Original Research

METABOLIC DISEASES

Diabetes knowledge and socio-economic status among adults with type 2 diabetes

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Abstract

Background and aims. Sociodemographic factors and diabetes knowledge play a crucial role in the management and long-term outcomes of type 2 diabetes, influencing both disease progression and the risk of complications. We aimed to assess the relationship between socio-economic status and diabetes knowledge using a demographically appropriate questionnaire for evaluating socioeconomic status and a culturally tailored bilingual diabetes knowledge assessment test for patients with type 2 diabetes in a multi-ethnic setting.

Methods. Our study was conducted in Mureș County, Romania, among adults with a minimum one-year history of type 2 diabetes. We collected data on the participants' sociodemographic and socioeconomic status. Our assessment test for diabetes knowledge consisted of 30 true-or-false statements, addressing etiology and risk factors, diabetes-related complications, and treatment, including lifestyle interventions and medication. Statistical analysis was carried out in the SPSS software.

Results. We screened 202 diabetic patients, 109 patients met the inclusion criteria and were enrolled in the study. Data were collected on their sociodemographic and socioeconomic characteristics, and they also completed the diabetes assessment test. Between the sociodemographic features and diabetes knowledge, only the diabetes duration showed a statistically significant positive correlation with the total ($r(107) = 0.254$, $r^2 = 0.064$, $p = 0.008$) and second domain's scores ($r(107) = 0.336$, $r^2 = 0.112$, $p = 0.000$). In addition, education level, household income and the type of antidiabetic treatment showed a statistically significant association with assessment test scores ($p < 0.05$).

Conclusion. In the study population, there was a statistically significant association between the performance on the assessment test and education level, type of antidiabetic treatment, household income and diabetes duration.

Keywords: social determinants of health, socio-economic level, diabetes knowledge, type 2 diabetes mellitus

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Background and aims

Sociodemographic factors influence diabetes prevalence, progression to complications and prognosis in the long term. These factors play a crucial role in effective diabetes management and reflect the complexity of approaching such patients' health-related, especially chronic, pathologies [1]. The 2025 guidelines of the American Diabetes Association also emphasize the importance of incorporating sociodemographic factors into diabetes management. Health systems are encouraged to identify and address disparities in diabetes care and health outcomes by analyzing clinical quality data based on variables like insurance status, race, ethnicity, preferred language for healthcare communication, disability, and other social determinants of health. During clinical encounters, it is essential to evaluate social determinants such as food and housing insecurity, financial

constraints, access to health insurance and healthcare services, environmental and neighborhood conditions, and social support networks. This information should guide treatment decisions, with referrals to appropriate local community resources when needed [2]. According to Hill-Briggs et al., sociodemographic factors can be divided into 5 categories: socioeconomic status, neighborhood and physical environment, food environment, healthcare access, and social context [3].

Socioeconomic status (SES) is a multidimensional construct that includes educational, economic, and occupational status [4]. It is associated with the extent to which individuals and communities can access material resources including health care, housing, transportation, and nutritious food, and social resources such as political power, social engagement, and control. The three components of SES are intercorrelated, but each aspect has unique implications for health. Each component can be assessed at the individual or population level [5]. Diabetes prevalence in the adult U.S. population shows a clear inverse relationship with educational levels, following a stepwise pattern. Among U.S. adults, the age-adjusted prevalence of diagnosed diabetes is 12.6% for those with less than a high school education, 9.5% for high school graduates, and 7.2% for individuals with education beyond high school [6]. The lowest odds of developing diabetes are observed among those with a college degree or higher [7]. Ferrie et al. conducted a meta-analysis on job insecurity and its association with incident diabetes, revealing that high job insecurity increases the risk of developing diabetes (OR 1.19, 95% CI 1.09–1.30) [8]. Similarly, a meta-analysis by Varanka-Ruuska et al. found that unemployment is linked to greater odds of both prediabetes (OR 1.58, 95% CI 1.07–2.35) and type 2 diabetes (OR 1.72, 95% CI 1.14–2.58) [9]. These findings underscore the complex relationship between socioeconomic status and diabetes prevalence and management, highlighting the importance of assessing these factors in diabetes care and prevention. In a recently published qualitative study, individuals with low socioeconomic status were interviewed about the challenges they face in managing diabetes. The findings showed that this population encounters difficulties related to biopsychosocial factors, nutrition, and diabetes self-management. Nevertheless, participants reported coping with these challenges by adopting healthier lifestyle behaviors and relying on family support, highlighting that, from the patients' perspective as well, socioeconomic factors play a crucial role in diabetes self-management [10].

