



УДК 616.679-008.64:614.212
DOI 10.24144/1998-6475.2023.60.29-35

PSYCHO-EMOTIONAL STATE OF PATIENTS WITH TYPE 2 DIABETES MELLITUS - BASED ON THE EXPERIENCES OF A REPRESENTATIVE SURVEY IN HUNGARY

Reho O. Yu.¹, Székely A. Jr.², Rohach I. M.¹, Székely A.³, Susánszky É.⁴, Purebl Gy.⁴

¹ Uzhhorod National University, Medical Faculty, Department of Social Medicine and Hygiene

² Végeken Egészségpszichológiai Alapítvány (Végeken Health Psychology Foundation)

³ Maria Kopp Institute for Demography and Families (KINCS)

⁴ Institute of Behavioral Sciences, Semmelweis University

Abstract. *Introduction.* Type 2 diabetes mellitus (T2DM) is one of the most common chronic diseases in the world. Its metabolic etiology and the multicomponent nature of its manifestations provoke the emergence of various complications, one of which is the risk of psychoemotional and cognitive changes. By modern reforms and the expansion of primary care functions, family doctors should be primarily responsible for the prevention and early detection of both the disease and its complications. However, this raises a number of problems that need to be scientifically addressed: insufficient staffing of family doctors, unclear hierarchy and distribution of treatment and prevention functions between primary and secondary care, unclear distribution of financial and technical support, insufficient number of sensitive and specialized screening methods for early diagnosis and clear algorithms for further management and routing of patients with complicated type 2 diabetes. That is why we consider it expedient to constantly analyze the current state of the current problems and ways to overcome them on the example of different countries, namely, in this article on the example of Hungary.

Aim. To introduce the work of a primary care physician in the quality of medical care for patients with type 2 diabetes mellitus in Hungary. Furthermore to assess the relationship between type 2 diabetes and its psychoemotional aspects, factors that have a potential impact on the quality of life of patients by processing the results of the Hungarostudy-2021 national survey.

Materials and methods. We conducted a literature review and statistically processed the database of the Hungarostudy 2021 (HS2021), a study of the Hungarian adult population, which included a sample of 7000 respondents aged 18 to 97 years, including a subgroup of 333 patients with type 2 diabetes. We used IBM SPSS Statistics 26 statistical software to analyze the data.

Results. After analyzing the data from the HS2021, a national large-scale population survey of Hungary, we found the relationship between the influence of various medical and social factors and the manifestations of type 2 diabetes, namely that: patients diagnosed with type 2 diabetes had a significantly higher body mass index (BMI) and were less physically active compared to people without diabetes. They also had higher levels of depressive symptoms, lower levels of subjective well-being, and more somatic symptoms. They had lower coping skills, lower life satisfaction, however lower emotional eating. They also had lower levels of education and tended to be older.

Conclusions. The association of type 2 diabetes mellitus and psychoemotional complications, which reduce patient satisfaction and quality of life, complicating the entire treatment process, was found to be significant. According to the experience of European countries, the primary healthcare level is the first point of contact where it is possible to effectively influence this problem. And since the expansion of its functions, the family doctor has become a key person in improving the provision of medical care to patients with type 2 diabetes and its psycho-emotional complications in accordance with the priority areas of prevention and early diagnosis, integration of the latest technologies, individualized and patient-centered care and an integrated approach to solving medical and social issues, freeing up more opportunities for high-quality and innovative work of endocrinologists.

Key words: type 2 diabetes mellitus, Hungarostudy2021 survey, Hungarian health care system, psycho-emotional complications of diabetes, quality of life of diabetes patients, primary care, socio-medical impact of diabetes



Психо-емоційний стан хворих на цукровий діабет 2 типу – на основі досвіду репрезентативного опитування в Угорщині

Реґо О.Ю., Сикель А. (молодший), Рогач І.М., Сикель А. (старший), Шушанські Є., Пуребл Д.

