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Review

Health literacy among Iranian patients with type 2 diabetes: A systematic review and meta-analysis

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ABSTRACT

Health literacy is one of the most important determinants of health. Limited health literacy can lead to reduced adherence to treatment, repeated hospitalizations, and increased disease complications. Several studies on health literacy among Iranian patients with type 2 diabetes have reported different prevalences of health literacy. The present study is aimed to determine through a systematic review and meta-analysis the prevalence of adequate health literacy in the Iranian population. A total of 8 articles that met the inclusion criteria, published from inception until December 2018, were collected. Articles were searched using the following keywords and their possible combinations: Health Literacy, Illiteracy, Functional Health Literacy, Diabetes, Diabetes Mellitus, and Iran. The data were analyzed using meta-analysis and the random-effects model was used to obtain a pooled prevalence estimate along with its 95% confidence interval. Heterogeneity among the studies was assessed using the I^2 statistic. Analyses were performed using STATA software, version 12. The overall prevalences of inadequate and borderline health literacy among Iranian patients with type 2 diabetes were 43.47% (95% CI: 31–55.95) and 26.34% (95% CI: 19.49–33.19), respectively. In addition, the prevalence of adequate health literacy among patients with type 2 diabetes was 29.72% (95% CI: 22.79–36.64). There was no significant relationship between health literacy with year of publication, sample size, and patients' age. Inadequate health literacy is high (43.5%) among Iranian patients with type 2 diabetes. This makes it necessary to provide interventions aimed at improving their health literacy which will reduce hospitalizations and disease complications.

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1. Introduction

The silent epidemic of diabetes is the seventh leading cause of death throughout the world, and it can lead to blindness, kidney failure, and foot amputation [1,2]. According to 2005 reports, the prevalence of diabetes in Iran was 7.7% (approximately 2 million people) that is projected to double by 2025 [3]. Diabetes has a complex therapeutic regimen requiring important lifestyle changes

that are difficult even for educated patients. Early diagnosis and proper management of diabetes increases the chance of preventing its complications and reducing the costs of treatment [4]. Proper management of diabetes requires the interdisciplinary collaboration of healthcare providers and the patients, with an increased focus on patient-centered care, and empowering patients through improving their health literacy [5,6].

Health literacy is a set of skills useful for effective performance in health settings [7]. It includes the ability to read, understand, and interpret texts (functional), effectively communicate and interact with health information (interactive), make proper health decisions (critical), and use numeric information for interpreting medication dosages and food labels and blood sugar (numeric) measurement [8]. Patients with chronic disorders, such as asthma, HIV/AIDS, and

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diabetes tend to have low health literacy [9]. Health literacy has been identified as a global issue, and according to the World Health Organization (WHO), it is one of the most important health indicators [10,11]. Patients with low health literacy have difficulty in reading medication labels, understanding dosage instructions, using educational brochures related to health, providing their informed consents, and interpreting medical test results [12]. Low health literacy also leads to inadequate knowledge on health information, inability to follow health instructions properly, and less cooperation from the patients in preventive measures that can result in late diagnosis of one's condition [13,14]. Those with inadequate health literacy use more emergency services, and are hospitalized more frequently [15]. The available evidence suggests that patients with diabetes tend to have low levels of health literacy [16,17].

Inadequate health literacy is associated with poor health-related knowledge, low adherence to treatment, and repeated hospitalizations, that impose substantial costs on the patients [2]. Low health literacy is associated with increased mortality rates among diabetic patients. In a study by Baker et al., the mortality rate was 1.5 times as high for patients with low health literacy as for those with adequate health literacy [18].

In another study, diabetic patients with low health literacy had suffered from more retinopathy complications and were less successful in controlling their blood sugar, compared to those with adequate health literacy [9]. Studies on the health literacy of Iranian patients with diabetes have led to different estimates. Given the increasing prevalence of diabetes in Iran, there is a need to have a better understanding of the level of health literacy among this group of patients in order to take effective measures to manage, prevent, or control its complications for the patients; therefore, the authors decided to conduct a systematic review and meta-analysis aimed to estimate the prevalence of health literacy among Iranian patients with type 2 diabetes.