Diabetes knowledge also plays a crucial role in the effective management of type 2 diabetes, influencing both self-care practices and clinical outcomes. Ferreira et al. emphasized that a higher level of knowledge about type 2 diabetes positively impacts future disease management by promoting adherence to treatment and lifestyle modifications [11]. Inadequate understanding of diabetes has been consistently associated with poor glycemic control, as demonstrated by Velázquez et al., who found a direct link between low diabetes knowledge and suboptimal blood glucose levels. Knowledge gaps can lead to misconceptions about medication use, dietary choices, and the importance of regular physical activity, contributing to ineffective disease control [12]. Phoosuwan et al. highlighted that education on diabetes and its management significantly enhances patients' ability to monitor their condition and make informed decisions about their health. Patients with better diabetes-related knowledge are more likely to adopt healthier behaviors, such as maintaining a balanced diet and adhering to prescribed treatment regimens. Conversely, lack of knowledge often results in delayed recognition of symptoms and poor engagement with healthcare services [13].

The most widely used instrument to measure diabetes knowledge is the DKT2 (Revised Brief Diabetes Knowledge Test), which contains 2 sections. The general knowledge segment has 14 items and is appropriate for adults with type 1 and type 2 diabetes. An additional 9 items constitute the insulin use subscale, which is appropriate for adults with type 1 and type 2 diabetes who use insulin [14]. At least secondary or higher education level, employment with a permanent income, and the existence of diabetes-related complications were related to increased general knowledge about diabetes [13]. Comprehensive patient education programs focusing on diabetes knowledge can help mitigate health disparities and improve overall management outcomes. Encouraging active patient participation in their care through knowledge empowerment fosters better self-management and long-term health benefits [15]. Another study conducted in Pakistan, which assessed diabetes knowledge using the Diabetes Knowledge Questionnaire (DKQ) and socioeconomic status using the modified Kuppuswamy index, demonstrated a strong association between SES and diabetes knowledge ($p < 0.001$), with progressively higher knowledge levels observed from lower to upper socioeconomic classes. Likewise, SES had a significant effect on glycemic control ($p = 0.005$), indicating a trend toward both increased diabetes knowledge and better glycemic control with higher socioeconomic status [16].

We aimed to assess the relationship between socio-economic status and diabetes knowledge using a demographically appropriate questionnaire for evaluating socioeconomic status and a culturally, linguistically tailored bilingual diabetes knowledge assessment test for patients with type 2 diabetes in an Eastern European, multi-ethnic setting.

Methods

The current investigation follows the STROBE statement`s guideline for cross-sectional studies [17]. Our cross-sectional, multicentric study was conducted among adults in Mures County, Romania diagnosed with type 2 diabetes and registered in a diabetes care center. The recruitment and data collection occurred in 3 diabetes care centers from Targu Mures, the county seat of Mures County, between September 2024 and December 2024 during the patients's control visits.

The inclusion criteria included: age over 20 years, diagnosed with type 2 diabetes, diabetes duration over one year, born and with a stable residence in Romania, living for at least 8 years in the past 10 years in Mures County, Romania, non-pregnant or lactating, on the evidence list of a diabetologist, signed consent form. The exclusion criteria were other types of diabetes, cognitive decline, and refusal to sign the consent form.

The selection process was randomized, involving patients who presented at the diabetes care centers for their regular 6 or 3-month checkup. Data on the sociodemographic characteristics, socioeconomic status, and diabetes knowledge of the included participants were collected through questionnaire survey method with the supervision of diabetologist resident doctors and medical students. Sociodemographic data were collected, such as gender (male/female), age (years), ethnicity (Romanian/Hungarian/Romani/other), and type of residency (urban/rural). Diabetes duration (years) and antidiabetic treatment were self-reported at the moment of data collection (lifestyle interventions/non-insulin antidiabetics/non-insulin antidiabetics with insulin/insulin).