Резюме. *Вступ.* Цукровий діабет 2 типу (ЦД2) є одним з найпоширеніших хронічних захворювань в Світі. Його метаболічна етіологія та полікомпонентність його проявів, провокує появу різноманітних ускладнень, одними з яких є ризик прояву психоемоційних та когнітивних змін. Першочергово профілактикою та раннім виявленням як і самого захворювання так і його ускладнень, відповідно до сучасних реформ та розширення функцій первинної ланки, має займатись сімейний лікар. Однак це викликає ряд проблем, які потребують науково обґрунтованого вирішення: недостатність кадрового забезпечення сімейними лікарями, не зрозумілість ієрархії та розподілу лікувально-профілактичних функцій між первинною та вторинною ланкою, нечіткість розподілу фінансового та технічного забезпечення, не достатня кількість чутливих та спеціалізованих скринінгових методів ранньої діагностики та чітких алгоритмів подальшого менеджменту та маршрутизації пацієнтів з ускладненим цукровим діабетом 2 типу. Саме тому вважаємо доцільним постійно аналізувати сучасний стан актуальних проблем та шляхів їх подолання на прикладі різних країн, а саме в цій статті на прикладі Угорщини.

Мета дослідження. Ознайомити з роботою лікарів первинної ланки по якісному наданню медичної допомоги хворим на цукровий діабет 2 типу в Угорщині; а також, оцінити взаємозв'язок між цукровим діабетом 2 типу та його психоемоційними аспектами, факторами, що мають потенційний вплив на якість життя пацієнтів, шляхом опрацювання результатів загальнонаціонального дослідження Hungarostudy-2021.

Матеріали та методи. Було проведено огляд літератури, статистично опрацьовано базу даних дослідження Hungarian Study 2021 (HS2021), проведеного серед дорослого населення Угорщини, що включала вибірку із 7000 респондентів віком від 18 до 97 років, серед яких була підгрупа хворих на цукровий діабет 2 типу чисельністю 333 особи. Для аналізу даних ми використовували статистичне програмне забезпечення IBM SPSS Statistics 26.

Результати досліджень. Після аналізу даних з бази національного широкомасштабного опитування населення Угорщини Hungarian study - 2021 виявили взаємозв'язки впливу різних медико-соціальних факторів з проявами діабету 2 типу, а саме, що: пацієнти з діагнозом діабету II типу мали значно вищий індекс маси тіла (ІМТ) і займалися меншою фізичною активністю порівняно з особами без діабету. Вони також мали вищий рівень депресивних симптомів, нижчий рівень суб'єктивного благополуччя та більше функціональних соматичних симптомів. Мали нижчу здатність до подолання труднощів, нижчу задоволеність життям і нижчий рівень емоційного харчування. Вони також мали нижчий рівень освіти і, як правило, були старшого віку.

Висновки. Вагомим виявився зв'язок цукрового діабету 2 типу та психоемоційних ускладнень, що знижують задоволеність та якість життя пацієнтів, ускладнюючи весь процес лікування. Згідно з досвідом європейських країн, першочерговою ланкою де є можливість ефективно вплинути на цю проблему є – первинна ланка. А сімейний лікар, з моменту розширення його функцій, став ключовою особою в сфері покращення надання медичної допомоги хворим на цукровий діабет 2 типу та його психоемоційних ускладнень відповідно до пріоритетних напрямків профілактики та ранньої діагностики, інтеграції новітніх технологій, індивідуалізованої та пацієнтоорієнтованої допомоги та комплексного підходу до вирішення медико-соціальних питань, вивільнивши більше можливостей для якісної та новітньої роботи ендокринологів.

Ключові слова: цукровий діабет 2 типу, дослідження Hungarostudy2021, система охорони здоров'я Угорщини, психоемоційні ускладнення діабету, якість життя хворих на діабет, первинна медична допомога, соціально-медичні наслідки діабету

Introduction

The prevalence of type 2 diabetes mellitus (T2DM) is growing rapidly, with 10.5% of the world's adults currently living with diabetes, which threatens not only the health and lives of individuals but also the sustainability of public health and economic development (1). Since

diabetes is a global problem, we believe it is appropriate to analyze the state of its prevalence and experience in combating the disease and its complications in different countries in order to create scientifically sound and effective recommendations in the future. The current state of diabetes prevalence is presented in Table 1 (1).

Table 1.

Prevalence of diabetes in Europe, Hungary and Ukraine according to IDF Atlas 2021

	Europe	Hungary	Ukraine
Number of adults 20–79 years with diabetes in 1,000s (95% confidence interval)	61,425.1 (47,459.9- 69,888.4)	661.4 (523.3- 865.6)	2,325.0 (2,101.7- 2,492.6)
Diabetes prevalence (%) in adults 20–79 years (95% confidence interval)	9.2 (7.1-10.4)	9.1 (7.2-11.8)	7.1 (6.4-7.6)

According to the Hungarian Central Statistical Office (KSH), in 2019, over 1.1 million adults and 5,000 children in Hungary were diagnosed with diabetes. Additionally, in the same year, the mortality rate attributable to diabetes was

62.7 per 100,000 individuals, with 29.3 among men and 33.4 among women. Figure 1 shows the dynamics of growth of diabetes patients registered with family doctors (2, 3).

