

Original article

Knowledge of Students in Health and Non-Health Studies about Diabetes Mellitus Type 1

Štefanija Kolačko^{1,2,3}, Antonio Kokot⁴, Nina Čuljak⁵, Jurica Predović^{1,2,4}, Martina Hrvačić¹, Franka Luetić⁶, Marko Bašković^{7,8}

1 University Hospital "Sveti Duh", Zagreb, Croatia

2 Faculty of Dental Medicine and Health Osijek, Josip Juraj Strossmayer University of Osijek, Osijek, Croatia

University of Applied Health Sciences, Zagreb, Croatia

4 Faculty of Medicine, Josip Juraj Strossmayer University of Osijek, Osijek, Croatia

5 Health Center Zaprešić, Zaprešić, Croatia

6 Health Center Zagreb – West, Zagreb, Croatia

7 Department of Pediatric Surgery, Children's Hospital Zagreb, Zagreb, Croatia

8 Scientific Centre of Excellence for Reproductive and Regenerative Medicine, School of Medicine, University of Zagreb, Zagreb, Croatia

*Corresponding author: Štefanija Kolačko, skolacko@kbsd.hr

Abstract

The aim of the research: The aim of this research paper is to examine and compare the knowledge of students in health and non-health studies about diabetes mellitus type 1. Namely, the research examined whether the respondents are sufficiently educated about the disease itself, treatment and preventive measures of diabetes type 1. Their knowledge was examined with regards to their age, gender and the type of studies they attend.

Respondents and methods: The research was conducted as a cross-sectional study. 101 respondents participated in the research. An anonymous online questionnaire was used as a measuring instrument, which was created for the purpose of this research. The research was conducted in July and August 2022.

Results: Most respondents have good knowledge about diabetes mellitus, which is evident in the correct answers to the questions in the survey questionnaire. Statistically, significant differences were found in the students' knowledge with regards to their age, gender and type of study. Respondents who participate in health studies have a higher level of knowledge than respondents who do not participate in health studies. Female respondents have a higher level of knowledge than male respondents. Older respondents also have greater knowledge about the disease itself.

Conclusion: Students who study health studies show a higher level of knowledge than students of other studies. Most of the respondents were well educated about type 1 diabetes mellitus. Diabetes is one of the biggest public health problems nowadays, and measures of prevention and education of the population should be implemented as much as possible in kindergartens, primary and secondary schools, colleges, hospitals, and the health system.

(Kolačko Š, Kokot A, Čuljak N, Predović J, Hrvačić M, Luetić F, Bašković M. Knowledge of Students in Health and Non-Health Studies about Diabetes Mellitus Type 1. SEEMEDJ 2023; 7(2); 57-65)

Received: Feb 21, 2024; revised version accepted: Jul 2, 2024; published: Jul 19, 2024

KEYWORDS: diabetes mellitus; students; type 1 diabetes

Introduction

Diabetes mellitus is a chronic metabolic disease caused by the interaction of hereditary and environmental factors that negatively affect the work of the pancreas, which then completely or partially stops producing the hormone insulin or insulin resistance occurs in the human body (1). As a result, hyperglycemia occurs, a condition of elevated blood glucose levels that can cause diabetic complications (2). Almost 50% of patients suffering from this disease will develop a serious complication during their lifetime (3, 4, 5). Some will lose their sight and others will develop end-stage kidney disease. The best control of the disease is achieved by applying appropriate therapy (6, 7, 8). The disease is widespread throughout the world and is considered to be a significant public health problem. The age limit of people suffering from diabetes is getting lower every year due to a fast and stressful lifestyle, lack of physical activity and consumption of unhealthy food (2). In addition to the aforementioned factors and genetic predisposition, there are other causes of the increase in the frequency of diabetes, one of which is the increase in life expectancy, which results in a greater proportion of elderly people in the population (9). It is extremely important to provide quality care for the sick, as well as to educate the sick and healthy population about diabetes (10, 11). The aim of this research was to examine the knowledge of health and non-health studies students about the disease type 1 diabetes, and to examine the differences in the knowledge of students regarding their age, gender and the type of study they are attending.

Respondents and methods

Structure of the study

For the purpose of this research, a cross-sectional study was conducted.

