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Knowledge, Attitudes, and Behaviors Toward Proper Nutrition and Lifestyles in Kosovar's Diabetic Patients

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Abstract

Background: The aim of our study was to assess the knowledge and attitudes about type 2 diabetes (T2D) in Kosovars patients, as well as self-efficacy toward eating behavior, and determine the impact of diabetes on patients' daily work and lifestyle practices.

Methods and Results: This analytical cross-sectional survey was performed among 400 T2D patients (203 males and 197 females) to assess their knowledge, attitude, and practice regarding diabetic diet and eating habits. It was conducted from February to May 2023 in Kosovo's rural and urban areas. Knowledge, attitudes, and eating behavior were assessed using the self-administered 28-item sets related to glycemic control, physical activity, risk of complications, foot care, and food and nutrition. The largest proportion (42.3%) was made up of the patients over 60 years of age; 41.5% were 40-60 years of age, and only 16.3% were 30-40 years old. Most of the patients were males (50.8%); more than 87% were married. Interviewed participants did not have enough knowledge about the consumption of foods with more fruits, beverages, and sweets. Generally, participants had poor knowledge about the impact of DM on health. Most diabetics in Kosovo still have suboptimal diet practices, choosing to base their main meals around carbohydrates containing food with a high glycemic index, such as white bread and potatoes most of the time. In our case, 38.8% of participants never exercised during the week because they did not know the importance of exercise to treat their disease. In our study, we found no association between the level of diabetes-related knowledge and age, gender, or the years since the patient was diagnosed. A worrying fact for Kosovar patients is that there are no diabetes counseling centers in the regions where they live.

Conclusion: There is a need to increase awareness of the complications of diabetes and consequently improve nutrition knowledge, attitudes, and practices. The benefits of early detection of T2D through screening in the general population are needed in Kosovo.**(International Journal of Biomedicine. 2024;14(1):110-117.)**

Keywords: knowledge • type 2 diabetes • eating habits • Kosovo adults

Introduction

Diabetes mellitus is a disease with multifactorial pathogenesis, and modifiable lifestyle factors that include obesity, physical inactivity, diet, and alcohol consumption. Worldwide, the number of people with diabetes is increasing due to population growth, aging, urbanization, and the rising prevalence of obesity and physical inactivity.[1,2]

The prevalence of diabetes for all age groups worldwide was estimated to be 2.8% in 2000 and 4.4% in 2023. By 2030, the world prevalence among adults is projected to increase to 7.7%.[3] Globally, 422 million people are living with diabetes,[4] and the estimate is projected to rise to over 592 million by 2035.[5] Prevalence has been rising more rapidly in low- and middle-income countries than in high-income countries. The largest increases are expected in the older age groups, with numbers more than doubling in the over-60 age group. In addition to known cases of diabetes, undiagnosed diabetes currently affects 1%–2% of US adults.[6] Furthermore, it is estimated that approximately 50% of diabetes cases are considered "uncontrolled." [7]

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In Europe, 61 million adults are living with diabetes. The number of adults with diabetes is expected to reach 67 million by 2030 and 69 million by 2045.[8] A high prevalence of type 2 diabetes (T2D) with considerable variability between European countries and between genders was found.[9,10] T2D most often occurs in persons older than 45 years. Still, it is increasing in children, adolescents, and adults due to increased levels of overweight, physical inactivity, and high-carbohydrate and high-fat diets.[11] In Kosovo, T2D affects more than 90% of diabetics. Diabetes mellitus confers an increased mortality risk and is associated with multiple comorbidities, decreased quality of life, and a significant economic burden.