2. Methodology

2.1. Search strategy

In the present study, health literacy among Iranian patients with type 2 diabetes was examined without time limitation. Search for articles was conducted in Iran's national databases, including Scientific Information Database (SID), IranMedex, MagIran, and Medlib, and also international databases, including Web of Science, PubMed, and Scopus. The following keywords and their possible combinations were used: Health Literacy, Illiteracy, Functional Health Literacy, Diabetes, Diabetes Mellitus, Iran. In the Persian database, the Persian equivalents of the keywords were used. The references lists of the articles were also reviewed to access other related articles.

2.2. Study selection and data extraction

The inclusion criteria were as follows: observational studies (cross-sectional or cohort), written in Persian or English, and that provides the prevalence of health literacy among adult patients with type 2 diabetes or data to calculate it. The exclusion criteria were as follows: interventional studies, repeated studies, use of researcher-made questionnaires, and lack of access to the full text. Two researchers independently gathered, screened, and selected the articles, and finally extracted the required data. Methodological quality was assessed using an instrument commonly-used in the Iranian and non-Iranian studies [19–21]. It assesses the following aspects of a study: comparison groups, sample characteristics, psychometric properties, and sample size. Each aspect is scored

0–3, and the total score ranges from 0 to 15. This score was used to determine the methodological quality of the studies: poor (0–5), average [6–10], and strong (>10). Disagreements between the two researchers were resolved by another researcher who was experienced in performing meta-analysis. Articles' information, including name of the first author, year of publication, city of study, total sample size, type of questionnaires used, and prevalence of adequate, borderline, and inadequate health literacy, were documented on an excel spreadsheet.

2.3. Statistical analysis

The variance of each study was calculated using the binomial distribution. The weighted mean was used to combine the prevalences reported by different studies, and the weight assigned to each study was the reciprocal of its variance. Heterogeneity among the selected studies was assessed using the Cochran's Q Test and the I^2 statistic; $P < 0.1$ and $I^2 < 75\%$ were considered as indicating a significant heterogeneity. Heterogeneity was classified into three categories: below 25% (low heterogeneity), 25–75% (moderate heterogeneity), and above 75% (high heterogeneity). Meta-analysis was conducted using the random effects model (to account for heterogeneity) in order to estimate the pooled prevalence of health literacy. The Egger's test and a Funnel plot were used to examine the effect of small studies and the publication bias. In order to determine the role of each study in the final results, the sensitivity analysis was utilized. The univariate meta-regression analysis was used to examine the relationship between prevalence of health literacy with year of study, sample size, and participants' mean age. The data were analyzed using the Stata software, version 12.

3. Results

In the present study, all articles in Persian or English examining health literacy among Iranian patients with type 2 diabetes were systematically reviewed and meta-analyzed, based on the PRISMA statement. In the initial search, 707 studies were identified, among which a total of 9 studies entered the final analysis based on the inclusion and exclusion criteria. A large number of articles were identified because the national databases were not sensitive to the Boolean operators (Fig. 1)

The total sample size was 2230 (mean = 278). All studies had less than 500 participants, were of moderate methodological quality, and had assessed health literacy using the Test of Functional Health Literacy in Adults (TOFHLA). Table 1 shows the general characteristics of the selected studies.

The overall prevalences of inadequate and borderline health literacy among Iranian patients with type 2 diabetes were 43.47% (95% CI: 31–55.95) and 26.34% (95% CI: 19.49–33.19), respectively. In addition, the prevalence of adequate health literacy among patients with type 2 diabetes was 29.72% (95% CI: 22.79–36.64) (Fig. 2).

Meta-regression results indicated that there was no significant relationship between inadequate, borderline, and adequate health literacy with year of publication, sample size, and patients' mean age (Table 2).

According to the results of sensitivity analysis, removal of each study did not result in a significant change in the pooled prevalence of health literacy (including inadequate, borderline, and adequate).

