General knowledge about diabetes in the elderly diabetic population in Slovenia

Splošno poznavanje sladkorne bolezni pri starejših sladkornih bolnikih v Sloveniji

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Izvleček

Izhodišče: Kronična bolezen, kot je sladkorna bolezen tipa 2 (SBT2), predstavlja za bolnika precejšnjo obremenitev. Za ustrezno vsakodnevno samooskrbo morajo biti sladkorni bolniki dobro usposobljeni in poučeni. Poznavanje bolezni omogoča bolniku, da deluje kot enakovreden partner pri vodenju in obvladovanju svoje bolezni.

Cilj: S študijo smo želeli oceniti stopnjo poznavanja SBT2 pri starejših sladkornih bolnikih v severovzhodni (SV) Sloveniji. Poleg tega smo želeli ugotoviti, ali obstajajo razlike v poznavanju bolezni med sladkornimi bolniki, ki živijo v mestu, in tistimi na podeželju.

Metode: Opravili smo presečno študijo starejših sladkornih bolnikov (starost ≥ 65 let), ki živijo v domu za ostarele in so obiskali družinskega zdravnika, specalistično ambulanto v bolnišnici ali specialistično zasebno prakso. Za zbiranje podatkov smo uporabili slovensko različico vprašalnika »Michigan Diabetes Knowledge test« . Statistično analizo smo opravili s pomočjo programske opreme IBM SPSS Statistics, različica 19.0.

Rezultati: 225 posameznikov je vrnilo vprašalnik, kar predstavlja 75-odstotno odzivnost. Nihče od anketiranih ni odgovoril pravilno na vseh 14 vprašanj. Povprečna dosežena ocena je 8,0±2,4 od 14. Povprečna ocena pri moških oziroma ženskah je 8,8±1,9 oziroma 7,6±2,5. V študiji ni statistično značilnih razlik v poznavanju bolezni med starejšimi, ki živijo v mestu, in bolniki s podeželja. Najpomembnejši parameter za dosego boljših rezultatov testa je stopnja izobrazbe.

Zaključek: Starejše osebe v SV Sloveniji izkazujejo relativno nizko raven splošnega poznavanja svoje bolezni. V skladu z Nacionalnim programom za obvladovanje sladkorne bolezni je potrebno večji poudarek nameniti sistematičnemu in stalnemu izobraževanju ter usposabljanju tako novo odkritih kot že obstoječih bolnikov s sladkorno boleznijo.

Abstract

Background: A chronic disease, such as diabetes, represents a substantial burden for the patient. In order to accomplish good self-care, patients need to be qualified and able to accept decisions and self manage the disease on a daily basis. A high level of knowledge about the disease empowers the patient to act as an equal partner in the management of the disease.

Aim: The aim of this study was to evaluate the level of knowledge and overall perceptions of diabetes Mellitus Type 2 (DM2) within the elderly population in North-East Slovenia. Moreover, we wanted to identify the differences in knowledge among the diabetic patients living in urban and rural areas.

Methods: A cross-sectional study of older (age ≥ 65 years), non-insulin dependent diabetes mellitus type 2 patients living in a nursing home, who visited a family physician, DM outpatient clinic or a private specialist practice, was conducted. The Slovenian version of the Michigan Diabetes Knowledge Test was used for data collection. Statistical analysis was performed using IBM SPSS Statistics software, version 19.0.

Results: A total of 225 individuals returned the questionnaire, which represents 75 % response rate. The average score was 8.0 ± 2.4. Not a single subject responded correctly to all 14 questions. The average score achieved by men and women was 8.8 ± 1.9 and 7.6 ± 2.5, respectively. There was no significant difference between the elderly living in urban and rural areas, and the level of education is the most important predictor for better results.

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Conclusion: Despite the various points of receiving information about the DM and its management, the elderly diabetic population in North-East Slovenia shows a low level of general knowledge about the disease. In line with the National Diabetes Prevention and Care Development Programme, an emphasis should be put on systematic and continuous education and empowerment of newly diagnosed as well as the existing patients with DM.

