Sciences, Mashhad, Iran. At the beginning of the study, the participants were provided with enough information about the purpose and method of research. They were also informed about their right to withdraw from the study at any time. They were asked to sign a written consent form at the onset of the study and were assured of the confidentiality of any identifiable personal information. This was performed while women were waiting in a queue or after receiving their care in the presence of the researcher.

Results

Most of the participants were 38-45 years old and had secondary education. The demographic and contextual characteristics and the average of their main variables are shown in Table 1.

Table 1. Table of demographic and contextual characteristics and the average of the main variables

Variable		Number (%)	Health literacy	P-value	Treatment adherence	P-value
			Mean±SD		Mean±SD	
Age	17-24 years	26 (10.0)	65.79±12.16	0.69*	29.50±5.70	0.50*
	25-29 years	52 (20.0)	68.67±12.52		30.31±5.67	
	30-34 years	75 (28.85)	68.19±16.21		31.28±5.96	
	35-48 years	107 (41.15)	66.39±14.51		30.35±5.51	
Education level	Reading and writing	14 (5.39)	46.25±14.77	<0.001*	26.93±2.62	0.02*
	Primary school	61 (23.46)	60.01±11.93		30.41±5.36	
	Secondary and high school	150 (57.69)	69.60±12.26		30.47±5.73	
	Academic	35 (13.46)	78.64±12.41		32.37±6.33	
Monthly income	Less than enough	96 (36.92)	62.73±13.57	<0.001*	28.79±5.57	<0.001*
	Enough	159 (61.16)	69.53±14.19		31.62±5.55	
	More than enough	5 (1.92)	84.50±6.89		28.80±4.09	
Gestational diabetes information	Low	177 (68.08)	65.18±14.43	0.001*	29.41±5.11	<0.001*
	Moderate	81 (31.15)	71.70±13.46		32.77±6.14	
	High	2 (0.77)	77.50±4.95		38.50±0.71	
Occupation	Housewife	244 (93.85)	66.53±14.44	<0.001**	30.32±5.65	0.02**
	Employed	16 (6.15)	79.15±6.64		33.56±5.45	
History of abortion	No	177 (68.08)	66.73±14.92	0.41**	30.56±6.03	0.92**
	Yes	83 (31.92)	68.53±13.25		30.45±4.91	
First-degree family history of diabetes	No	148(56.92)	65.70±14.71	0.03**	29.59±5.51	0.002**
	Yes	112 (43.08)	69.43±13.77		31.75±5.70	
History of stillbirth	No	245 (94.23)	67.41±14.51	0.56**	30.53±5.76	0.82**
	Yes	15 (5.77)	65.67±12.84		30.40±4.36	
History of gestational diabetes	No	190 (73.08)	66.79±14.47	0.36**	30.19±5.65	0.09**
	Yes	70 (26.92)	68.72±14.24		31.41±5.72	
History of Preterm delivery	No	218 (83.85)	66.92±14.55	0.34**	30.34±5.52	0.43**
	Yes	42 (16.15)	69.30±13.60		31.45±6.47	
Number of pregnancies	1	44 (16.92)	68.65±14.18	0.37*	31.18±6.62	0.11*
	2	70 (26.92)	69.38±14.08		31.69±5.73	
	3	58 (22.31)	67.25±13.63		28.83±5.02	
	4	39 (15.0)	63.00±16.32		30.08±5.77	
	5 and more	49 (18.85)	66.64±14.14		30.63±5.04	
History of infertility	No	232 (89.23)	67.02±14.48	0.43**	30.26±5.65	0.01**
	Yes	28 (10.77)	69.70±13.81		32.71±5.57	
Wanted or unwanted pregnancy	Wanted	213 (81.92)	67.68±14.51	0.47*	30.29±5.51	0.40*
	Unwanted	35 (13.46)	64.81±14.62		31.66±7.06	
	Unplanned	12 (4.62)	68.00±12.09		31.33±4.01	
Gestational Age	>=30 Week	53 (20.39)	64.49±13.08	0.03*	30.32±7.04	0.62*
	31-36 Week	61 (23.46)	70.65±14.19		31.13±6.13	
	> 36 Week	146 (56.15)	66.94±14.77		30.34±4.92	