4. Discussion

Many healthcare professionals consider low health literacy a silent epidemic, because patients with limited health literacy are not able to effectively describe their problems for healthcare

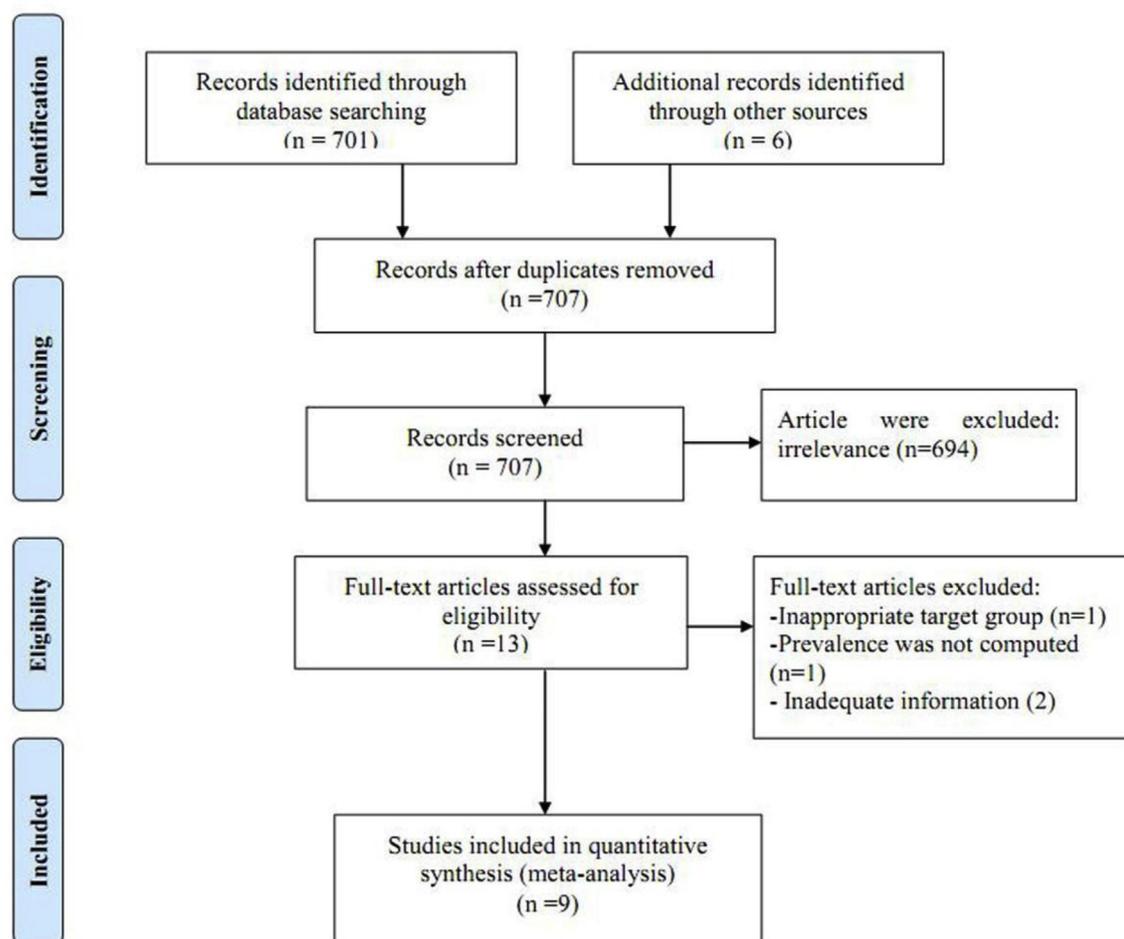


Fig. 1. Flowchart of selecting and screening articles according to the PRISMA statement.

Table 1

Description of the selected studies included in the meta-analysis.

