

## DA LI JE ZNANJE O DIJABETES MELITUSU PREDUSLOV OPTIMALNE SAMONJEGE I KONTROLE OVE BOLESTI?

**Marijana Jandrić-Kočić**

Dom zdravlja Krupa na Uni, Republika Srpska

\* Korespondencija: Marijana Jandrić-Kočić, Stevana Jakovljevića 23, 78000 Banjaluka, Republika Srpska; e-mail: [marijanajandrickocic@gmail.com](mailto:marijanajandrickocic@gmail.com)

### SAŽETAK

Dijabetes melitus (engl. *Diabetes mellitus* - DM) predstavlja najčešću endokrinološku bolest savremenog doba pandemijskih razmjera. Osobe s DM imaju povećan rizik od prerane smrti uzrokovane kardiovaskularnim i ostalim bolestima u odnosu na opštu populaciju. Znanje oboljelih o DM uključuje niz uvjerenja o različitim aspektima bolesti koje su oboljeli prikupili tokom svog života, prije i poslije dijagnoze. Ovo znanje predstavlja značajan kognitivni faktor koji može uticati na prilagođavanje osobe na bolest, tok bolesti i njeno liječenje. U okviru ovog preglednog rada ispitano je da li je znanje o DM preduslov optimalne samonjege i kontrole ove bolesti. Pretraživanje literature sprovedeno je korištenjem sljedećih ključnih riječi: dijabetes melitus, samonjega, znanje i edukacija u okviru *PubMed*, *Emabase*, *Scopus*, *SCIndex* i Hrčak za razdoblje od 2001. do 2024. godine. Najveći broj istraživanja o znanju oboljelih o DM koristilo je Upitnik znanja o dijabetesu (engl. *Diabetes knowledge questionnaire* - DKQ) s 24 stavke. Kod oboljelih od DM tipa 1 i DM tipa 2, koji su učestvovali u ovim istraživanjima, uočeno je deficitarno znanje o DM koje autori dovode u vezu s suboptimalnim vrijednostima glukoze u krvi, visokim morbiditetom i mortalitetom. Porodična istorija DM, mlađa životna dob i fakultetsko obrazovanje su identifikovani kao nezavisni prediktori optimalnog znanja oboljelih od DM u većini istraživanja. Rutinska procjena nivoa znanja oboljelih o DM putem standardizovanih upitnika, prateća identifikacija vulnerabilnih grupa i njihova edukacija omogućila bi unapređenje znanja oboljelih od DM i usvajanje vještina neophodnih u aktivnostima samonjege.

**Ključne riječi:** Dijabetes melitus, samonjega, znanje, edukacija

### Uvod

Učinkovito liječenje DM započinje s oboljelim koji imaju primjereno znanje o DM (1). Znanje oboljelih o DM uključuje niz uvjerenja (zasnovanih na informacijama) o različitim aspektima bolesti koje su oboljeli prikupili tokom svog života, prije i poslije dijagnoze. Uvjerenja se obično odnose na identifikaciju uzroka, simptoma, faktora progresije, dostupnih metoda liječenja i posljedica bolesti. Prikupljaju se iz različitih izvora, poput prethodnog ličnog iskustva, medicinskog osoblja, knjiga ili interneta. Istinitost uvjerenja može varirati, i neka od njih su zapravo lažna (2).

Znanje oboljelih o DM predstavlja značajan kognitivni faktor koji može uticati na prilagođavanje osobe na bolest, tok bolesti i njeno liječenje. Meha-

nizmi navedene interakcije nisu u potpunosti jasni. Vjeruje se da oboljele osobe s optimalnim znanjem o DM imaju snažniju ukupnu psihološku adaptaciju na bolest i kvalitetniju komplijansu. Nasuprot tome, nepotpuno ili netačno znanje o DM može predstavljati ograničavajući faktor u liječenju (2).

U okviru ovog preglednog rada ispitano je da li je znanje o DM preduslov optimalne samonjege i kontrole ove bolesti.

### Metode

Pretraživanje literature je sprovedeno korišćenjem sljedećih ključnih riječi: dijabetes melitus, samonjega, znanje i edukacija. Realizacija pretraživanja je ostvarena korišćenjem sledećih baza

## IS KNOWLEDGE OF DIABETES MELLITUS A PREREQUISITE FOR OPTIMAL SELF-CARE AND CONTROL OF THIS DISEASE?

**Marijana Jandrić-Kočić**

Primary Health care Center Krupa na Uni, Republic of Srpska

\* Correspondence: Marijana Jandric-Kocic, Stevana Jakovljevic 23, 78000 Banjaluka, Republic of Srpska; e-mail: [marijanajandrickocic@gmail.com](mailto:marijanajandrickocic@gmail.com)