* Kruskal-Wallis

** Mann-Whitney U test

Table 2. Mean treatment adherence in terms of health literacy

Health literacy	Mean score of treatment adherence			
	Dietary adherence	Blood sugar monitoring	Exercise adherence	Total
Inadequate	22.36±3.84	3.79±1.80	1.00±1.16	27.21±5.07
Border	24.58±6.62	4.71±2.51	1.73±1.46	30.95±5.66
Adequate	25.29±3.30	5.15±2.51	1.87±1.63	32.24±5.20
total	24.32±3.72	4.63±2.42	1.62±1.48	30.52±5.69
P-value	<0.001*	0.003*	0.03*	<0.001*

* Kruskal-Wallis

The results of the Kruskal-Wallis test indicated that the mean score of treatment adherence in women and its components was significantly different according to the level of health literacy ($p < 0.05$). Mann-Whitney U test was used to determine which level of health literacy is significantly different, which showed that the total average score of treatment adherence and its components in women with inadequate health literacy is significantly lower ($p < 0.05$) compared to the border and adequate ones (Table 2).

Table 3 presents the association between health literacy and adherence to the treatment regimen in women with gestational diabetes. The Shapiro-Wilk test was used to test variables which indicates they do not have a normal distribution. Therefore, Spearman's rank correlation coefficient was used to investigate their association with each other. The results indicated direct and significant relationships between health literacy and dietary adherence ($P < 0.001$, $r = 0.314$), health literacy and blood sugar monitoring ($P < 0.001$, $r = 0.241$), and exercise score ($P = 0.009$, $r = 0.162$) with a total score of adherence to treatment regimen ($P < 0.001$, $r = 0.356$). There was a positive and significant correlation ($P < 0.001$) between all the variables except for the scores of exercise adherence and blood sugar monitoring ($P = 0.338$, $r = 0.060$). The highest correlation score was seen between the total score of treatment adherence and dietary adherence ($P < 0.001$, $r = 0.897$) (Table 3).

The results of multiple linear regression showed that people with higher education compared to those with high school education had a higher score of total treatment adherence ($P = 0.044$). Unwanted ($P = 0.006$) or unintended ($P = 0.021$) pregnancy had a positive and significant correlation with the total score of treatment adherence. Women with a first-degree family history of diabetes ($P = 0.010$) and a history of abortion ($P = 0.021$) had a higher total score of treatment adherence.

Table 3. Association between health literacy and adherence to treatment regimen in women with gestational diabetes (n=260)

Variable	Health literacy	Dietary adherence	Blood sugar monitoring	Exercise Adherence
Dietary adherence	0.31 **			
Blood sugar monitoring	0.24 **	0.39 **		
Excercise adherence	0.16 *	0.31 **	0.06 ^{NS}	
Treatment adherence	0.36 **	0.90 **	0.65 **	0.47 **

Spearman's rank correlation coefficient

*: $p < 0.01$ **: $p < 0.001$ ^{NS}: Not Significant

Discussion

Low adherence to dietary recommendations is a reason for failing to control blood sugar in women with gestational diabetes since adherence to a diabetes diet is an important challenge in controlling diabetes (17, 18). The present study indicated that there were direct and significant relationships between health literacy and adherence to diet, exercise, blood sugar monitoring, and total score of dietary adherence. Individuals with adequate health literacy paid more attention to their diet and a treatment regimen, but those with inadequate health literacy failed to understand the importance of diet in controlling blood sugar and had poor dietary adherence. In other words, the higher the health literacy is in patients with gestational diabetes, the better and higher adherence to diet and better control of blood sugar was observed. Low health literacy leads to poor adherence to treatment regimen and blood sugar control. Kooshyar et al. (2013) found a direct and significant relationship between health literacy and adherence to diet and exercise in the elderly with diabetes (4). Mehrtak et al. (2017) also investigated a significant relationship between health literacy and adherence to diet and exercise (13). In a study by Rahmati et al. (2019), a direct and significant relationship between health