Socio-economic status was evaluated through the self-completing questionnaire method and data were collected on education level (primary/lower-secondary/upper-secondary/tertiary-vocational/tertiary-university), source of income (employee/managerial position/private entrepreneur/business owner/social assistance/ill-health pension/disability pension/pension/passive income/none/other) with multiple choices, net income per person per month in the household (below 1000 RON, between 1000 and 2000 RON, 2000 and 3000 RON, over 3000 RON; 1 EUR ~ 5 RON), housing (ownership, persons/room), the financial burden to keep a healthy, diabetes adequate diet in the last year (yes/no), missing investigation or treatment because of the costs in the last year (yes/no), the financial burden to pay for diabetes-related health services in the last year (yes/no).

The diabetes knowledge assessment test was conceptualized based on the Revised Brief Diabetes Knowledge Test (DKT2) [14]. Our self-completing, bilingual (Romanian, Hungarian), culturally appropriate assessment test consisted of 30 true-or-false statements, organized into three domains, each containing 10 statements. The first domain was related to etiology and risk factors, the second to complications, and the third to treatment, including lifestyle interventions and medication. The calculation for the final assessment test score was the following: 1 point for the right answer, and 0 point for the wrong or no answer. The maximum attainable points were: 30 for insulin-treated patients and 28 for non-insulin-treated patients.

Statistical analysis was performed using the Mann-Whitney U test, Spearman correlation and Kruskal-Wallis test in SPSS software to assess the association between sociodemographic factors, socioeconomic status, and diabetes knowledge. Results were considered statistically significant if p-value < 0.05.

Results

We screened 202 diabetic patients across three diabetes care centers in Târgu Mureș between September 2024 and December 2024. Following the screening, 109 patients met the inclusion criteria and were enrolled in the study (Figure 1).

The baseline characteristics of the study population are shown in tables I and II. The mean age of the participants was 66.6 years (SD = 9.82), with a median diabetes duration of 6 years (IQR: 3–15). The majority of the participants were female (58%) and lived in urban areas (61%). Most participants belonged to the Hungarian ethnic minority (89%), while 11% were of Romanian ethnicity. Regarding antidiabetic treatment, 67% of participants were treated with non-insulinic antidiabetics, 25% were on a combination of non-insulinic antidiabetics and insulin, 6% were treated with insulin alone, and only 2% relied solely on lifestyle interventions.

Socio-economic data revealed a relatively high education level among participants: 40% had completed secondary superior education, 28% had non-university tertiary education, and 19% had a university degree. Monthly household income varied, with 30% earning above 3000 RON per person, 25% earning between 2000–3000 RON, and 35% earning between 1000–2000 RON. Only 6% reported an income below 1000 RON. The primary source of income for most participants (67%) was their pension, with a smaller proportion reporting income from employment (14%) and other sources. Most participants (96%) owned their homes, and 61% reported having ≤1 person per room in their household. Financial burdens related to diabetes care were reported by a minority: 15% experienced financial difficulties maintaining a diabetes-adequate diet, 7% missed investigations due to cost, 3% missed treatment due to cost.