In 2019, diabetes and kidney disease due to diabetes caused an estimated 2 million deaths.[12] Premature mortality caused by T2D results in the loss of 12 to 14 years of life. This disease is associated with severe complications that affect patients' health, productivity, and quality of life. More than 50% of people with diabetes have cardiovascular disease and account for the sole cause of end-stage renal disease, which requires either dialysis or kidney transplantation. Moreover, diabetes is a leading cause of blindness due to retinal damage in the adult age group, diabetic retinopathy as well as lower limb amputations. Diabetic foot is a life-changing complication for the diabetic patient and is associated with increased morbidity and mortality. In a person with diabetes, ulcers are associated with peripheral arterial disease and peripheral neuropathy, often in combination. It is estimated that at least 10% of diabetic patients will suffer a foot ulcer during their lifetime.

Early diagnosis, intensive treatment, and consistent dietary patterns, along with regular care and follow-ups, are essential and can help to preserve the health of diabetes patients and significantly lower the risk of complications.[13,14] The CDC has identified self-dietary management as a major step in assessing a patient's knowledge of the nutritional aspects, treatment, and complications of diabetes.[15] Previous research has highlighted dietary and lifestyle modifications related to reducing risk.[9,10]

Dietary management in T2D is the cornerstone of care. However, according to many publications, many diabetics worldwide have insufficient dietary knowledge, positive attitudes, and good habits toward the importance of DM care; therefore, self-management is recognized as a central component in disease prevention and treatment.[16-18]

Poor diet quality is a major modifiable risk factor for T2D. Specifically, diets low in legumes, whole grains, fruits and vegetables, and high in sodium, added sugar, alcohol, and red and processed meats are responsible for much of this burden.[19]

According to the World Health Organization, adherence is "the extent to which a person's behavior—taking medication, following a diet, and/or executing lifestyle changes—corresponds with agreed recommendations from a healthcare provider." Dieting to achieve glycemic control in diabetes is integral to improving diabetes outcomes.[20] Many studies from different authors have described dietary practices with very poor dietary profiles and poor knowledge, attitudes, and practices toward diabetes and dietary management.[21-24]

The standard of care for diabetes is education on proper diet, physical activity, and glucose monitoring. Using and managing medications alone (without exercise and diet) does not lower HbA1C. However, the combination of nutrition counseling and exercise results in a 1% reduction in hemoglobin A1C in middle-aged T2D patients.[25] Intake of food in large portions can increase blood glucose levels. Diabetes education leads to better disease control and is widely accepted to be an integral part of comprehensive diabetes care.[26]

Most people living with diabetes mellitus know the dietary recommendations and healthy behavior. Still, they do not comply with the suggestions because they consider that diet food for diabetes patients tends to be unpleasant, so they eat according to their wishes, especially if they have not shown serious problems.[27]

Physical activity also helps control blood sugar levels and lowers the risk of heart disease. Some additional benefits include maintaining a healthy weight, losing weight, if necessary, feeling happier, getting better sleep, improving your memory, controlling blood pressure, lowering LDL ("bad" cholesterol), and raising HDL cholesterol ("good" cholesterol). The goal is to perform moderate-intensity physical activity at least 150 minutes a week. Walking can be one of the most basic forms of exercise, but it is also a very effective form of activity to help lower blood glucose levels. Therefore, many experts have suggested that physical activity in these patients can be an important "weapon" in preventing foot ulcers.[28-30]

"A healthy diet, regular physical activity, maintaining a normal body weight, and avoiding tobacco use are ways to prevent or delay the onset of T2D."[12]

Because of the lack of a National Registry for Diabetes in Kosovo and the lack of official data, according to ICD-10, no conclusion can be drawn about the prevalence of the disease in the country.

The aim of our study was to assess the knowledge and attitudes about T2D in Kosovars patients, as well as self-efficacy toward eating behavior, and determine the impact of diabetes on patients' daily work and lifestyle practices.

Materials and Methods

Study design and participants

This analytical cross-sectional survey was performed among 400 T2D patients to assess their knowledge, attitude, and practice regarding diabetic diet and eating habits. It was conducted from February to May 2023 in Kosovo's rural and urban areas. The qualitative phase used a phenomenological exploratory design, which enabled collection through face-to-face interviews with patients who were scheduled to visit the primary Medicine Centers and in the areas where participants lived.