literacy and dietary adherence was observed (19). Wannasirikul et al. (2016) found that health literacy had a significant direct and positive correlation with dietary adherence (20). The results of the abovementioned studies were consistent with those of the present study despite the diversity of the research community. A good level of health literacy is associated with a greater ability to take responsibility for one's health. Patients with high levels of health literacy have a higher level of perceived sensitivity and attention to the consequences of the disease. As a result, patients with diabetes who had higher health literacy are more sensitive to the exact time of doctor's appointment, medication and treatment recommendations, diet, and blood sugar monitoring, so they try to do these things more accurately.

In a study by Seyedoshohadaee et al. (2016), no significant relationship was found between health literacy and total self-care score. Furthermore, no significant relationship was observed between health literacy with exercise and blood sugar monitoring which their findings were inconsistent with the findings in the present study. Perhaps the reason for this inconsistency is the difference between the assessment tools, the research community, the implementing methods such as interviews, and the place of the study. However, a significant relationship was found between health literacy and adherence to a self-care diet that was consistent with the results of the present study (14).

Results of various studies on the patients' adherence to treatment regimens were not very promising. In some studies, the rate of medication non-adherence was reported to be from 23% to 93% in diabetics. It was one-third to three-quarters of patients in some other studies (7). Furthermore, half of the diabetics indicated non-adherence to diet, and more than 33% of them showed non-adherence to exercise (4). Moreover, the results of studies indicated that low dietary adherence was observed in pregnant women with gestational diabetes (8). In a study conducted by Mehrtak et al. (2017), 74.3% of patients were in poor levels of adherence to diet and exercise (13). Treatment adherence is the best way to control type 2 diabetes. Some studies indicate that patients with adequate health literacy control their blood sugar better than those with low health literacy, so they have fewer complications of diabetes (5). In the present study, treatment adherence was relatively low. Given the relationship between health literacy and treatment adherence, 53.8% of individuals had border health literacy that prevented them from treatment adherence which indicates the need for more attention to health literacy in health promotion programs. Diet is the first step in controlling gestational diabetes. On the other hand, 15-30% of women with gestational diabetes under diet can not control their blood sugar through diet and physical activity and need medical treatment (21). Since dietary adherence plays an important role in controlling blood sugar, there is a direct and significant relationship between health literacy and adherence to treatment regimen according to the present study. Increasing the adherence to treatment regimen in mothers with gestational diabetes is possible by increasing their level of health literacy, and preventing their need for medication by controlling blood sugar. The limitation of the present study was self-reporting in the method of data collection. Of course, it was tried to encourage women in providing correct and realistic answers.

Implications for Practice

Improving health literacy and promoting it through educational interventions is necessary as it is associated with treatment regimen (diet, exercise, and blood sugar monitoring) in mothers with gestational diabetes. It is recommended that educational interventions be performed effectively to increase the level of health literacy in women with gestational diabetes. Also, health care providers are advised to evaluate and consider the patients' level of health literacy to provide them with appropriate information about it and to be more successful in following the treatment regimen by accompanying more patients.

Acknowledgments

This study was funded by the deputy of research, Mashhad University of Medical Sciences (with research plan code 971109). The present article was derived from a research project, approved by the Student Research Committee, Faculty of Medicine, Mashhad University of Medical Sciences with an ethical code of (IR.MUMS.NURSE.REC.1397.091). We are deeply grateful to the Student Research Committee of Mashhad University of Medical Sciences, and principals and staff of Imam Reza, Ghaem, and Ommolbanin hospitals, and health centers of Mashhad for their great cooperation in the present research.

Conflicts of Interest

The author declares that there is no actual conflict of interest.