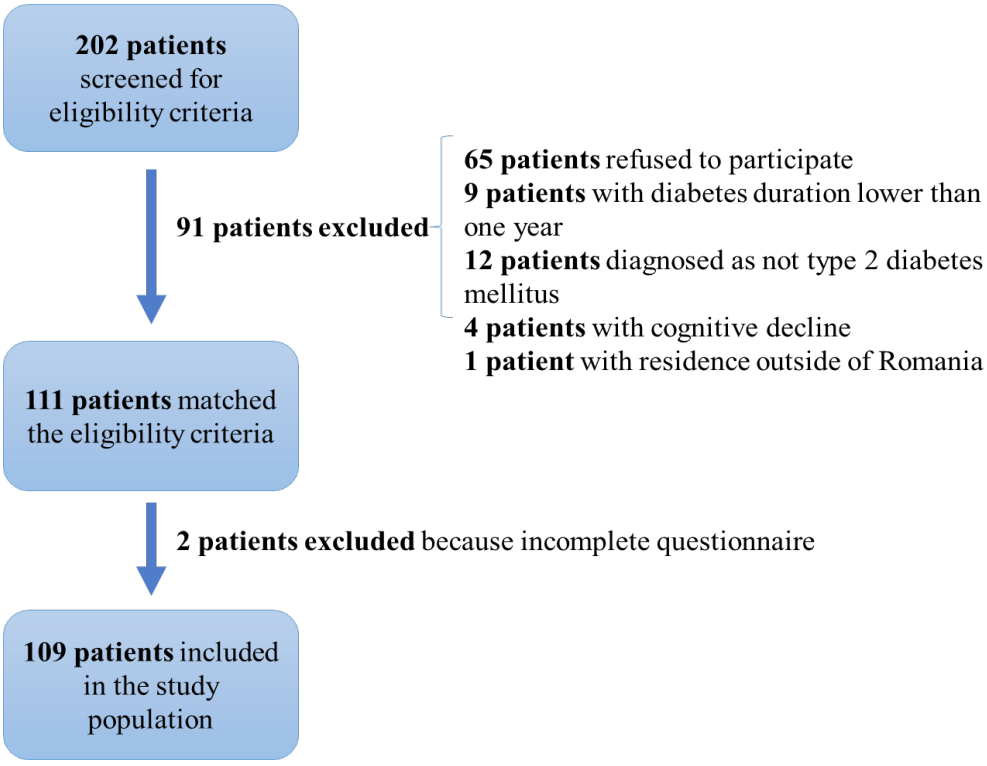

Figure 1. Flow-chart about the selection process.

Table I. Baseline characteristics – sociodemographic, antidiabetic treatment (N = 109).

Age (years)	**mean: 66,6**	**SD: 9,82**
Diabetes duration (years)	median: 6	IQR: 3-15
Gender	female	58%
	male	42%
Type of residency	urban	61%
	rural	39%
Ethnicity	Romanian	11%
	Hungarian	89%
Antidiabetic treatment	lifestyle interventions	2%
	non-insulinic antidiabetics	67%
	non-insulinic antidiabetics + insulin	25%
	insulin	6%

Table II. Baseline characteristics – socio-economic status (N = 109).

Education level	primary (1-4 classes)	1%
	secondary inferior (5-8 classes)	11%
	secondary superior (9-12/13 classes)	40%
	tertiary – non-university	28%
	tertiary – university	19%
Monthly income per person in the household	below 1000 RON	6%
	1000 – 2000 RON	35%
	2000 – 3000 RON	25%
	above 3000 RON	30%
	no answer	5%
Source of income (multiple choices)	employee	14%
	managerial position	3%
	private entrepreneur	3%
	business owner	4%
	social assistance	1%
	ill-health pension	6%
	disability pension	6%
	pension	67%
	passive income	6%
	none	3%
Home ownership (patient or his/her family)	yes	96%
	no	4%
Persons/room	≤1 person/room	61%
	>1 person/room	33%
	no answer	6%
Financial burden to keep a healthy, diabetes adequate diet in the last year	yes	15%
	no	85%
Missing investigation because of the costs in the last year	yes	7%
	no	93%
Missing treatment because of the costs in the last year	yes	3%
	no	97%
Financial burden to pay for diabetes-related health services in the last year	yes	3%
	no	96%
	no answer	1%

The results of the diabetes knowledge assessment are presented in table III. The mean total score for correct answers was 73%, with the highest performance in Domain 1 (etiology and risk factors) at 76% and Domain 2 (complications and comorbidities) at 75%. Domain 3 (lifestyle interventions and treatment) had the lowest performance, with a mean score of 66%. In Domain 1, the highest proportion of correct answers (95%) was for the statement "Diabetes is a communicable disease," while the lowest (55%) was for "Younger age is a risk factor for type 2 diabetes" and "Insulin resistance means that the effect of insulin on the target cells is weakened." For Domain 2, participants showed excellent knowledge of wound healing in diabetic patients (97%) but struggled with identifying symptoms of hypoglycemia (43%). In Domain 3, the highest correct response rate (84%) was for the recommendation of at least 150 minutes of moderate physical activity per week, while the lowest (37%) was for the statement about sampling capillary blood glucose from the second drop of blood.

Table III. Results of the diabetes knowledge assessment test.

	Mean % of right answers
Total score	73
Domain 1 – etiology, risk factors	76
Domain 2 – complications, comorbidities	75
Domain 3 – lifestyle interventions, treatment	66
Domain 1 (max.) - Diabetes is a communicable disease.	95
Domain 1 (min.) - Younger age is a risk factor for type 2 diabetes./ Insulin resistance means that the effect of insulin on the target cells is weakened.	55
Domain 2 (max.) - Wounds in diabetic patients are slow to heal.	97
Domain 2 (min.) - Symptoms of hypoglycemia include loss of appetite, frequent urination, and thirst.	43
Domain 3 (max.) - At least/over 150 minutes of moderate physical activity per week is recommended.	84
Domain 3 (min.) - When measuring blood glucose, the sample should be taken from the second drop of blood.	37

Table IV. Sociodemographic features and diabetes knowledge.