First Author	Publication year	Sample size	Region	Study design	Mean age	Women %	Health literacy (%)			Quality
							Inadequate	Borderline	Adequate	
Mehrtak [22]	2018	241	3	Cross-sectional	55.1 ± 10.1	46.7	53.1	27	19.9	8
Abbaszadeh Bazzi [23]	2018	150	5	Cross-sectional	50.5 ± 9.4	43.3	48.6	22.7	28.7	9
Khosravi [24]	2018	400	2	Descriptive	—	61.8	35	23.6	41.4	8
Borji [25]	2017	250	4	descriptive-correlational	47.4 ± 9.1	57.2	32	40.8	27.2	7
Arbabi [26]	2016	150	5	Cross-sectional	58.3 ± 6.9	68	25.3	34.6	40.1	7
Rezaee Esfahrood [27]	2016	432	5	Cross-sectional	55 ± 6.3	16.7	59.3	18.5	22.2	6
Mohammadi [28]	2015	407	1	Cross-sectional	55.8 ± 11.3	61.7	70	11.8	18.2	7
Seyedoshohadaee [29]	2015	200	1	Cross-sectional	51.8 ± 8.8	35	24	34	42	6

Region 1: the provinces of Tehran, Alborz, Qazvin, Mazandaran, Semnan, Golestan, and Qom; Region 2: the provinces of Isfahan, Fars, Boushehr, Chaharmahal va Bakhtiari, Hormozgan, and Kohkilouyeh va Boyerahamad; Region 3: the provinces of Eastern Azarbaijan, Western Azarbaijan, Ardebil, Zanjan, Gilan, and Kurdistan; Region 4: the provinces of Kermanshah, Ilam, Hamedan, Lorestan, Markazi, and Khuzestan; Region 5: the provinces of Khorasan Razavi, Southern Khorasan, Northern Khorasan, Kerman, Yazd, and Sistan va Balouchestan.

providers, and often feel embarrassed [30]. In the present study, inadequate health literacy (43.47%) was more prevalent than adequate health literacy (29.72%). In addition, more than one-fourth of patients with type 2 diabetes had borderline health literacy. In a study in Pakistan, it was found that 67.1% of diabetic patients had inadequate health literacy and only 15.3% had adequate health literacy [12]. Hussein et al.'s study in Kuwait showed that 44.5%, 19.5%, and 35.5% of patients with diabetes had inadequate, borderline, and adequate health literacy [30]. Schinckus et al. found that 48%, 42.2%, and 9.8% of Belgian patients

with diabetes had adequate, borderline, and inadequate health literacy, respectively [4].

Diabetes has a complex treatment regimen that requires important lifestyle changes that are difficult even for educated patients [2]. These results show that most patients with type 2 diabetes do not have adequate health literacy. Another study in Taiwan showed that 76% of patients with type 2 diabetes had adequate health literacy, and 17% and 7% had borderline, and inadequate health literacy, respectively [31]. Sarkar et al. also found that 38.2% and 48.5% of diabetic patients had inadequate and