Participants were over 18 years of age, diagnosed with T2D at least 6 months previously, and were not pregnant. During visits, participants were interviewed in their homes and Family Health Centers. The research protocol included voluntary participation. The subjects were contacted individually and were assured of confidentiality and anonymity.

Data collection

Knowledge, attitudes, and eating behavior were assessed using the self-administered 28-item sets related to glycemic control, physical activity, risk of complications, foot care, and food and nutrition. This questionnaire was designed to take approximately 15 minutes to complete. The dietary knowledge questionnaire used in this study was prepared after thoroughly reviewing the literature.

Questionnaires were administered by third-year students from the Nursing program and physicians in Public Health. Students were trained for data collection before the commencement of the survey. Before distributing the questionnaire, researchers elucidated the aim of the study. Special attention was paid to patients. For those who had problems completing the questionnaires because of age, lack of literacy, or visual impairment, researchers dictated questions to them and recorded their answers without providing hints. The questionnaire was tested, adjusted, and validated through a pilot study on a convenience sample of 20 diabetics (data not reported or included in the study). The questionnaire was divided into three parts:

Part A consisted of questions related to the participant's socio-demographic characteristics and habits.

Part B assessed participants' habits for smoking, use of alcohol, and physical activity, whether they have a counseling center for diabetes, and frequency of visits to diabetic clinics. The study subjects were asked to answer whether they were doing physical activity, the kind of exercise (walking, running), the number of days per week, the duration of disease, comorbidity, and the number of meals.

Part C consisted of diagnosed health conditions, symptoms, and complications of diabetes, such as cardiac, renal, stroke, and diabetic foot infections.

Dietary assessment

In brief, participants were asked to assess their usual dietary intake and all food and beverages consumed within a week according to the types of food. The food frequency questionnaire included information on all the food groups consumed worldwide (i.e., questions about how many times per week they consume dairy products, cereals, fruit, vegetables, meat, meat products, legumes, sweets,etc.)

Statistical analysis was performed using the statistical software package SPSS version 25.0 (SPSS Inc, Armonk, NY: IBM Corp). Baseline characteristics were summarized as frequencies and percentages for categorical variables and as mean ± standard deviation (SD) for continuous variables. Levene's Test for Equality of Variances   and Independent Samples Test were applied. Odds ratio (OR) with 95% confidence interval (CI) was also calculated. A probability value of $P<0.05$ was considered statistically significant.

Ethical approval for this study was obtained from the Ethical Committee of Medical University of Gjakova (protocol No 001/1094, December 2022). All participants provided written informed consent.

Results

Table 1 presents the socio-demographic characteristics of the participants. There were 203 males and 197 females in our study. The largest proportion (42.3%) was made up of the patients over 60 years of age; 41.5% were 40-60 years of age, and only 16.3% were 30-40 years old. Most of the patients were males (50.8%); more than 87% were married.

Table 1.

Socio-demographic characteristics of the participants.

Demographic data	Number of patients (n=400)	Percentage (%)
Gender		
Males	203	50.8
Females	197	49.2
Age (years)		
30-40 years	65	16.2
40-60 years	166	41.5
over 60 years	169	42.3
Material status		
Married	349	87.2
Unmarried	32	8.0
Divorced	19	4.8
Profession		
Housewife	145	36.2
Unemployed	119	29.8
Employed	136	34.0
Education		
Primary school	189	47.2
Secondary school	136	34.0
University degree	54	13.5
Other	21	5.3
Residence		
Urban	157	39.2
Rural	243	60.8

Regarding education, 47.3% of the participants had only primary education, 34% had secondary education, 13% had university education, and 5.3% had other. Most respondents (60.8%) lived in rural areas, and 39% lived in urban areas. There were significant differences in knowledge and attitude between education levels. There were generally poor practices on a healthy diet, physical activity, diabetes mellitus complications, and setting goals for therapy. We found no association between the level of diabetes-related knowledge and age, gender, or the number of years since the participants were diagnosed.