		Domain 1 median (IQR)	Domain 2 median (IQR)	Domain 3 median (IQR)	Total median (IQR)
Gender	female (n = 63)	**80** (70-90)	**80** (60-90)	**70** (50-75)	**75** (64-82)
	male (n = 46)	**80** (60-90)	**80** (70-90)	**70** (50-76.2)	**75** (66.2-83)
	*p**	*0.246*	*0.890*	*0.807*	*0.667*
Type of residency	urban (n = 66)	**80** (67.5-90)	**80** (60-90)	**70** (50-80)	**78** (63.7-82.2)
	rural (n = 43)	**80** (60-80)	**80** (70-90)	**70** (60-75)	**71** (67-82)
	*p**	*0.363*	*0.507*	*0.761*	*0.516*
Ethnicity	Romanian (n = 12)	**75** (52.5-80)	**80** (60-90)	**75** (64.7-78.7)	**75** (57.5-84.5)
	Hungarian (n = 97)	**80** (65-90)	**80** (65-90)	**70** (50-75)	**75** (64-82)
	*p**	*0.210*	*0.706*	*0.387*	*0.767*
Antidiabetic treatment	non-insulin antidiabetics (n = 73)	**80** (60-90)	**80** (60-90)	**75** (50-75)	**71** (61-82)
	non-insulin antidiabetics with insulin (n = 27)	**80** (70-90)	**90** (80-90)	**70** (60-80)	**80** (70-83)
	insulin (n = 7)	**80** (70-90)	**80** (70-90)	**70** (70-80)	**80** (70-83)
	*p***	*0.650*	***0.034***	*0.841*	*0.179*

* Mann-Whitney-U test, ** Kruskal Wallis test

Table IV summarizes the relationships between sociodemographic characteristics and diabetes knowledge. No statistically significant differences in total test scores were observed based on gender (p = 0.667), type of residency (p = 0.516), or ethnicity (p = 0.767). A statistically significant difference was found in Domain 2 scores based on antidiabetic treatment (p = 0.034), with patients with combined antidiabetic therapy scoring higher on non-insulinic antidiabetics and insulin. Regarding the diabetes duration, age and assessment test scores relationship, as shown on figure 2 and 3, only the diabetes duration showed a statistically significant positive correlation with the total ($r(107) = 0.254$, $r^2 = 0.064$, $p = 0.008$) and second domain's scores ($r(107) = 0.336$, $r^2 = 0.112$, $p = 0.000$). Age showed no significant correlation with the assessment test scores.

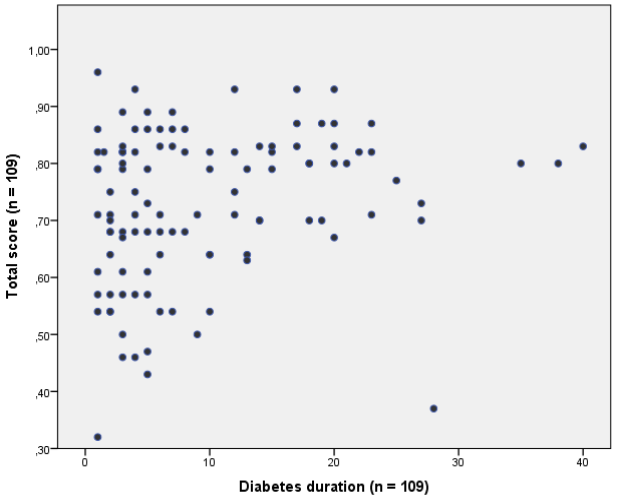

Figure 2. Association between diabetes duration and total test score.

