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ORIGINAL RESEARCH

Association Between Health Literacy and Glycaemic Control in Patients with Type 2 Diabetes: A Cross-Sectional Study

Elif Karataş[1*], Murat Şenol[2], Zeynep Aktan[1]

1. Department of Internal Medicine, Altınkoru University Faculty of Medicine
2. Clinic of Endocrinology and Metabolism, Yeşilvadi Training and Research Hospital

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ABSTRACT

Objective: To assess the association between health literacy and glycaemic control in adults with type 2 diabetes.

Methods: In this cross-sectional study, 312 patients attending the diabetes outpatient clinics of two centres between January and June 2025 were examined. Health literacy was measured with the Turkish Health Literacy Scale-32 (TSOY-32), and the HbA1c value from the previous three months was taken from the records. HbA1c ≥7% was defined as inadequate glycaemic control, and the association was assessed with multivariable logistic regression.

Results: The mean age of the participants was 58.4 ± 9.7 years, and 54.2% were women. Health literacy was limited in 191 patients (61.2%). Inadequate glycaemic control was present in 68.6% of the limited health literacy group and in 47.1% of the adequate group. After adjustment for age, sex, education, diabetes duration and insulin use, limited health literacy remained associated with inadequate glycaemic control (OR 2.14; 95% CI 1.29–3.55; p = 0.003).

Conclusion: Limited health literacy is common in patients with type 2 diabetes and is independently associated with poor glycaemic control. Diabetes education should be adapted to the health literacy of patients.

Keywords: Type 2 diabetes mellitus; health literacy; glycaemic control; glycated haemoglobin; patient education

Corresponding author: Elif Karataş, Department of Internal Medicine, Altınkoru University Faculty of Medicine

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INTRODUCTION

Health literacy is defined as the capacity of a person to access, understand, appraise and use health information in everyday decisions [1]. Type 2 diabetes requires continuous self-management, including medication use, nutrition, physical activity and blood glucose monitoring. The ability of patients to interpret the information they receive therefore has a direct effect on the success of treatment.

Low health literacy has been associated with poorer glycaemic control and more frequent complications in patients with diabetes [2,3]. However, few studies have examined this association in outpatient settings, with a validated national scale and independently of educational level. In this study, we aimed to assess the association between health literacy and glycaemic control in adults with type 2 diabetes.

METHODS

Study design and participants

This cross-sectional study was conducted in the diabetes outpatient clinics of two centres between January and June 2025 and is reported according to the STROBE recommendations [5]. Consecutive patients aged 18 years or older, with a diagnosis of type 2 diabetes for at least one year and able to read and understand Turkish, were invited. Patients with cognitive impairment, severe visual loss or no HbA1c measurement in the previous three months were excluded.

Measurements

Health literacy was assessed in a face-to-face interview with the 32-item Turkish Health Literacy Scale (TSOY-32). Patients with an index score of 33 or below on the 0–50 scale were classified as having "limited" and those above 33 as having "adequate" health literacy. The HbA1c value from the previous three months was taken from high-performance liquid chromatography results. In line with current guidelines, HbA1c ≥7% was considered inadequate glycaemic control [4].

Statistical analysis

Continuous variables are presented as mean ± standard deviation and categorical variables as number and percentage. Groups were compared with the t test and the chi-square test. A multivariable logistic regression model including age, sex, education, diabetes duration and insulin use was built to assess the association with inadequate glycaemic control. A p value < 0.05 was considered significant.

RESULTS

Of the 341 patients invited, 312 completed the study. Health literacy was limited in 191 patients (61.2%) and adequate in 121 (38.8%). The limited group was older and included more women and more patients with primary school education or less (Table 1).

Table 1. Characteristics of patients by health literacy level

Characteristic	Limited (n = 191)	Adequate (n = 121)	p
Age, years	60.1 ± 9.4	55.7 ± 9.6	<0.001
Women, n (%)	112 (58.6)	57 (47.1)	0.047
Primary school or less, n (%)	118 (61.8)	34 (28.1)	<0.001
Diabetes duration, years	9.8 ± 6.1	8.6 ± 5.7	0.08
Insulin use, n (%)	74 (38.7)	38 (31.4)	0.19
HbA1c, %	7.9 ± 1.4	7.1 ± 1.2	<0.001
HbA1c ≥7%, n (%)	131 (68.6)	57 (47.1)	<0.001

The mean HbA1c of the whole group was 7.6% ± 1.4. In the multivariable analysis, limited health literacy was independently associated with inadequate glycaemic control (OR 2.14; 95% CI 1.29–3.55; p = 0.003). Each year of diabetes duration also increased the odds of inadequate control (OR 1.05; 95% CI 1.01–1.10).

DISCUSSION

In this study, health literacy was limited in about two thirds of patients with type 2 diabetes, and in this group the odds of inadequate glycaemic control doubled, independently of educational level. Our findings agree with earlier studies showing the association of low health literacy with diabetes outcomes [2,3].

Possible explanations include misreading medication instructions and glucose values, difficulty in translating dietary advice into daily life and difficulty in communicating with health professionals. That the association persisted after adjustment for education suggests that health literacy is not merely a reflection of formal schooling.

The cross-sectional design does not allow causal inference. The sample was limited to two centres, and some variables were based on patient report. On the other hand, face-to-face assessment with a validated scale and laboratory data taken from records are strengths of the study.

CONCLUSION

Limited health literacy is common in patients with type 2 diabetes and is independently associated with poor glycaemic control. Brief health literacy screening in outpatient clinics and diabetes education adapted to the patient, using plain language, visual material and the teach-back method, are recommended.

Ethics approval: The study was approved by the Altınkoru University Clinical Research Ethics Committee (decision no: 2024/11-07). Written informed consent was obtained from all participants.

Conflict of interest: The authors declare no conflict of interest.

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Author contributions: EK: concept, design, data collection, writing; MŞ: design, critical review; ZA: data collection, statistical analysis.

Data availability: The data are available from the corresponding author on reasonable request.

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