### SUMMARY

Diabetes mellitus (DM) is the most common endocrinological disease of the modern era of pandemic proportions. People with DM have an increased risk of premature death caused by cardiovascular and other diseases compared to the general population. Patients' knowledge about DM includes a series of beliefs about different aspects of the disease that patients have accumulated during their lifetime, before and after diagnosis. This knowledge represents a significant cognitive factor that can influence a person's adaptation to the disease, the course of the disease and its treatment. In this review, it was examined whether knowledge about DM is a prerequisite for optimal self-care and control of this disease. The literature search was conducted using the following key words: diabetes mellitus, self-management, knowledge and education in PubMed, Emabase, Scopus, SCIndex and Hrčak for the period from 2001 to 2024. The largest number of studies on DM patients' knowledge used the Diabetes Knowledge Questionnaire (DKQ) with 24 items. In patients with DM type 1 and DM type 2 who participated in these studies, ubiquitous, deficient knowledge about DM was observed, which the authors link to suboptimal blood glucose values, high morbidity and mortality of the patients. Family history of DM, younger age and college education were independent predictors of optimal knowledge of patients with DM in most studies. Routine assessment of the level of knowledge of patients with DM through standardized questionnaires, accompanying identification of vulnerable groups and their education would enable the improvement of the knowledge of patients and the acquisition of skills necessary for self-management.

**Key words:** Diabetes mellitus, self-management, knowledge, education

### Introduction

The efficient treatment of DM begins with patients who have adequate knowledge about DM (1). Patients' knowledge about DM includes beliefs (based on information) about different aspects of this disease that patients have collected during their lifetime, before and after the diagnosis. These beliefs usually relate to the identification of causes, symptoms, factors of progression, available treatment methods and consequences of the disease. They are collected from various sources, such as previous personal experience, medical staff, books or the Internet. The validity of these beliefs may vary, while some of them are actually false (2).

Patients' knowledge about DM is a significant cognitive factor that can influence the person's

adaptation to the disease, its course and treatment. The mechanisms of the above mentioned interaction have not been completely clarified. It is believed that patients with optimal knowledge about DM have stronger overall psychological adaptation to the disease and better compliance. In contrast, incomplete or incorrect knowledge about DM may represent a limiting factor in the treatment (2).

In this review article, it was investigated whether knowledge about DM is a prerequisite for optimal self-care and control of this disease.

### Methods

The search of literature was conducted using the following key words: diabetes mellitus, self-

podataka: *PubMed*, *Emabase*, *Scopus*, *SCIndex* i *Hrčak*. Pretraživanje je sprovedeno za razdoblje od 2001. do 2024. godine.

## Dijabetes melitus

Dijabetes melitus (engl. *Diabetes mellitus*, DM) je složena, multifaktorska i poligenetska hronična metabolička bolest koju karakteriše poremećaj metabolizma ugljenih hidrata, masti i bjelancevina uzrokovan relativnim ili apsolutnim nedostatkom insulina, poremećajem djelovanja insulina ili kombinacijom ova dva mehanizma (3).

DM predstavlja najčešću endokrinološku bolest savremenog doba pandemijskih razmjera. Prema izvještaju Međunarodne federacije za dijabetes (engl. *International Diabetes Federation*, IDF), globalna prevalencija DM u osoba uzrasta od 20 do 79 godina, iznosi 463 miliona što predstavlja 9% svjetske populacije. Najveći broj oboljelih u okviru navedene starosne grupe utvrđen je u Kini, Indiji i Sjedinjenim Američkim Državama. Procijenjeni broj osoba uzrasta od 65 do 99 godina s DM iznosi 135,6 miliona (19,3%). U Evropi, DM je dijagnostifikovan u 59,3 miliona osoba uzrasta od 20 do 79 godina, odnosno 8,9% osoba navedene starosne grupe (4). U Srbiji je utvrđeno 770.000 oboljelih osoba, što odgovara komparativnoj prevalenciji od 9,0% (5).

U odnosu na patofiziologiju, savremena etiološka klasifikacija razlikuje četiri kategorije DM:

1. Tip 1 DM uzrokovan razaranjem  $\beta$  ćelija gušterače s posljedičnim apsolutnim nedostatkom insulina. Obuhvata dva podtipa: autoimuni (1A) i idiopatski (1B).

2. Tip 2 DM objedinjuje promjenjiv stepen rezistencije na insulin, progresivni defekt izlučivanja insulina i prekomjerno stvaranje glukoze u jetri.

3. Gestacijski DM predstavlja DM koji je nastao ili je prvi put dijagnostikovao tokom trudnoće.

4. Drugi specifični oblici DM-a uključujući monogenetske sindrome DM, bolesti egzokrinog dijela pankreasa, endokrinopatije, DM uzrokovane lijekovima ili hemikalijama i druge specifične oblike DM (4).