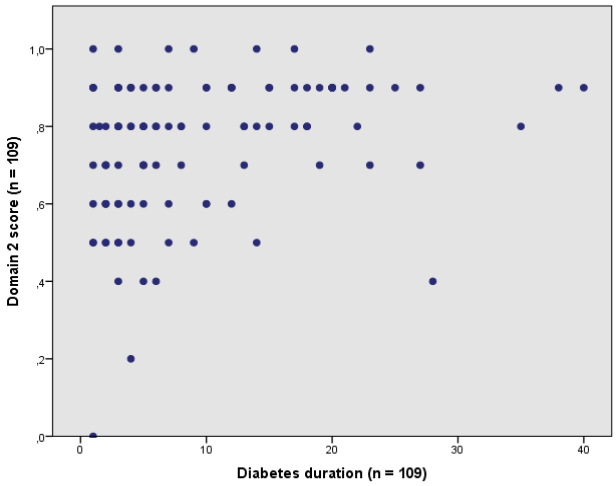

Figure 3. Association between diabetes duration and domain 2 score.

Table V presents the associations between socio-economic status and diabetes knowledge. Participants who experienced financial burdens maintaining a diabetes-adequate diet in the past year scored lower in Domain 1 ($p = 0.047$). Education level was strongly associated with diabetes knowledge, with university graduates achieving the highest total scores ($p < 0.001$, shown on figure 4). Monthly income per person in the household was also associated with total diabetes knowledge scores ($p = 0.004$), with participants earning above 3000 RON scoring higher compared to those with lower income levels (Figure 5).

Table V. Socio-economic status and diabetes knowledge.

		Domain 1 median (IQR)	Domain 2 median (IQR)	Domain 3 median (IQR)	Total median (IQR)
Persons/room	≤1 person/room (n = 66)	**80** (67.5-90)	**80** (60-90)	**70** (60-76.2)	**76** (67-82)
	>1 person/room (n = 36)	**80** (62.5-90)	**80** (62.5-90)	**70** (50-75)	**74** (67-83)
	*p**	*0.963*	*0.684*	*0.874*	*0.913*
Financial burden to keep a healthy, diabetes adequate diet in the last year	yes (n = 16)	**70** (50-80)	**80** (70-90)	**72.5** (50-78.7)	**68** (58-83)
	no (n = 93)	**80** (70-90)	**80** (60-90)	**70** (60-75)	**75** (67.5-82)
	*p**	***0.047***	*0.796*	*0.904*	*0.517*
Education level	secondary inferior (n = 12)	**70** (60-77.5)	**75** (42.5-80)	**63** (41-75)	**66** (54-79)
	secondary superior (n = 44)	**70** (60-90)	**80** (60-90)	**70** (50-75)	**70.5** (61.7-80)
	tertiary – non-university (n = 31)	**80** (70-90)	**80** (60-90)	**70** (60-80)	**77** (68-83)
	tertiary – university (n = 21)	**80** (80-90)	**90** (80-90)	**75** (70-80)	**82** (80-86.5)
	*p***	***0.002***	***0.001***	*0.139*	***0.000***
Monthly income per person in the household	below 1000 RON (n = 6)	**75** (60-85)	**85** (67.5-90)	**66.5** (39.5-80)	**74.5** (63.7-83)
	1000 – 2000 RON (n = 38)	**70** (57.5-82.5)	**75** (60-90)	**63** (47-75)	**68** (56.2-79)
	2000 – 3000 RON (n = 27)	**80** (70-80)	**80** (70-90)	**75** (70-88)	**80** (70-83)
	above 3000 RON (n = 33)	**80** (80-90)	**90** (75-90)	**70** (63-75)	**80** (71-82.5)
	*p***	***0.003***	*0.104*	***0.003***	***0.004***