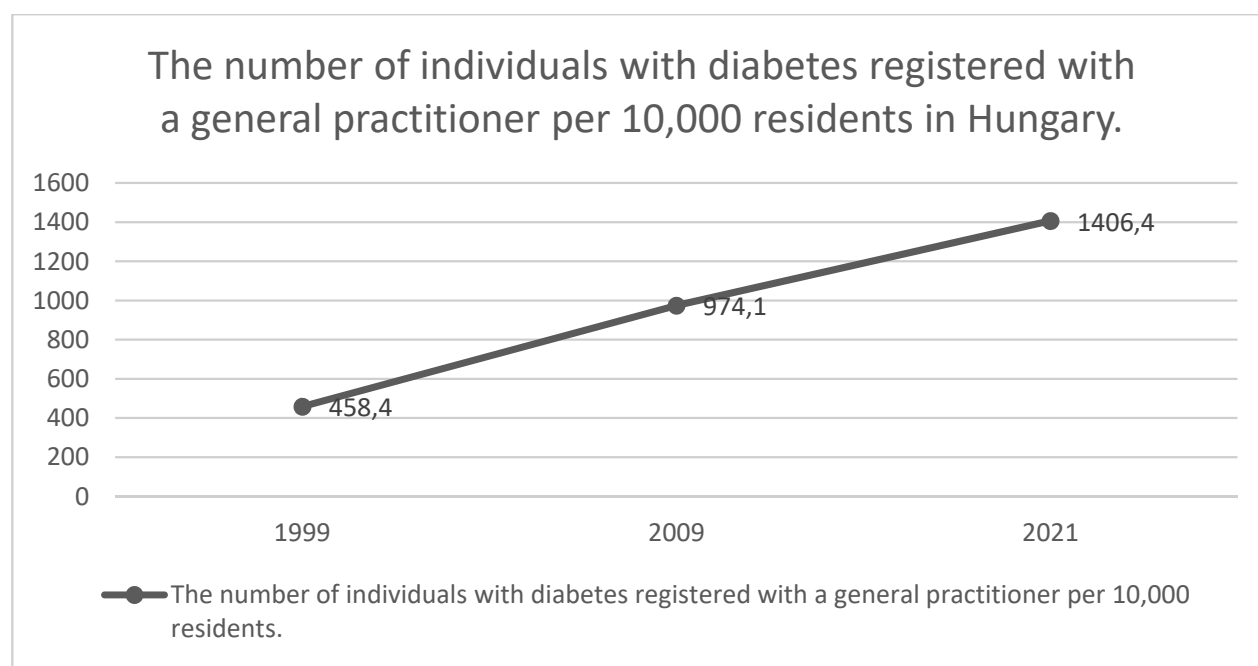


Figure 1. Dynamics of the number of people with diabetes registered with a general practitioner per 10,000 residents in Hungary.

Undoubtedly, the high level of morbidity (Figure 1) from diabetes causes an increased burden on the country's health care system, which, in the context of modern reforms and functioning of health care, requires attention and effective action primarily from family doctors. However, this raises a new problem - the shortage of family doctors, which significantly complicates the provision of effective, continuous and accessible primary health care. While the number of cases is rising, the number of people per GP remains the same. As of 2021, there are 5807 general practitioners (pediatric and adult)

in Hungary, and the number of people per family doctor is 1669 (4).

Treatment of T2DM and its complications is multifaceted and requires a comprehensive approach. The importance of primary care in the management of T2DM cannot be overemphasized. General practitioners (GPs) are often the first point of contact for patients and play a crucial role in early detection, treatment and referral to specialized services when necessary. In Hungary, the need to strengthen the role of GPs in the management of T2DM has led to several initiatives, including an EU-funded



pilot program to establish GP clusters (EFOP 1.8.0.-VEKOP 17.-2017-00 001 B). The result of this program was the development of a model of chronic care for adult patients with diabetes within the clusters of GPs. This model was based on both Hungarian and ADA-EASD (American Diabetes Association-European Association for the Study of Diabetes) consensus guidelines for diabetes care. It aimed to provide family physicians with practical tools for implementing evidence-based medicine in the prevention and treatment of type 2 diabetes (5).