Background

Diabetes mellitus (DM) is a chronic disease that presents a major public health problem in the world. The total number of people with diabetes mellitus in the world is rising rapidly and according to International Diabetes Federation (IDF) data, the absolute number of diabetics in the EU-25 will rise from approximately 25 million in 2003 to 29 million in 2025. [1]

The global increase in diabetes is associated with many factors, starting with population ageing, unhealthy diets and inactive lifestyles that increase the tendency towards obesity of the population. In the industrialized countries, the prevalence of DM is higher in people > 65 years of age.[2,3] Slovenia does not differ from the comparable developed countries. There are 125,000 patients with diabetes (6.25 % of the population) and according to data from the National Institute of Public Health,[4] 22.2 % of the population over 75 years, and 16 % of the population aged 65 to 74 years have been diagnosed with diabetes. Due to the high incidence of DM, the National Diabetes Prevention and Care Development Programme was adopted in 2010. This Programme states: "At the centre of the attention is an empowered patient able to participate actively in the medical treatment process, able to assume full responsibility for his or her health and leading a quality and full life without diabetes complications." [5] Patient empowerment is the cornerstone of diabetes care and the basic assumption of empowerment is patient's knowledge about the disease and its complications. A chronic disease, such as diabetes, represents a substantial burden for the patient. On average, patients with diabetes think of their disease every twenty minutes, every day for the rest of their lives. [5,6]

Each day, patients are making decisions and are asking themselves about the factors that affect the treatment results. The medical personnel have little influence on the decisions that the patient makes between the doctors' visits. Therefore, life-long education on the disease, which provides knowledge, skills and confidence for the patient, are vital to good management of DM.[5,6]An overall beneficial effect of education among patients with diabetes has already been shown in several studies.[7,8,9] Optimal control of DM requires effective self-management in terms of diet, activity, foot care, medication adherence, and the complex nature of DM can present challenges to self-managing the disease well.[10,11] As studies show, empowered patients can achieve a better level of confidence on the basis of knowledge, experience and skills that will enable the decision on treatment in accordance with the objectives.[12-16]

Further, in addition to basic knowledge, which should be transmitted at diagnosis, diabetic patients need a regular, systematic education throughout their lives. This is to ensure the patient to maintain the basic level of knowledge and to be informed about the new principles and procedures in the treatment of diabetes. [17-22]

In Slovenia, in addition to health professionals, societies of patients with diabetes have been active for the last five decades with their primary goals being mainly raising awareness about DM, connecting patients towards a better quality of care. For many years they have been implementing an innovative project for raising awareness and destigmatising diabetes among the young in the form of competitions in knowledge about diabetes. However, to the best of our knowledge, no study to evaluate the general knowledge of patients with DM has been conducted previously in Slovenia.

Aim

The aim of the study was to evaluate the level of knowledge and overall perceptions

of DM within the elderly diabetic patients in Slovenia.

The research questions posed in this study were:

- What is the general knowledge about diabetes among diabetic patients aged 65 years and older?
- What is the difference in diabetes knowledge with respect to the education and place of living in terms of (1) diet, (2) HbA1c, (3) hypoglycaemia management, (4) activity, (5) effect of illness and infection on blood sugar levels, (6) foot care.

The following hypothesis was tested: The level of general knowledge about diabetes in the elderly population living in urban areas of Slovenia is higher than in those living in rural areas.

Methods

Study population

300 questionnaires were delivered to a diabetologic outpatient clinic, private specialist practice, family physician practice and a nursing home. According to the eligibility criteria, the study participants were non-insulin dependent patients with diabetes mellitus type 2 and ≥ 65 years of age in North-East Slovenia. The subjects were selected using a convenience sample of patients visiting physicians for their check ups. The time frame of data collection was May–August 2011.