* Mann-Whitney-U test, ** Kruskal Wallis test

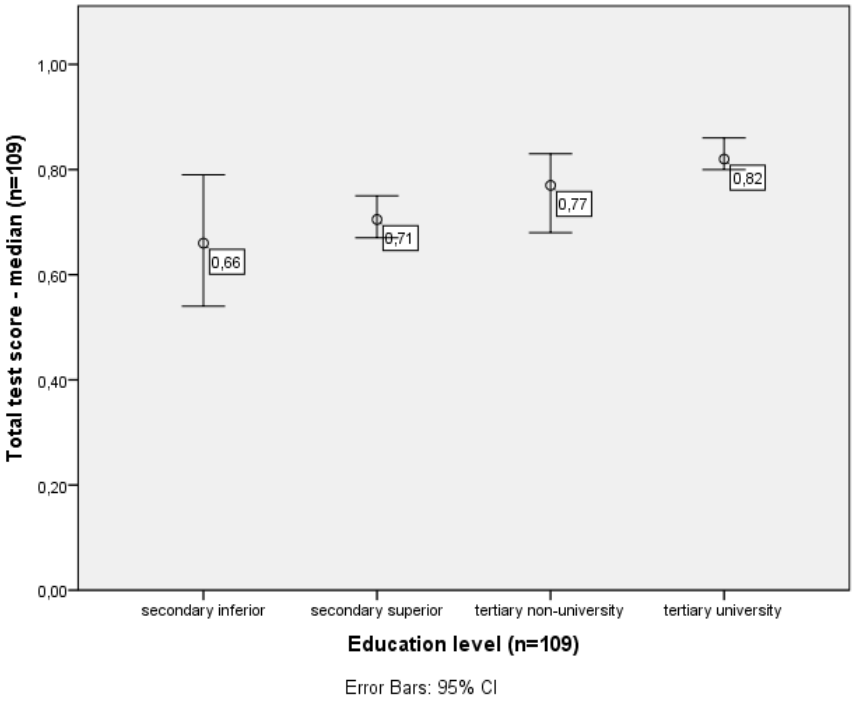

Figure 4. Association between education level and total test score.

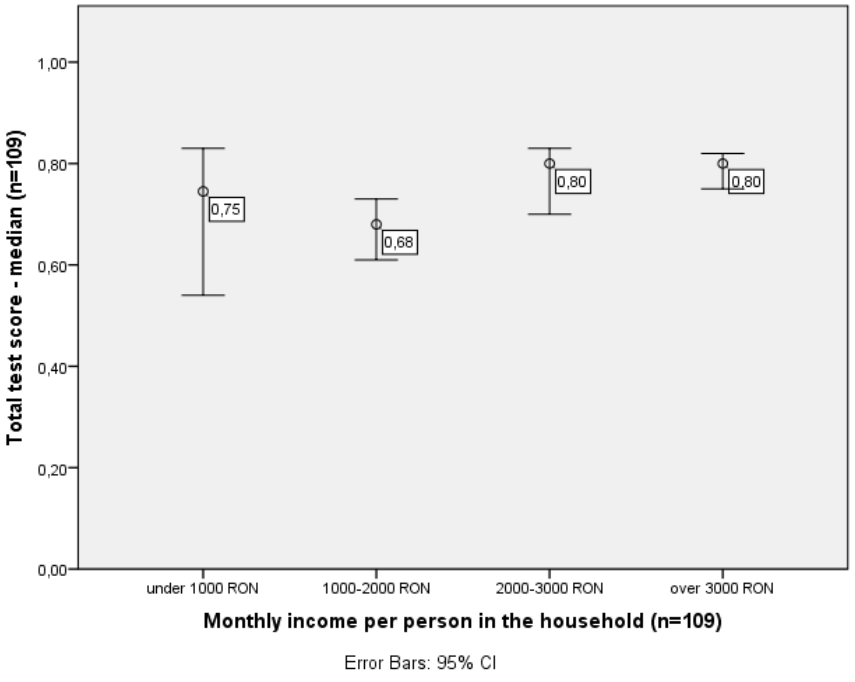

Figure 5. Association between monthly income per person and total test score.

Discussion

The study population consisted of a higher percentage of women (58%), urban residents (61%), participants with third-grade education level (47%), with a mean age of 66.6 ±9.82 years and a median of years with diabetes of 6 (IQR 3-15), which factors influenced the scores obtained on the diabetes knowledge assessment test. Regarding the economic status, the majority of our studied patients (around 90%) are not having problems to keep a diabetic, healthy diet, to finance their diabetes-related services. The attained average score on the diabetes knowledge assessment test highlighted varying degrees of understanding across the domains, indicating that while some concepts were well understood, knowledge gaps persisted, particularly in areas such as treatment and lifestyle management. Our findings indicate that the average percentage of the right answers was 73%, and the treatment domain was the most challenging, with the lowest mean score (66%). These high average scores can be explained by the study population's higher socio-economic status, with stable employment or pension, higher income per person in the household, and higher education level, secondary degree or above for most of the patients. These findings are consistent with those observed during the validation process of the Hungarian version of the Revised Diabetes Knowledge Test (DKT2). In that study, a sample of 129 patients diagnosed with type 2 diabetes mellitus and undergoing insulin therapy was evaluated. The group consisted predominantly of women (84 out of 129 participants), with a mean age of 59.67 years (SD = 12.6). The results indicated a relatively high level of diabetes-specific knowledge among the participants, as reflected by the average correct answer rate of 81.66% [18].