Diabetes knowledge and attitudes

Generally, participants had poor knowledge about the impact of diabetes mellitus on health. Therefore, they were not aware of how excessive consumption of certain items affects blood glucose levels. Our study showed that most Kosovars make unhealthy choices of food high in sugar, less minerals, and vitamins. Most of them still have a misperception of the amount of food they consume and choose to base their main meals

around carbohydrates most of the time. Therefore, educational efforts should improve knowledge at the population level.

When the participants were asked about the level of their diabetes-related nutrition knowledge, the percentage was significantly lower on healthy eating habits.

Our study showed that over 98% diabetics were not aware of the link between bread and T2D, 98.3% of them eat bread more than four times per week and 88% of them eat legumes more than three times per week.

Interviewed participants did not have enough knowledge about the consumption of foods with more fruits, beverages, and sweets; 70.5% of participants ate fruits more than four times per week, 48.3% consumed beverages more than three times a week, and 50.5% consumed sweets up to three times a week. Red meat and fried food, associated with increased cardiovascular risk, were consumed more by males than by females.

Most diabetics in Kosovo still have suboptimal diet practices, choosing to base their main meals around carbohydrates containing food with a high glycemic index, such as white bread and potatoes most of the time (Table 2).

Table 2.

Practice relating to participant's food intake per week.

Practice relating to participant's food intake per week	Never	Sometimes (1-3 times per week)	Regularly (≥ 4 times per week)
How many times per week do you eat vegetables?	4 (1%)	96 (24%)	300 (75%)
Beverages	122 (30.5%)	193 (48.2%)	85 (21.2%)
Milk	59 (14.8%)	189 (47.2%)	152 (38.0%)
Yogurt	17 (4.2%)	82 (20.5%)	301 (75.3%)
Cheese	19 (4.8%)	82 (20.5%)	299 (74.8%)
Fruits	15 (3.8%)	103 (25.8%)	282 (70.5%)
Sweets	159 (39.8%)	202 (50.5%)	39 (9.8%)
Bread times per week	2 (0.5%)	5 (1.3%)	393 (98.2%)
Potatoes	37 (9.2%)	325 (81.2%)	38 (9.5%)
Legume	35 (8.8%)	352 (88%)	13 (3.2%)
Rise	47 (11.8%)	335 (83.8%)	18 (4.5%)
Pasta	136 (34.0%)	241 (60.2%)	23 (5.8%)
Corn bread	157 (39.2%)	211 (52.8%)	32 (8.0%)
How often do you drink alcohol?	346 (86.5%)	42 (10.5%)	12 (3.0%)

However, an important limitation was the small sample size, which threatened the generalizability of the results. However, this study can still help diabetic patients in Kosovo by providing some insight into the roles that they could play in self-managing diabetes.

Regarding the symptoms participants had and their answers, 61.8% had an infection, followed by 54% who had burning during urination. Problems with itching in hands and feet were found in 27.5%, and 21.8% had frequent colds (Table 3). Among the comorbidities, 64% of the participants had hypertension, followed by hyperlipidemia (43%) and cardiovascular diseases (30.2%). Problems with teeth and a bad smell in the mouth were noted in 38.8% of T2D patients. Overweight and skin problems were found in 40.5% and 31.5% of participants, respectively (Table 4).

Table 3.

Symptoms and conditions commonly observed in study patients.

	Yes (n/%)	No (n/%)
Infection	247 (61.8%)	153 (38.3%)
Acne	27 (6.8%)	373 (93.3%)
Burning during urination	216 (54%)	184 (46%)
Frequent colds	87 (21.8%)	313 (78.3%)
Itching in hands and feet	110 (27.5%)	290 (72.5%)

Table 4.

Co-morbidities among study participants.