Respondents

Respondents in the research were health and non-health undergraduate students. The health study included students of the first year of

undergraduate nursing studies at the Faculty of Dental Medicine and Health, Pregrada, Josip Juraj Strossmayer University of Osijek. The non-health study included undergraduate students of the Faculty of Economics and Business, University of Zagreb. In the period from 1 July to 31 August 2022, the students filled out an online questionnaire anonymously via the link that had been sent to them. The limitations of the study are the relatively small number of respondents, which opens up opportunities for further research work with a larger number of respondents who do not attend any health studies.

Methods

The survey was conducted via a Google form, which was sent to a closed group that the students used to share information. An anonymous survey questionnaire, created for the purpose of this research, was used as a measuring instrument. Participation in the research was voluntary and anonymous. By filling out the questionnaire, the respondents also gave their consent to participate in the research. The questionnaire consisted of 16 questions to which multiple answers were offered. Out of the total of 16 questions, the first four related to general information about the respondents and the study they were attending, while the other 12 questions related to testing the knowledge about type 1 diabetes prevention measures.

Statistical methods

Categorical data were presented by absolute and relative frequencies. The Chi-square test was used to analyze the differences between proportions. All P values were two-sided. The level of significance was set at Alpha of 0.05. The statistical analysis was performed using the IBM SPSS 23.0 Statistics for Windows (IBM, United States of America).

Results

One hundred and one subjects participated in this research, 40 (39.6%) of which were male and 61 (60.4%) were female. In the conducted

research, there were 36 (35.6%) respondents aged 18–25, 41 (40.6%) respondents aged 26–35, 17 (16.8%) respondents aged 36–45 and seven (6.9%) respondents aged 46–55. Eighty (79.2%) respondents stated that they live in the city and 41 (40.6%) of respondents answered that they were studying in a health study. When asked how type 1 diabetes is treated, 10 (9.9%) respondents answered with oral hypoglycemic

agents, 69 (68.3%) respondents answered with insulin, while 22 (21.8%) respondents answered with a combination of insulin and oral hypoglycemic agents ($p < 0.001$). When asked what the most frequent symptoms of type 1 diabetes are, more than 80% of respondents answered that these are frequent urination and thirst (Table 1).

Table 1: Answers to the question “The most common symptoms of type 1 diabetes mellitus are:”

	N	%
Frequent urination	83	82.18
Thirst	86	85.15
Sudden weight loss	72	71.28
Weakness	50	49.5
Blurred vision	46	45.5
Nausea and vomiting	30	30

Table 2: Answers to the question “How many basic types of diabetes mellitus are there?”

			2 types	3 types	4 types	χ^2	p
Are you studying in health studies?	Yes	N	33	6	2	1,241	0.538
		%	80.5	14.6	4.9		
	No	N	44	14	2		
		%	73.3	23.3	3.3		

Table 3: Answers to the question “What is glycated hemoglobin HbA1c?”

			Three-month average of blood values	Blood sugar value measured on an empty stomach	Blood sugar value after eating	χ^2	p
Are you studying in health studies?	Yes	N	32	7	2	5.308	0.07
		%	78	17.1	4.9		
	No	N	36	12	12		
		%	60	20	20		

To the question that referred to the examination of the differences in the respondents' knowledge about the basic types of diabetes regarding the type of study, 80.5% of the respondents who attend health studies answered that there were two types of the disease, in contrast to 73.3% of respondents who do not attend health studies. Comparing the answers to the question about the basic types of diabetes in relation to the study participants, no statistically significant difference was found (Table 2).

Comparing the answers to the question about glycated hemoglobin HbA1c in relation to the study, the respondents studying in health studies have better knowledge about glycated hemoglobin (Table 3).

Comparing the answers to the question about the reference values of glycated hemoglobin regarding the type of study, it was noticed that the respondents studying in health studies have better knowledge about the reference values of glycated hemoglobin (Table 4).

Table 4: Answers to the question "What are the reference values of glycated hemoglobin HbA1c?"

			Below 4.5%	Below 6%	Below 8%	below 10%	χ^2	P
Are you studying in health studies?	Yes	N	5	22	10	4	3,706	0.295
		%	12.2	53.7	24.4	9.8		
	No	N	12	22	15	11		
		%	20	36.7	25	18.3		

Comparing the answers to the question about the recommended values of glucose in the blood regarding the sex of the respondents, a statistically significant difference was observed.

It was observed that female respondents have better knowledge about recommended blood glucose values compared to male respondents (Table 5).