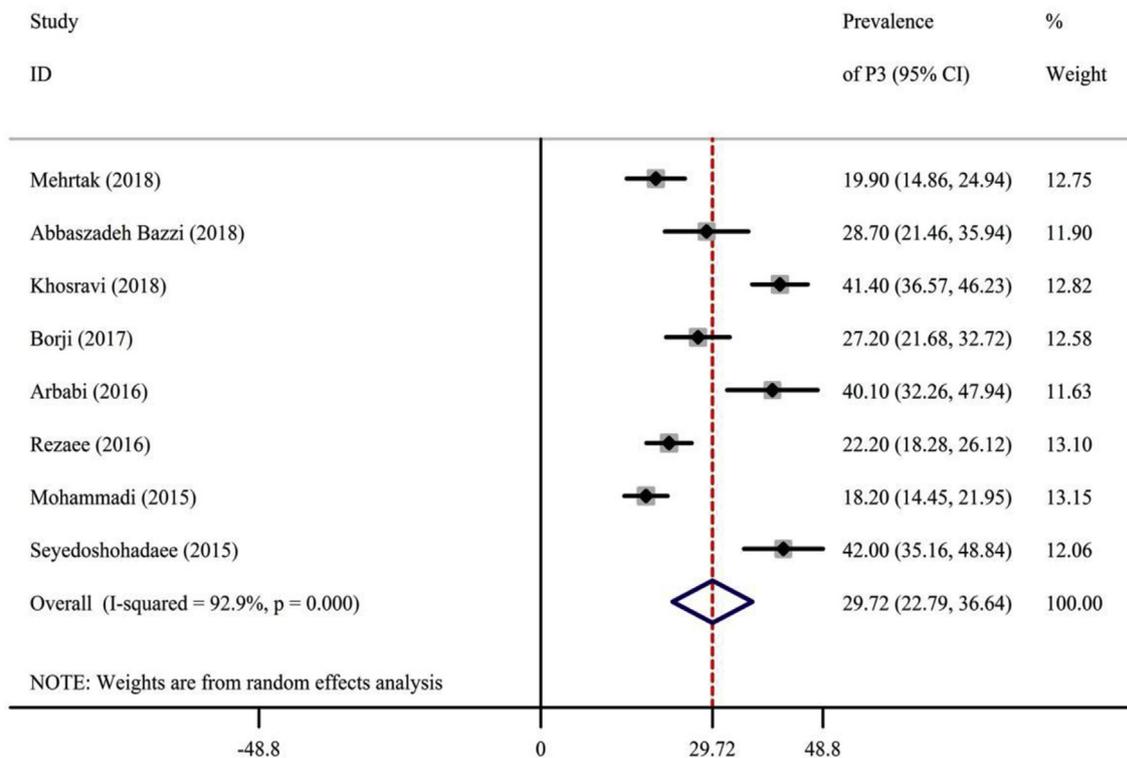


Fig. 2. Forest plot of the prevalence of adequate health literacy Iranian patients with type 2 diabetes. The confidence interval of 95% for each study is shown by a horizontal line around the main mean, the dotted line in the middle represents the overall mean score, and the rhombus shows the confidence interval of the prevalence of adequate health literacy.

Table 2
Univariate meta-regression results for health literacy among Iranian patients with type 2 diabetes.

Variable	Health Literacy	Coefficient	Standard error	t	P	95% Confidence Interval
Year	Inadequate	-0.56	5.29	-0.11	0.91	-13.52, 12.38
	Borderline	0.89	2.96	0.30	0.77	-6.36, 8.14
	Adequate	-0.05	3.11	-0.02	0.98	-7.67, 7.57
Sample size	Inadequate	0.08	0.04	1.75	0.13	-0.03, 0.20
	Borderline	-0.05	-0.02	-2.15	0.07	-0.11, 0.007
	Adequate	-0.03	0.03	-0.93	0.38	-0.10, 0.04
Age	Inadequate	1.26	2.08	0.61	0.57	-4.09, 6.62
	Borderline	-1.22	1.12	-1.09	0.32	-4.11, 1.66
	Adequate	-0.14	1.14	-0.13	0.90	-3.08, 2.79

adequate health literacy, respectively [32].

The main goal in promoting health literacy is to increase people's knowledge on their health/illness condition so that the desired treatment outcomes could be achieved more easily [30]. By focusing on diabetic patients with borderline health literacy and providing them with the necessary training, their health literacy could be raised to the adequate level. One of the themes extracted in a qualitative study by Rubin et al. was health literacy [33]. In this study, there was no significant relationship between the prevalence of inadequate, borderline, and adequate health literacy with year of publication, sample size, and patients' mean age. However, in a study by Kim et al., a significant relationship was found between inadequate health literacy and age, and the highest inadequate health literacy was found among older adults [34]. In a study by Schillinger et al. also older adults with diabetes had lower health literacy [9].

Most researchers believe that health literacy is an important predictor of health status (even stronger than income, career, and education) [35]. Therefore, it is important to pay attention to the improvement of health literacy among diabetic patients. One of the

strengths of the present study is that it is the first meta-analysis aimed at estimating the overall prevalence of health literacy among Iranian patients with type 2 diabetes. Among the limitations of our study was that some of the analyzed articles lacked some of the necessary information.

5. Conclusion

The study results clearly show that most Iranian patients with type 2 diabetes have inadequate health literacy, and that one-fourth have borderline health literacy. The policymakers and practitioners in the healthcare domain should focus their effort on improving health literacy among patients with diabetes, especially those with borderline health literacy, through providing them with appropriate interventions, so that the complications of type 2 diabetes could be effectively controlled.

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