	Yes (n/%)	No (n/%)
Hypertension	256 (64.0%)	144 (36%)
Hyperlipidemia	172 (43.0%)	228 (57.0%)
Overweight	162 (40.5%)	238 (59.5%)
Cancer	9 (2.2%)	391 (97.8%)
Thyroid problems	34 (8.5%)	365 (91.2%)
Skin problems	125 (31.5%)	275 (68.8%)
Cardiovascular diseases	121 (30.2%)	279 (69.8%)
Teeth problems and bad smell in the mouth	155 (38.8%)	245 (61.2%)
Foot problem	57 (14.2%)	343 (85.8%)

Among the patients, diabetes awareness and management are still the major challenges stakeholders face worldwide. Knowledge is very important for people living with diabetes mellitus to avoid complications, so an intervention is needed to increase knowledge about the disease, treatment therapy, self-management, diet, and physical activity.

In our study, we found no association between the level of diabetes-related knowledge and age, gender, or the years since the patient was diagnosed.

A worrying fact for Kosovar patients is that there are no diabetes counseling centers in the regions where they live; although the health institutions are close to the patients, because

there is a lack of endocrinologists and nutritionists, they don't go to the doctor. Thus, 50.8% of the participants stated that in the absence of specialists, they turn to the University Clinical Center in Pristina with already developed complications of diabetes; 22% of them receive all the necessary information about the disease from the Internet, and more than 27% of them turn to University Clinical Center for consultation with endocrinologists.

The study results show that 45% of patients had diabetes for less than 5 years, 33.8% for 6 to 10 years, 16% for more than 15 years, and only 5.2% for more than 20 years (Table 5). Diabetes was diagnosed in 44.8% of patients during routine visits; in 41.5% of patients, T2D was diagnosed during a visit to the doctor due to the presence of other diseases and in 13.2% of cases, in preparation for surgery.

Table 5.

Diabetes duration in the patients.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3-5 years	180	45.0	45.0	45.0
	6-10 years	135	33.8	33.8	78.8
	15-20 years	64	16.0	16.0	94.8
	> 20 years	21	5.2	5.2	100.0
	Total	400	100.0	100.0	

Practices

Unhealthy eating habits and physical inactivity are the leading causes and complications among T2D patients. To understand the potential contributions of physical activity, lifestyle, and dietary habits to preventing T2D, beyond their effects on weight loss, it is necessary to determine the physiological basis underlying the lower incidence of T2D.

In our case, 38.8% of participants never exercised during the week because they did not know the importance of exercise to treat their disease; 5.5% exercised once a week, and 8.5% twice a week. Despite the high level of education of the participants in this study, only one participant stated that they exercised up to 8 times a week. At the same time, men were more likely to engage in sports than women. Doctors should be supported by campaigns promoting physical activity among all patients with diabetes throughout the country.

Additionally, a potential reason that Kosovo women engage in less physical activity may be due to differences in social gender roles, as women are expected to take on more household and childcare responsibilities and, therefore, spend less time devoted to physical exercise. An independent sample T-test was conducted to compare the physical activities (exercise) of female and male respondents. There was a significant difference (P=0.000) in scores for males (0.31±0.46) and females (0.15±0.35) with greater physical activity in males than females. The magnitude of differences in the means was significant (P=0.000) (Table 6).

Discussion

Many studies show that low knowledge, poor quality of life, and poor dietary habits are associated with diabetes comorbidity and complications.

Patients with diabetes in Kosovo receive some information from doctors in healthcare settings, but their knowledge about diabetes management, diet, lifestyle, and food intake is insufficient.

Our study found that more than 98% of diabetics in Kosovo were unaware of the link between diabetes and high-carbohydrate meals, fruits, and sweets. More than 51.5% of participants had the habit of eating three times a day, 35% had a habit of eating two times a day, and only 10.8% had a habit of regularly eating - four times a day.

Education and employment levels are important factors in diabetes control. In our study, 47.3% of participants

Table 6.

Comparison by gender and physical activity.