Table 5: Answers to the question "The recommended fasting blood glucose value is:"

			4- 6mmol/L	5- 7mmol/L	6- 8mmol/L	χ^2	P
Sex	male	N	26	5	9	7,207	0.027
		%	65	12.5	22.5		
	female	N	53	4	4		
		%	86.9	6.6	6.6		

Table 6: Answers to the question "The most dangerous complication of diabetes mellitus type 1 is:"

			Hypoglycemia	Diabetic ketoacidosis	Hyperglycemia	χ^2	P
Age	18-40	N	11	22	7	11,357	0.003
		%	27.5	55	17.5		
	40-55	N	6	52	3		
		%	9.8	85.2	4.9		

By examining the differences in the respondents' knowledge about the most dangerous complication of type 1 diabetes regarding the age of the respondents, a statistically significant difference was observed. It was noticed that respondents aged 40–55 have better knowledge about the most dangerous complication of type 1 diabetes compared to respondents aged 18–40 (Table 6).

Discussion

The obtained results of the research confirmed that respondents who study in health studies are better acquainted with diseases than those who do not. Similar results were observed in a study conducted at the Ziauddin University in Karachi, Pakistan by Shadma, Tabind and Hemna. In the mentioned research, the knowledge of medical students about type 1 diabetes was compared. The average overall knowledge of medical students in the study was determined, while the students at clinical level of the study had better knowledge compared to those at pre-clinical levels. Similar results were observed among Pakistani nurses (12, 13).

In response to the question about the types of diabetes, the obtained results show that more respondents who do not participate in health studies answered this question incorrectly. This problem of ignorance regarding the disease itself could be solved by more frequent education of health personnel, hospitalized patients, patients in day hospitals, clinics and health centers (14, 15, 16).

Answers to questions about blood glucose values were compared with the gender of the subjects. It was noticed that more female than male respondents answered correctly. As previously stated, hypoglycemic events are associated with adverse effects on cognitive function and are linked to 4–10% of deaths associated with type 1 diabetes, so it is extremely important that patients, their families and others involved in treatment know the values of hypoglycemia in order to react in a timely manner (17).

The results obtained in the research we conducted in Zagreb show that respondents

who participate in health studies have better knowledge about the HbA1c screening than respondents who do not participate in health studies. It is extremely important for the population to know what this test is. It is one of the first things a patient should do if they start to feel some of the symptoms of diabetes, such as frequent urination, thirst and fatigue (18, 19, 20).

When asked what the reference values of HbA1c are in relation to the type of study, respondents studying in health studies showed better knowledge – twenty-two (53.7%) respondents studying in health studies answered correctly, i.e. that the reference values are below 6%, while twenty-two of them (36.7%) who are not participating in health studies answered the same. The importance of reducing glycated hemoglobin is best demonstrated by the fact that lowering glycated hemoglobin by 1% reduces total mortality by 21%, i.e. mortality from microvascular complications of diabetes by 37% and from myocardial infarction by 14% (21, 22, 23).

The American Diabetes Association (ADA) defines the education for people with diabetes as a process of acquiring knowledge, skills and competences, the long-term goal of which is to train participants for adequate self-care of diabetes (24, 25).

It is believed that proper diet, education and physical activity can greatly reduce the probability of diabetes and many other diseases. Similar results to our study were observed in a study at the Ziauddin University in Karachi, Pakistan conducted by Shadma, Tabind and Hemna. A total of 366 subjects participated in the mentioned research, 145 of which (39.6%) were from a preclinical level and 221 (60.4%) from a clinical level of subjects. As an answer to the question related to disease prevention, 89% of the clinical group knew that diabetes can be prevented and the same number of students (89%) believed that there is a role of exercise in prevention, while almost half of the preclinical students (49%) had no idea about prevention and almost the same number of students (44%) did not know about the role of exercise in disease prevention ($p < 0.001$). On the other hand, research conducted in America showed that

only 31% of non-diabetic health workers were aware of the role of exercise in prevention, which indicates ignorance about the key role of exercise in disease prevention (26, 27, 28).

The increasing prevalence of diabetes requires targeted screening to detect diabetes and prediabetes in at-risk groups. This is the basis for early measures to prevent diabetes in these groups and to delay the progression of diabetes (29).

Conclusion

The respondents who are students in health studies show better knowledge about diabetes type 1 than the respondents who do not study in health studies, as shown by the results: 80.5% of respondents who participate in health studies correctly answered the question about the basic types of diabetes type 1, while fewer

respondents, 73 of them (3%) who are not studying in health studies answered the question correctly. There is a significant difference in the knowledge of all respondents involved in the research according to age and gender, with female respondents and elderly respondents showing a higher level of knowledge about type 1 diabetes.