Between the socio-demographics and diabetes knowledge, only the diabetes duration showed a statistically significant positive correlation with the total ($r(107) = 0.254$, $r2 = 0.064$, $p = 0.008$) and the second domain's scores ($r(107) = 0.336$, $r2 = 0.112$, $p = 0.000$). Most of the studies conducted in this area were concluded about this relationship. In a Saudi Arabian study, patients' educational level ($p = 0.045$), occupation ($p = 0.026$), and diabetes duration ($p = 0.037$) were significantly associated with knowledge of diabetic complications [19]. A Portuguese study showed that good diabetes knowledge is associated with age ≥ 70 years (OR = 0.44; 95% CI: 0.18-1.08) [20]. A systematic review conducted in Southeast Asia, which included seven studies encompassing 1,749 patients with type 2 diabetes and five different assessment tools (ranging from 5 to 41 items) focusing on disease characteristics, treatment, and nutrition, similarly identified age, educational level, and glycemic control as the most frequently reported factors influencing diabetes knowledge [21]. However, some studies showed that patients with diabetes duration over 5 years were less likely to have good knowledge of DM complications [22].

In addition, education level, household income and the type of antidiabetic treatment showed a statistically significant association with assessment test scores ($p < 0.05$). Another Portuguese study showed that low education is a risk factor (OR = 7.78; 95% CI 3.36-18.01; OR = 13.05; 95% CI 4.63-36.82) for insufficient diabetes knowledge and the negative attitude toward self-care [23]. Multiple studies highlight this relationship, showing a significant correlation between education level and both diabetes knowledge score ($r = 0.374$, $P = 0.007$) and self-care activities score ($r = 0.317$, $P = 0.025$). Additionally, age was significantly associated with diabetes knowledge score ($P = 0.008$) and self-care activities score ($P = 0.035$) [24]. Another study conducted in Saudi Arabia among more than 900 individuals with type 2 diabetes mellitus demonstrated significant associations between diabetes knowledge levels and age, marital status, educational attainment, monthly income, and type of accommodation [25].

The above-mentioned studies collectively highlight the need to initiate educational programs aimed at improving diabetes knowledge, particularly diabetes self-management. Several effective initiatives have already been described in the literature. For example, a German study examined the association between participation in structured diabetes self-management education (DSME) programs and patients' perceived diabetes knowledge, information needs, sources of information, and diabetes-related distress. Participants in DSME programs demonstrated higher overall diabetes knowledge, especially regarding general disease concepts, treatment, acute complications, and the management of diabetes in daily life. Moreover, DSME participants reported greater information needs concerning both late and acute complications compared with individuals who had never participated in DSME, and they more frequently consulted diabetologists and diabetes care specialists as key sources of information [26].

This study has several limitations. Non-response and participant drop-out, together with the overrepresentation of urban residents with higher education levels, may have introduced selection bias, while the lack of multivariate analyses limited the ability to adequately adjust for potential confounders. Additionally, although some associations reached statistical significance, the modest effect sizes may limit their clinical relevance, and the cross-sectional design precludes any causal inferences. Further psychometric analysis and validation are required for the diabetes knowledge assessment test, and further data collection is necessary targeting rural population, individuals with lower educational attainment.

Conclusions

In the study population, there was a statistically significant association between diabetes knowledge assessment test scores and diabetes duration, education level, household income. Further validation and psychometric testing of the diabetes knowledge assessment test is needed to allow an effective and comprehensive assessment of diabetes knowledge. It is important to emphasize that beyond the overall and domain-specific scores obtained from this test, healthcare professionals can also benefit from a more targeted, item-by-item analysis of patient responses. This targeted review allows physicians to identify specific areas where patients lack diabetes related knowledge, enabling them to tailor educational interventions and reinforce critical aspects of diabetes self-management. It is also important to emphasize the need for individualized and effective educational programs in outpatient diabetes care settings to enhance self-management and improve the patients' understanding of diabetes-related complications and other risk factors associated with poorer prognosis.

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