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% CI of the Difference	
		F	Sig.	t	fd	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Do you exercise?	Equal variances assumed	65.329	0.000	-3.925	398	0.000	-0.162	0.041	-0.243	-0.081
	Equal variances not assumed			-3.910	367.587	0.000	-0.162	0.041	-0.243	-0.080

had primary school education, 34% had secondary school education, and 13.5% had tertiary education. In terms of employment status, 29.8% of participants were unemployed, 36.3% were housewives, and 34% were employed. Our data are consistent with a previous study in which 34% of patients were employed and 36.3% of patients with diabetes were unemployed. Lack of work and adequate financial resources limit the ability to adhere to the dietary regime.[31-33]

Many studies show that the link between soft drink consumption with obesity and diabetes results from the use of large amounts of high fructose corn syrup in the production of soft drinks, which raises blood glucose levels and BMI to dangerous levels. In our study, 48.3% of participants consumed soft drinks more than three times per week. Assy and colleagues[34] showed that diet soft drinks contain glycated chemicals that markedly increase insulin resistance.

Food intake is closely associated with obesity, not only in terms of food volume but also in terms of diet composition and quality. High consumption of red meat, sweets and fried foods increases the risk of insulin resistance and T2D.[34-37]

Hansaram et al.[15] found poor patient knowledge regarding diabetic diet with a mean knowledge score of 14.46±4.52 (maximum knowledge score was 34). Similarly, Bano et al.[38] reported that only 19% of the patients had good knowledge, and the remaining 81% had poor knowledge.

Another study conducted at the Abidjan Diabetes Center found that 60.7% of patients did not have good knowledge of the recommended diet for diabetics, and 88.5% of patients did not have regular meals.[39]

In our study, comorbidity was found in almost most of our patients: 64% of the participants had hypertension, followed by hyperlipidemia (43%) and cardiovascular diseases (30.3%). A high percentage of concomitant diseases may be associated with the peculiarities of medical insurance when each patient pays for medical services from his budget, lack of screening at the country level, low level of health education, lack of diabetes consultation centers, the socio-economic situation of the country, etc.

Considering the data obtained, it is recommended that educational programs on diabetes be introduced at the country level. Family physicians must provide appropriate health education to their patients and enforce that their attitudes, knowledge, and practices are consistent. Education is needed on the importance of following a diet that can help treat illness, take proper care of oneself, and improve quality of life. Efforts should also be made to increase knowledge about T2D and the importance of a healthy lifestyle.

Training in self-monitoring skills, frequency, and accuracy of self-monitoring of blood glucose levels, and self-reporting of dietary habits should be integral to diabetes management. Improving glycemic control in poorly controlled populations may provide cost savings because it reduces healthcare costs associated with both short- and long-term complications of diabetes.

Active and effective dietary education can prevent diabetes and its complications. A study conducted by Shah et al.[22] in India found that 63% of patients with T2D did not know what diabetes was, and the majority were also unaware of its complications. According to a study conducted by Bani[40] in Saudi Arabia, most patients (97.3% of men and 93.1% of women) were unaware of the importance of diabetes monitoring.

In our study, patients were not offered any education regarding physical activity and its importance in preventing complications. Many cross-sectional as well as prospective, and retrospective studies have found a significant association between physical inactivity and T2D, so intensive lifestyle interventions on these issues (diet and physical activity) may prevent or delay the development of diabetes among people at high risk.

Conclusion

Our findings may provide practical guidance for interventions in nutrition and education, as the general patterns of behavior that change as a result of dietary intake, physical activity, and self-management can be easily interpreted by the general population as their health status. Diabetes awareness and management continue to be significant challenges faced by healthcare providers and patients in Kosovo. Patients in Kosovo do not go for regular eye, heart, and kidney examinations and only visit the doctor when they are sick, so there is a need to increase awareness of the complications of diabetes and consequently improve nutrition knowledge, attitudes, and practices. There is a gap between the patient's level of knowledge and their practice. The benefits of early detection of T2D through screening in the general population are needed in Kosovo.

Competing Interests

The authors declare that they have no competing interests.

Acknowledgments

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