DM tipa 2 je najučestaliji (više od 90% ukupnog DM). Slijede DM tipa 1 (oko 7% ukupnog DM), gestacijski DM i drugi specifični oblici DM (oko 2% ukupnog DM) (4).

DM tipa 1 i tipa 2 su heterogene bolesti u kojih se klinička prezentacija i progresija bolesti razlikuju.

DM tipa 1 objedinjuje pretklinički DM, klinički DM, djelimičnu remisiju i ponovno intenziviranje bolesti s doživotnom ovisnošću o insulinu (1). Polidipsija i poliurija su najčešće prve manifestacije DM tipa 1 u djece i oko 50% djece javlja se dijabetesna ketoacidoza. Prezentacija u odraslih osoba je varijabilna i oni mogu imati privremenu remisiju bolesti, kada im insulin nije potreban. DM tip 1 uzrokuje niz akutnih komplikacija poput dijabetesne ketoacidoze, laktatne acidoze, dijabetesnog hiperosmolarnog neketogenog stanja i hipoglikemije (3,6).

DMT2 nerijetko ostaje nedijagnostikovano dugi niz godina, budući da se hiperglikemija većinom razvija postepeno i u ranijim fazama bolesti nije isuviše ozbiljna da uzrokuje klasične simptome DM. Uprkos tome, čak i oboljeli s nedijagnostikovanim DM imaju povećan rizik od razvoja hroničnih komplikacija bolesti uključujući mikrovaskularne (retinopatija, nefropatija i polineuropatija) i makrovaskularne (koronarna bolest, cerebrovaskularna bolest i periferna arterijska bolest) komplikacije (6).

Liječenje DM-a objedinjuje medikamentoznu (neinsulinski lijekovi i insulini) i nemedikamentoznu terapiju (medicinska nutritivna terapija, fizička aktivnost, edukacija i podrška u samostalnom upravljanju DM-om i psihosocijalna podrška). Troškovi liječenja oboljelih na globalnom nivou iznose 760 milijardi američkih dolara (engl. *United States Dollar*, USD) (6).

Osobe s DM imaju povećan rizik od prerane smrti uzrokovane kardiovaskularnim i ostalim bolestima u odnosu na opštu populaciju (7). Globalno, DM uzrokuje 11,3% smrtnih slučajeva među osobama uzrasta od 20 do 79 godina. Gotovo polovina smrtnih slučajeva utvrđena je u radno sposobnog stanovništva uzrasta ispod 60 godina (4). U Srbiji, DM predstavlja treći vodeći uzrok umiranja i ogovoran je za 3% svih smrtnih slučajeva (5).

U cilju optimalne regulacije vrijednosti glukoze u krvi osoba s DM neophodna je modifikacija zdravstvenog ponašanja, samodisciplina i sprovođenje aktivnosti samonjege. Osobe s DM u prosjeku tri sata godišnje provode sa ljekarom, dok preostalih 8.757 sati samostalno kontrolišu svoju bolest. Prema tome, svaka osoba s DM treba da posjeduje odgovarajuće znanje i samopouzdanje kako bi preuzela odgovornost za sopstveno zdravlje tokom čitavog života (8).

care, knowledge and education. The search was realized using the following databases: PubMed, Embase, Scopus, SCIndex and Hrčak. The search was conducted for the period 2001 to 2024.

## Diabetes mellitus

Diabetes mellitus (DM) is a complex, multifactorial and polygenic chronic metabolic disease characterized by the disorder of carbohydrate, fat and protein metabolism caused by relative or absolute deficiency in insulin, impaired insulin action or combination of these two mechanisms (3).

DM is the most common endocrine disease of modern age, which has pandemic proportions. According to the report of the International Diabetes Federation (IDF), the global prevalence of DM in persons aged 20 to 79 is 463 million that represents 9% of the world's population. The largest number of patients within the mentioned age group was determined in China, India and the United States of America. The estimated number of persons aged 65 to 99 years with DM is 135.6 million (19.3%). In Europe, DM was diagnosed in 59.3 million persons aged 20 to 79 years, that is, 8.9% of persons in the mentioned age group (4). In Serbia, 770,000 persons affected by DM were identified, which corresponds to the comparative prevalence of 9.0% (5).

In relation to its pathophysiology, modern etiological classification distinguishes four categories of DM:

1. Type 1 DM results from destruction of pancreatic  $\beta$  cells with the consequent absolute lack of insulin. It includes two subtypes: autoimmune (1A) and idiopathic (1B).

2. Type 2 DM combines variable degrees of insulin resistance, a progressive defect in insulin secretion and excessive production of glucose in the liver.