References

1. Cunningham FG, Leveno K, Bloom SL, Spong CY, Dash JS, Hofman BL, et al. Williams obstetrics. 25th ed. New York: McGraw-Hill; 2018.
2. Jafari-Shobeiri M, Ghojazadeh 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(8):1036-44.
3. Salzer L, Yogev Y. Complications of gestational diabetes. *Gestational diabetes: origins, complications, and treatment*. Florida: CRC Press; 2014. P. 95.
4. Kooshyar H, Shoorvazi M, Dalir Z, Hosseini M. Health literacy and its relationship with medical adherence and health-related quality of life in diabetic community-residing elderly. *J Mazandaran Univ Med Sci*. 2014;23(1):134-43.
5. 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 Literacy*. 2018;3(2):137-44.
6. Shrivastava SR, Shrivastava PS, Ramasamy J. Role of self-care in management of diabetes mellitus. *J Diabetes Metab Disord*. 2013;12(1):14.
7. Rezaie Kargar F, Karbandi S, Hassanabadi H, Esmaili H. Type of personality and the amount of adherence to recommended regimens in diabetic patients. *Iran J Psychiatry Clin Psychol*. 2006;11(4):441-8.
8. Karimy S, Mansouri A, Shahdadi H, Pakizeh-Del P. The effect of health belief model-based education on adherence to the dietary regimen in pregnant women with gestational diabetes. *J Diabetes Nurs*. 2016;4(4):1-9.
9. Rouhi BL, Paryad E, Kazemnezhad Le, Bouraki S, Sadeghi MA, Nasiri SN. Study status of care adherence and its related factors in patients undergoing coronary artery bypass surgery. *J Holistic Nurs Midwifery*. 2015;25(3):34-45.
10. Masoompour M, Tirkari B, Ghazanfari Z. The relationship between health literacy, self-efficacy, and self-care behaviors in diabetic patients. *Evid Based Care*. 2017;7(3):17-25.
11. Lai AY, Ishikawa H, Kiuchi T, Mooppil N, Griva K. Communicative and critical health literacy, and self-management behaviors in end-stage renal disease patients with diabetes on hemodialysis. *Patient Educ Couns*. 2013;91(2):221-7.
12. Sørensen K, Van den Broucke S, Fullam J, Doyle G, Pelikan J, Slonska Z, et al. Health literacy and public health: a systematic review and integration of definitions and models. *BMC Public Health*. 2012;12(1):80.
13. Mehrtak M, Hemati A, Bakhshzadeh A. Health literacy and its relationship to medication adherence, diet and exercise in patients with type II diabetes. *J Health Literacy*. 2018;3(2):137-44.
14. Seyedshohadaee M, Barasteh S, Jalalinia F, Eghbali M, Nezami M. The relationship between health literacy and self-care behaviors in patients with type 2 diabetes. *Iran J Nurs Res*. 2016;10(4):43-51.
15. Jalali M. Relationship between health literacy and general health among patients with leukemia before bone marrow transplant. *Iran J Cancer Nurs*. 2019;1(1):1-7.
16. Ebadi Fard Azar F, Hedari H, Solhi M. Relationship between self-care behavior and health locus of control in patients with type II diabetes. *Razi J Med Sci*. 2016;23(146):84-92.
17. Hashemi SM, Bouya S. Treatment adherence in diabetic patients: an important but forgotten issue. *J Diabetes Nurs*. 2018;6(1):341-51.
18. Salehmoghaddam AR, Khosravi Bonjar A, Karimi Moonaghi H, Gholami H. An investigation of the effect of e-learning education method on dietary regimen in type 2 diabetic patients. *Evid Based Care*. 2013;3(3):51-8.
19. Rahmati M, Rejeh N, Heravi Karimooi M, Tadrissi SD. Investigating the relationship between health literacy and adherence with treatment regimen in the elderly with hypertension. *Iran J Nurs Res*. 2019;13(5):15-22.
20. Wannasirikul P, Termsirikulchai L, Sujirarat D, Benjakul S, Tanasugarn C. Health literacy, medication adherence, and blood pressure level among hypertensive older adults treated at primary

- health care centers. Southeast Asian J Trop Med Public Health. 2016;47(1):109-20.
21. Durnwald C, Nathan D, Werner E, Barss V. Gestational diabetes mellitus: glycemic control and maternal prognosis. Massachusetts: UpToDate; 2020.