Measurement

A cross sectional study about knowledge regarding diabetes, risk factors, signs and symptoms, and complications was conducted among patients in North-East Slovenia with diabetes mellitus type 2 that were older than 64 years.

The Michigan Diabetes Knowledge Test was used for data collection. After obtaining the approval by Michigan Diabetes Research Training Center (MDRTC) for using the Michigan Diabetes Knowledge Test, the Slovene version of the questionnaire was developed and validated. The Diabetes Knowledge Test (DKT) consists of 23 knowledge test items, which represent a test of general knowledge of diabetes. The first 14 items are appropriate for people who do not use insulin. The entire 23 items are applicable to people who do use insulin. For the purpose of this study the 14 item questionnaire was used, as one of the inclusion criteria was non-insulin dependence.

The general knowledge section has questions related to: (1) diet, (2) HbA1c, (3) hypoglycaemia management, (4) activity, (5) effect of illness and infection on blood sugar levels, and (6) foot care.

Scoring is done by summing the number of questions answered correctly. Higher scores mean that an individual has greater knowledge about diabetes and management of diabetes than those individuals who score lower on the instrument. The DKT can be self-administered. The cost was minimal because the copyrighted instrument is freely available with acknowledgement to the MDRTC. The Michigan Diabetes Research Training Center[23]states that this instrument should not be used to evaluate diabetes self--management education/training because the questions do not match item-to-item with diabetes self-management program educational components, but rather it should be used as a measure of general diabetes knowledge.

The questionnaire was forward-translated and back-translated by two independent translators, reviewed by two medical doctors and pre-tested on a convenience sample. The demographic variables were gathered using multiple-choice questions for gender, age, education, income and place of living.

After receiving administrative approval from the practices, the questionnaire was disseminated to a diabetologic outpatient clinic in Maribor (170), private specialist practice (30), family physician practice (50) and a nursing home (50). A convenience sample of diabetic patients ≥ 65 years of age was chosen. The nurses in the practices were asked to hand the questionnaire to patients that came into the practice. The patients filled out the questionnaire on the spot and returned it to the nurse, who collected the questionnaires.

Ethical considerations

This cross sectional study was carried out as a part of a wider study on patient reported outcomes of the elderly population with type 2 diabetes mellitus in Slovenia, which was approved by the National Medical Ethics Committee of the Republic of Slovenia.

Statistical analysis

Statistical analysis was performed using IBM SPSS (Statistical Package for the Social Sciences) statistics software, version 19.0. Univariate analysis was carried out on demographic and study variables to obtain standard descriptive statistics (mean, standard deviation, frequency and percentage).

Table 1: Demographic and health-related characteristics of the subjects.

	Urban n = 85	Rural n = 94	Mann-Whitney U Z	p
Age, number (%)				
65–69 years	27 (31.8)	34 (36.2)		
70–74 years	19 (22.4)	23 (24.5)		
75–79 years	21 (24.7)	20 (21.3)		
≥ 80 years	18 (21.2)	17 (18.1)	-0.378	0.706
Sex, number (%)				
Men	34 (40.0)	32 (34.0)		
Women	50 (58.8)	61 (64.9)		
N/A (missing)	1 (1.2)	1 (1.1)	0.695*	0.405*
Education, number (%)				
Primary school	22 (25.9)	53 (56.4)		
Secondary school	46 (54.1)	35 (37.2)		
Professional college	13 (15.3)	4 (4.3)		
Bachelor's degree	4 (4.7)	2 (2.1)		
Master's/Doctorate	0 (0.0)	0 (0.0)	-4.346	< 0.001
Duration of diabetes, number (%)				
0–5 years	19 (22.4)	16 (17.0)		
6–9 years	34 (40.0)	21 (22.3)		
≥ 10 years	31 (36.5)	54 (57.4)		
N/A (missing)	1 (1.2)	3 (3.2)	-2.548	0.011
Medicines per day, number (%)				
1	2 (2.4)	2 (2.1)		
2	7 (8.2)	7 (7.4)		
3	13 (15.3)	10 (10.6)		
4	16 (18.8)	16 (17.0)		
5 or more	46 (54.1)	58 (61.7)		
N/A (missing)	1 (1.2)	1 (1.1)	-1.017	0.309