In this pilot study, general practitioners in Hungary formed clusters to provide preventive services. These clusters were responsible for screening, health education, and chronic care of patients with type 2 diabetes and prediabetes. Standardized, evidence-based services were provided during prevention consultation hours. These services included: routine screening for T2DM in high-risk groups; health education with a focus on lifestyle modifications such as diet and physical activity; regular monitoring and control of blood glucose levels; timely detection and treatment of complications; and referrals to specialists when necessary (6).

Despite the structured approach, several challenges faced by GPs were found at the general practice level. These include limited resources and staffing; patients' non-compliance with recommendations for lifestyle changes and medication; coordination between different levels of care. Continuous evolution and adaptation of the chronic care model can further improve the effectiveness of T2DM treatment in general practice. Telemedicine, patient-centered care, and strengthening of multidisciplinary approaches are some of the areas that require special attention (5, 6).

It is scientifically proven that type 2 diabetes mellitus is a multicomponent metabolic disease with a high risk of developing various micro- and macrovascular complications in all body systems. (7-13). However, psycho-emotional and cognitive complications are among the least studied, but no less important. (14-16) In a study conducted in Hungary, found that individuals with diabetes have significantly poorer quality of life indicators compared to the non-diabetic population, highlighting the importance of incorporating behavioral medicine methods to improve quality of life in diabetes care (17).

The aim of one Hungarian study was to investigate the relationship between diabetes

complications and depressive and anxiety symptoms among patients with type 2 diabetes in the practice of family physicians. The study found a significant association between diabetes complications and various factors, such as older age, less physical activity, higher BMI, insulin therapy, higher HbA1c levels, higher creatinine and urea concentrations, and worse depressive and anxiety symptoms. Multivariate analysis revealed that diabetes complications, along with certain socio-demographic factors (female gender, lower education level, and rural residence), were determinants of higher BDI (Beck Depression Inventory) and HAM-A (Hamilton Anxiety Scale) scores. This suggests that patients with diabetes complications have a higher prevalence and severity of depressive and anxiety symptoms. The results support the recommendation that patients with type 2 diabetes should be screened for mood disorders, especially in the presence of complicated forms of diabetes (18).

The aim of the paper

To introduce the work of a primary care physician in the quality of medical care for patients with type 2 diabetes mellitus in Hungary. Moreover, to assess the relationship between type 2 diabetes and its psychoemotional aspects, factors that have a potential impact on the the quality of life of patients by processing the results of the Hungarian study-2021 national survey.

Materials and methods

The research involved a review of the literature of foreign sources, a systematic approach and analysis, bibliosemantic, medical and statistical, and social methods. The Hungarostudy 2021 (HS2021) database was used to find the relationship between type 2 diabetes and psychoemotional complications among the Hungarian adult population. A representative sample of 7000 people, weighted by sex, age, and county, participated in the HS2021 study. The age range of participants was from 18 to 97 years, with an average age of 48.42 (SD=17.44). In terms of gender, 3279 participants (46.8%) were male, and 3721 participants (53.2%) were female. Data collection was conducted via face-to-face interviews during the summer of 2021 using specialized questionnaires. The sample was selected using a two-stage, proportionally stratified, probability sampling design and is representative of the Hungarian population in terms of sociodemographic characteristics. The

study was conducted in collaboration between Semmelweis University's Behavioral Sciences Institute and the Kopp Mária Institute for Population and Families (KINCS) (19). Among the participants included in the Hungarostudy 2021 sample, a subset of 333 individuals had Type II Diabetes. The average age in this subgroup was 63.68 (SD=11.86) years, with an age range from 20 to 97 years. The gender distribution within this subset included 115 males (34.6%), and 218 females (65.4%). The non-diabetic sample had 6592 individuals, with the average age of 47.66 (SD=17.32), and the age range from 18 to 97. The non-diabetic sample included 3146 males (47.7%) and 3447 females (52.3%).

During the data collection process, any distortions that occurred were corrected using a multi-criteria, iterative weighting procedure. The multi-criteria weighting process involved adjusting distortions related to major socio-demographic variables by comparing the collected data with the 2016 Mikrocensus data for the population aged 18 and above. This allowed for corrections to be made based on the socio-demographic characteristics such as gender, age, type of settlement, and educational attainment (19). For the analyses, we used IBM SPSS Statistics 26 software. To compare the type 2 diabetic and non-diabetic samples, we used the Mann-Whitney U test. The reason for using the non-parametric Mann-Whitney test was that in some cases the variable was ordinal and in no instance did the scale scores show a normal distribution. For the same reason we interpreted the results of the Mann-Whitney tests by comparing the medians of the groups. This helped us understand the main tendencies and see if there were any significant differences.