Most of the respondents who were involved in the conducted research were well educated about the disease and treatment of type 1 diabetes. Research shows that education about available resources, adherence to given recommendations and regular use of prescribed therapy are extremely important for patients.

Acknowledgement. None.

Disclosure

Funding. No specific funding was received for this study.

Competing interests. None to declare.

References

LITERATURE

1. Petrač D, Bergovec M, Božikov V, Delić-Brkljačić D, Galesić K, Grbac I et al. Internal medicine. Zagreb: Medicinska naklada; in 2019
2. Bralić Lang V. Diabetes – essential news for care in family medicine. Med Fam Croat. 2019;27(1-2):33-40.
3. Batičić L, Ivanović L, Grčić A., Pernjak Pugel E, Varljen J, Detel D. Diabetes and DPP IV/CD26 inhibitors. Medicine Fluminensis. 2019;55(3):200-14.
4. Andreis I, Jalšovec D. Anatomy and physiology, 2nd ed. Zagreb: School book; 2015
5. Jennings RE, Berry AA, Strutt JP, Gerrard DT, Hanley NA. Human pancreas development. Development. 2015;142(18):3126-37.
6. International Diabetes Federation. IDF Diabetes Atlas 2019. Brussels, Belgium: International Diabetes Federation; in 2019
7. Poljičanin T, Švajda M. National register of people with diabetes CroDiab – report for 2019. Zagreb: Croatian Institute for Public Health; in 2020
8. Petersmann A, Müller-Wieland D, Müller U, Landgraf R, Nauck M, Freckmann G et al. Definition, Classification and Diagnosis of Diabetes Mellitus. Exp Clin Endocrinol Diabetes. 2019; 127:1-7.
9. American Diabetes Association. Diagnosis and classification of diabetes mellitus. Diabetes Care. 2014;37(1):81-90.

10. Shadma M, Tabinda A, Hemna S. Knowledge of medical students regarding Diabetes mellitus at Ziauddin University, Karachi. *J Pak Med Assoc.* Vol. 59, No. 3, March 2009, 163-6.
11. DiMeglio LA, Evans-Molina C, Oram RA. Type 1 diabetes. *Lancet.* 2018;391(10138):2449-62.
12. Mayfield J. Diagnosis and classification of diabetes mellitus: new criteria. *Am Fam Physician.* 2018;58(6):1355-62.
13. Stratton IM, Adler AI, Neil HAW, Matthews DR, Manley SE, Cull CA et al. Association of glycemia with macrovascular and microvascular complications of adults with type 2 diabetes (UKPDS 35): prospective observational study. *BMJ.* 2000; 321:405-21.
14. Piljac A, Metelko Ž. Insulin therapy in the treatment of diabetes. *Medix.* 2009; 15: 116-21.
15. R. Živković, Diabetes mellitus, manual for diabetes patients, Školska knjiga, Zagreb, 2006.
16. Atkinson MA, Eisenbarth GS. Type 1 diabetes: new perspectives on disease pathogenesis and treatment. *Lancet.* 2017;358(9277):221-9.
17. Codella R, Terruzzi I, Luzi L (2017). Why should people with type 1 diabetes exercise regularly? *Acta Diabetologica.* 54:615-30.
18. Papatheodorou K, Banach M, Edmonds M, Papanas N, Papazoglou D. Complications of Diabetes. *J Diabetes Res.* 2015:189525.
19. Chinese Diabetes Society; National Office for Primary Diabetes Care: National guidelines for the prevention and control of diabetes in primary care, *Zhonghua Nei Ke Za Zhi*, 2018.
20. Marušić M, et al. Introduction to scientific work in medicine. 4th ed. Textbook. Zagreb: Medicinska naklada; in 2008
21. Miolski J, Ješić M, Zdravković V. "Complications of type 1 diabetes mellitus in Children", *Medical youth*; 2020, 71(3):49-53.
22. Auer, RN, Hypoglycemic brain damage. *Metab. Brain. Dis.* 19 2004, 169-75
23. Lachin, JM, Genuth, S, Nathan DM, Zinman, B, Rutledge, B N. Effect of glycemic exposure on the risk of microvascular complications in the diabetes control and complications trial — revisited. *Diabetes* 2008; 57: 995-1.
24. Kharono B, Nabisere R, Nabyonga KP, Nakakeeto J, Openy A, Kitakaa SB; Knowledge, Attitudes, and Perceived Risks Related to Diabetes Mellitus Among University Students in Uganda: A Cross-Sectional Study; *East African Health Research Journal.* 2017. | Volume 1 | Number 2; 105-11.
25. Powers MA, Bardsley J, Cypress M, Duker P, Funnell MM, Fischl AH et al. Diabetes Self-management Education and Support in Type 2 Diabetes: A Joint Position Statement of the American Diabetes Association, the American Association of Diabetes Educators, and the Academy of Nutrition and Dietetics. *Diabetes Care.* 2017; 43:40-53.
26. Al-Mahrooqi B, Al-Hadhrami R, Al-Amri A, et al. Self-reported knowledge of diabetes among high school students in Al-Amerat and Quriyat, Muscat Governorate, Oman. *Sultan Qaboos Univ Med J.* 2013;13(3):392-8.
27. Stetoskop.info.; Diabetes type 1 - diabetes mellitus (sugar disease); Available at: <https://www.stetoskop.info/hormonski-poremecaji-i-poremecaji-metabolizma/diabetes-mellitus-secerna-bolest-tip-1>; Date of access: 27.8.2022.