** Pearson χ^2 was used instead of Mann-Whitney U test*

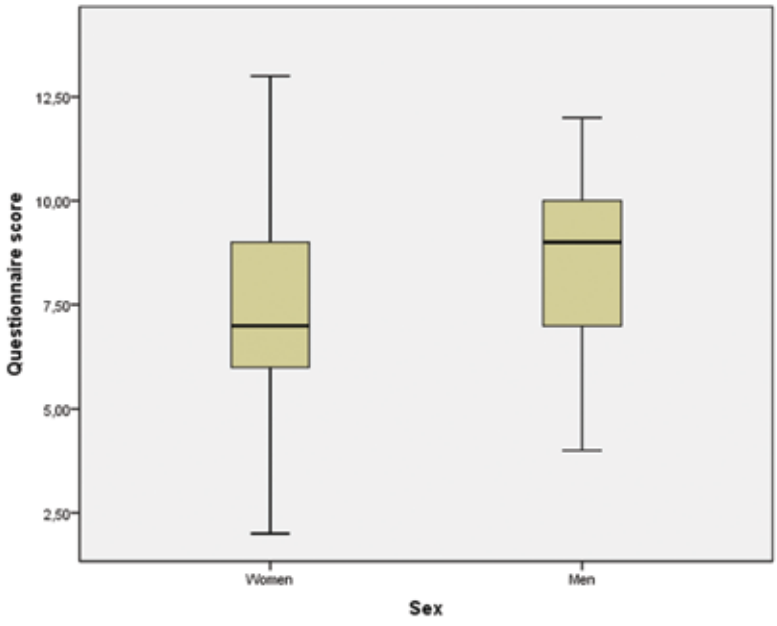

Figure 1: Boxplot of knowledge distribution between women and men.
Source: Authors own calculation

The Shapiro-Wilk test was used for testing whether the data came from a normally distributed population. The level of general and specific knowledge about diabetes in rural and urban areas was compared using the non-parametric Mann-Whitney U test for independent samples. All significance tests were two-tailed and a probability value of less than 0.05 was considered statistically significant. When multiple comparisons were performed, the statistical significance level was adjusted by using the Šidák correction. An exploratory linear regression model was used to assess the influence of different variables on the questionnaire score.

Results

A total of 225 individuals returned the questionnaire, which represents 75 % response rate. Out of these, 45 were excluded due to unmet age requirements, 1 questionnaire was excluded for being incomplete. After eliminating all responded questionnaires of the subjects that did not meet the eligibility criteria, 85 respondents were from urban area, and 94 came from rural area.

Demographic characteristics of the subjects and gender differences are shown in Table 1.

34 percent of the subjects were between 65 and 69 years of age. About 87 percent had studied up to high school, with 56.4 percent of those living in the rural areas finishing only primary school. Almost 58 percent of the subjects are taking 5 or more different medicines per day, and 47 percent of the subjects have been living with DM for 10 or more years.

The highest score obtainable if all questions were answered correctly was 14 points. However, not a single subject responded correctly to all 14 questions. The average score on the research questions regarding the general knowledge about diabetes among diabetic patients 65 years and older was

Table 2: The general knowledge according to place of living.