Results and discussion

As expected, individuals diagnosed with Type II diabetes showed a significantly elevated Body Mass Index (BMI), with a median of 28.96 compared to 25.39 in the non-diabetic cohort ($U = 625,743.5$, $p < 0.001$). This finding suggests a noteworthy association between Type II diabetes and higher BMI. Furthermore, individuals with Type II diabetes engaged in significantly less physical activity. The median physical activity score stood at 1 for this group, as opposed to 2 among the non-diabetic individuals ($U=858,977$, $p<0.001$), highlighting a possible connection between reduced physical activity and the onset of Type II diabetes.

Moving to mental health parameters, self-reported depressive symptoms were found to be more prevalent among individuals with Type II diabetes. This was shown by a median Beck Depression Inventory (BDI) score of 4.44, which contrasts sharply with a median score of 0 among non-diabetic individuals ($U = 955,478.5$, $p < 0.001$). Additionally, the Well-Being Index-5 (WBI-5) results indicated a lower sense of subjective well-being in the diabetic cohort. The median WBI-5 score was 10 among individuals with Type II diabetes, compared to 11 among non-diabetic individuals ($U = 734,107$, $p < 0.001$), suggesting a potential psychological burden associated with the disease.

Next, it is important to address the findings from the PHQ-14 scale, which demonstrated that individuals with Type II diabetes experience a higher prevalence and severity of functional somatic symptoms. The median score was 8 for individuals with Type II diabetes, as opposed to 2 for non-diabetic individuals ($U=540,015$, $p<0.001$), which may reflect the physical strain and stress associated with managing the condition.

In terms of coping capacities and sense of coherence, as measured by the Sense of Coherence Scale (19), individuals with Type II diabetes recorded significantly lower scores, with a median score of 9, compared to 10 for non-diabetic individuals ($U=864,655$, $p<0.001$). This shows a diminished ability to perceive life as comprehensible, manageable, and meaningful, which may be impacted by the challenges of living with a chronic condition. Notably, life satisfaction showed a significant difference between the groups, with non-diabetic individuals reporting higher levels of life satisfaction compared to those with Type II diabetes ($U=879,893$, $p<0.001$).

In terms of eating behavior, the Three-Factor Eating Questionnaire (TFEQ-R6) revealed a lower propensity towards emotional eating among individuals with Type II diabetes, with significantly lower scores on this measure ($U = 1,021,831$, $p < 0.001$).

Regarding educational attainment, individuals with Type II diabetes had significantly lower levels ($U=1,016,352.5$, $p<0.001$). Furthermore, the age demographic demonstrated that the median age among individuals with Type II diabetes was significantly higher at 65 years, compared to 47 years among non-diabetic individuals ($U=540,015$, $p<0.001$).



Conclusions

Expanding the functions of family physicians has become a primary challenge for the health care system, as they are the main managers of human health and play a crucial role in the prevention and treatment of various chronic diseases, including type 2 diabetes and its complications. The aging of the population, rising levels of obesity and physical inactivity, non-compliance with the basic principles of healthy and balanced nutrition, and an increased level of stress impulses in the daily routine actively contribute to the growth of type 2 diabetes mellitus and are also among the main factors in the occurrence of psycho-emotional complications in this cohort of patients (20, 21). The fact that there is a high risk of developing such complications in patients with type 2 diabetes is confirmed by the analysis of the Hungarian study-2021 survey results.

The experience of Hungary, as one of the neighboring European countries where the Hungarian Family Physicians' Cluster pilot program

was implemented (5, 6), which contributed to the development of a new model of chronic treatment of type 2 diabetes, is very important for the further formation and development of effective and accessible recommendations to address problematic issues in the process of providing medical care to patients with type 2 diabetes in the primary care setting.

Overall, these findings provide valuable insights into the multifaceted nature of type 2 diabetes and its impact on various aspects of physical and mental well-being. They emphasize the importance of integrated approaches to treatment, the correctness of the direction of movement towards expanding the preventive and therapeutic functions of the family doctor, which will further reduce the consulting workload of endocrinologists, and expand their resources and prospects for development towards the latest and most technologically advanced, highly specialized methods of treating diabetes and its complications.

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Отримано 02.06.2023 р.