28. Laffel, L M. et al. General quality of life in youth with type 1 diabetes: relationship to patient management and diabetes-specific family conflict. *Diabetes Care*. 2003;26:3067-73.

29. Harreiter J, Roden M. Diabetes mellitus: definition, classification, diagnosis, screening and prevention. *Wien Klin Wochenschr*. 2023; 135:7-17.

Author contribution. Acquisition of data: KŠ, KA, ČN, PJ, HM
Administrative, technical or logistic support: KŠ, KA, ČN, PJ, HMBM
Analysis and interpretation of data: KŠ, KA, ČN, PJ, HM, BM
Conception and design: KŠ, KA, ČN, PJ, HM
Critical revision of the article for important intellectual content: KŠ, KA, ČN, PJ, HM, BM
Drafting of the article: KŠ, KA, ČN, PJ, HM, BM
Final approval of the article: KŠ, KA, ČN, PJ, HM, BM
Guarantor of the study: KŠ, KA, ČN, PJ, HM
Provision of study materials or patients: KŠ, KA, ČN, PJ, HM
Statistical expertise: KŠ, KA, ČN, PJ, HM, BM

Znanje studenata zdravstvenih i ne-zdravstvenih studija o dijabetesu melitusu tipa

1

Cilj istraživanja: Cilj ovoga istraživačkog rada je ispitati i usporediti znanje studenata zdravstvenih i nezdravstvenih studija o dijabetesu melitusu tipa 1. Istraživano je jesu li ispitanici dovoljno educirani o samoj bolesti, liječenju i preventivnim mjerama dijabetesa tipa 1. Njihovo znanje ispitano je s obzirom na dob, spol i vrstu studija koje pohađaju.

Ispitanici i metode: Istraživanje je provedeno kao presječna studija. U istraživanju je sudjelovao 101 ispitanik. Kao mjerni instrument korišten je anonimni on-line upitnik, koji je kreiran za potrebe ovog istraživanja. Istraživanje je provedeno u srpnju i kolovozu 2022. godine.

Rezultati: Većina ispitanika ima dobro znanje o dijabetesu melitusu, što je vidljivo iz točnih odgovora na pitanja u anketnom upitniku. Statistički značajne razlike utvrđene su u znanju studenata s obzirom na dob, spol i vrstu studija. Ispitanici koji pohađaju zdravstvene studije imaju višu razinu znanja od ispitanika koji ne studiraju na zdravstvenim studijima. Ženski ispitanici imaju višu razinu znanja od muških ispitanika. Stariji ispitanici također imaju veće znanje o samoj bolesti.

Zaključak: Studenti koji studiraju na zdravstvenim studijima pokazuju višu razinu znanja od studenata drugih studija. Većina ispitanika bila je dobro educirana o dijabetesu melitusu tipa 1. Dijabetes je jedan od najvećih javnozdravstvenih problema danas, te bi mjere prevencije i edukacije stanovništva trebale biti što je moguće više implementirane u vrtiće, osnovne i srednje škole, fakultete, bolnice i zdravstveni sustav.