	Urban Score ± SD (median)	Rural Score ± SD (median)	Mann-Whitney U	
	n=85	n=94	Z	p
Diet	2.2 ± 0.9 (2)	2.2 ± 0.9 (2)	-0.15	0.886
HbA1c (level)	1.1 ± 0.7 (1)	1.0 ± 0.6 (1)	-1.62	0.102
Hypoglycemia management	0.5 ± 0.6 (0)	0.3 ± 0.5 (0)	-1.81	0.068
Activity	0.8 ± 0.4 (1)	0.8 ± 0.4 (1)	-0.38	0.719
Effect of illness and infection on blood sugar levels	0.6 ± 0.5 (1)	0.6 ± 0.5 (1)	-0.43	0.763
Foot care	0.9 ± 0.4 (1)	0.6 ± 0.5 (1)	-3.22	0.002*
Cumulative score	8.4 ± 2.3 (8)	7.7 ± 2.3 (8)	-1.90	0.057

** significant after Šidák correction (β = 0.007)*

8.0 ± 2.4. The analysis showed that the results differed between men and women. The average score achieved by men and women was 8.8 ± 1.9 and 7.6 ± 2.5, respectively. According to the Shapiro-Wilk test the scores from both groups were not from a normally distributed population: $D(111) = 0.975$, $p < 0.05$; $D(66)=0.944$, $p < 0.05$. The result of Mann-Whitney U test suggests that the differences in education level are statistically significant: $U = 2622$, $z = -4{,}35$ $p < 0.05$. Figure 1 shows the knowledge distribution between men and women.

The general knowledge segment has questions related to: (1) diet, (2) HbA1c, (3) hypoglycaemia management, (4) activity, (5) effect of illness and infection on blood sugar levels, (6) foot care. The results of the second research question with respect to the place of living are presented in Table 2.

To assess the influence of different variables on the questionnaire score, we used an

Table 3: Parameters of the multiple regression model.

	B	SE B	β
Step 1			
Constant	8.60	2.43	
Age	-0.05	0.03	-0.14
Education	0.93	0.23	0.32**
Place of living	-0.33	0.34	-0.07
Sex	0.49	0.34	0.11
Duration of illness	-0.03	0.22	-0.01
Medicines per day	0.31	0.14	0.15*
Step 2			
Constant	8.56	2.41	
Age	-0.05	0.03	-0.14**
Education	0.93	0.23	0.32
Place of living	-0.33	0.33	-0.07
Sex	0.49	0.34	0.11
Medicines per day	0.31	0.14	0.15*
Step 3			
Constant	7.63	2.21	
Age	-0.04	0.03	-0.12
Education	1.01	0.22	0.34**
Sex	0.49	0.34	0.11
Medicines per day	0.31	0.14	0.15*
Step 4			
Constant	8.60	2.43	
Age	-0.05	0.03	-0.15*
Education	1.07	0.21	0.37**
Medicines per day	0.31	0.14	0.15*

*R^2=0.20, *p< 0.05, **p< 0.01*

exploratory linear regression model. Due to the lack of previous research in Slovenia, we chose the meaningful variables based on our assumptions about their theoretical influence. For this reason, and to avoid the suppressor effect, we chose the backward stepwise method for building a linear regression model. The initially included variables were as follows: age, education, place of living, sex, duration of illness and number of medicines per day. The final model consisted of the following predictors: age, education and number of medicines per day. Model coefficients are presented in Table 3. B values represent the coefficients of a multiple regression equation ($Y=B_0+B_1X_1+B_2X_2+\ldots+B_nX_n + \varepsilon$). They are accompanied by their associated standard errors (SE B) and standardized versions of B coefficients (β), which are directly comparable, since they are not dependent on the units of measurement of variables in the regression equation.

The quality of the model is modest since it can only account for around 20 % of the variation in questionnaire score. However, in the final model we have three predictor variables that make a statistically significant contribution to the accuracy of prediction.

Discussion

In order to lay the groundwork for health education for emerging health problems, in this study, the elderly diabetic population of North-East Slovenia was surveyed regarding its level of knowledge and overall perceptions of diabetes. The results are somewhat surprising. As showed above, on average, the patients scored 8 point out of 14. This shows an overall poor knowledge of the elderly diabetic patients and raises concern about the involvement of patients in their disease management. However, the results demonstrate that the place of living does not influence the level of general knowledge, so the hypothesis that the elderly patients with type 2 diabetes living in urban area have better knowledge about the disease than those living in rural areas was rejected by our findings. This implies that the accessibility to health care services and diabetes educators does not differ a lot in North – East Slovenia. It would be worthwhile to conduct a study in other regions of Slovenia and get an interregional comparison of general diabetes knowledge among patients. Furthermore, knowledge among younger patients could be tested as well. According to the model, the level of education is the most important predictor while the contribution of age and number of medicines per day is roughly equal. We can also conclude that the age increase reflects negatively on the questionnaire result, while higher levels of education and medicine intake should result in better scores. We initially suspected that place of living should have a significant effect on the outcome; however it was excluded from the model after step 2.

Regarding chronic diseases such as diabetes, education is an essential component of any strategy aimed at disease control and prevention. Educating patients with diabetes is an integral part of providing health care and is one of the basic activities of healthcare teams. Our study focused on older patients, and the results show that almost 58 percent of the respondents are taking 5 or more different medicines per day. This indicates a high probability of adverse effects and therefore it is very important that the patients are well informed about the possible complications. In a study on self-reported understanding of DM and its treatment among the elderly subjects with DM, it was shown that despite high self-reported understanding of DM and its treatment, 24.5 % of subjects made at least one error with regard to their medication treatment. [24]

The United Kingdom Prospective Diabetes Study [25,26] showed that each 1 % reduction in haemoglobin A1C level was associated with a 37 % decrease in the risk of microvascular complications and a 21 % decrease in the risk of death related to diabetes, with no evidence of a threshold. The present study showed that knowledge of the elderly patients regarding classic symptoms of diabetes was limited, and that two thirds of the subjects were unable to answer the question on the meaning of HbA1c correctly. Research shows[25,26,27] that good blood sugar control correlates with lower risk of developing major related health problems,

such as cardiovascular diseases, kidney disease, eye disease, nerve damage, amputations and circulation problems. In order to reduce the burden of the chronic disease and be empowered for self-care, the DM patients should receive continuous education on the disease management. A patient with newly diagnosed DM receives initially a lot of information from the physician, nurse, DM education classes, as well as from pharmacists and other DM patients.[24] It is important that the patients understand the information obtained. Moreover, the type of knowledge they acquire is also important. Heisler et al.[28,29] show that knowing the HbA1c value correlates with better understanding of DM treatment. However this did not translate into the increased confidence and motivation to improve DM self-management.

Limitations of the study

The lack of a randomized sample and the use of a convenience sample limit the ability to generalize the results. Because the study was conducted in a single region of Slovenia, the limitation of the study is its lack of generalizability at the national level. Furthermore, only the elderly were included in the study while self management of the disease is also very important for younger patients. A larger sample would provide more power to detect significant relationships between the study variables and differences between groups.

Conclusion

The central objectives of this research were (1) to assess general population knowledge and perceptions of diabetes, and (2) to tease out whatever relationships exist between the various components of knowledge and socio-demographic background as well as people living in rural and urban areas. Despite the various sources of receiving information about the DM and its management, the elderly population in North-East Slovenia shows a low level of general knowledge about the disease. In line with the National Diabetes Prevention and Care Development Programme, an emphasis should be put on systematic and continuous education and empowerment of newly diagnosed as well as the existing patients with DM. A knowledgeable and empowered patient can enhance the self-care, avoid the complications and thus also have an impact on the health system by avoiding unnecessary complications and reducing damage. Further research is needed to evaluate the general knowledge of DM on the national level, and among younger diabetic patients, and to find ways of improving the empowerment of the patients.

Author contributions

ET and AI were responsible for the study conception and design. ET performed the data collection. ET and MP performed the data analysis and were responsible for the drafting of the manuscript. AI and VPR made critical revisions to the paper for important intellectual content. MP provided statistical expertise. AI and VPR provided administrative, technical or material support. AI supervised the study.

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Conflict of interest

No conflict of interest has been declared by the authors.

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