3. Gestational DM is DM that developed or was diagnosed for the first time during pregnancy.

4. Other specific forms of DM including monogenic syndromes of DM, diseases of the exocrine part of the pancreas, endocrinopathy, DM caused by drugs or chemicals and other specific forms of DM (4).

Type 2 DM is the most common form of DM (more than 90% of all cases of DM). This is followed by type 1 DM (about 7% of all cases of DM), gestational DM and other specific forms of

DM (about 2% of all cases of DM) (4).

Type 1 and type 2 DM are heterogeneous diseases, in which clinical presentation and progression are different. Type 1 DM combines preclinical DM, clinical DM, partial remission and relapse of the disease with lifelong insulin dependence (1). Polydipsia and polyuria are the most common first manifestations of type 1 DM in children, while in about 50% of children, diabetic ketoacidosis occurs. The presentation in adults is variable and they may have a temporary remission of the disease, when they do not need insulin. Type 1 DM causes a number of acute complications such as diabetic ketoacidosis, lactate acidosis, diabetic hyperglycemic hyperosmolar non-ketonic syndrome and hypoglycemia (3,6).

Type 2 DM often goes undiagnosed for many years because hyperglycemia usually develops gradually and in early stages of the disease it is not too severe to cause the classic symptoms of DM. Despite this, even patients with undiagnosed DM have an increased risk of developing chronic complications including microvascular (retinopathy, nephropathy and polyneuropathy) and macrovascular complications (coronary disease, cerebrovascular disease and peripheral arterial disease) (6).

The treatment of DM includes medicinal (non-insulin and insulin drugs) and non-medicinal treatment (medical nutritional therapy, physical activity, education and support in self-management of DM and psychosocial support). Globally, treatment costs amount to 760 billion US dollars (6).

Persons with DM have an increased risk of premature death caused by cardiovascular and other diseases in comparison to the general population (7). Globally, DM causes 11.3% of deaths among people aged 20-79 years. Almost half of deaths occur in the working age population under the age of 60 (4). In Serbia, DM is the third leading cause of death and it is responsible for 3% of all deaths (5).

In order to optimally regulate blood glucose levels in persons with DM, modification of health behavior is necessary, as well as self-discipline and self-care activities. Persons with DM spend on average three hours a year with a doctor, while the remaining 8,757 hours they control their disease independently. Therefore, each person with DM should have appropriate knowledge and

## Uloga znanja oboljelih o dijabetes melitusu u menadžmentu dijabetes melitusa

Učinkovito liječenje DM-a zahtjeva primjereno znanje oboljelih o DM-u i modalitetima njegovog liječenja. Iako optimalan menadžment DM zahtjeva i druge kvalitete i kompetentnost oboljelih za samonjegu, posjedovanje znanja o DM-u je esencijalno. Naime, znanje oboljelih o DM-u predstavlja temelj informisane odluke o ishrani, fizičkoj aktivnosti, kontroli tjelesne težine, praćenju vrijednosti glukoze u krvi, upotrebi lijekova i redovnim pregledima ljekara (1,9,10).

Istraživanja povezuju znanje oboljelih o DM s optimalnom samonjegovom i kvalitetom života (11-13). S druge strane, nedostatak znanja oboljelih poistovjećuje se sa suboptimalnom kontrolom DM (14,15). Na primjer, u istraživanju među osobama s DM tipa 2 u Tajvanu ustanovljeno je da značajan broj oboljelih odlaže upotrebu insulina, nerijetko do nastanka ireverzibilnih multiorganskih oštećenja, smatrajući da upotreba insulina narušava funkciju bubrega. Osim toga, uočeno je i značajno odsustvo samokontrole vrijednosti šećera u krvi u oboljelih koji vjeruju da uvijek osjećaju porast vrijednosti šećera u krvi (14). Nemali broj osoba s DM tipa 2 koji su učestvovali u istraživanju u Indiji smatrao je da nije u obavezi da koriguje ishranu ukoliko uzima lijekove budući da promjena životnog stila ne unapređuje kontrolu DM. Nadalje, određen broj učesnika u ovom istraživanju bilo je mišljenja da produžena upotreba oralne neinsulinske terapije uzrokuje ozbiljne nuspojave. Sve navedeno u značajnoj mjeri ograničava kvalitetnu samonjegu i optimalnu kontrolu DM (15).

## Edukacija oboljelih o dijabetes melitusu

Prema aktuelnim standardima i smjernicama za uspješnu samonjegu i podršku osobama s DM, Američke asocijacije za dijabetes (engl. *American Diabetes Association*, ADA), neophodno je da sve osobe s DM učestvuju u strukturiranoj edukaciji u cilju sticanja znanja, vještina i sposobnosti neophodnih za kvalitetnu samonjegu, prilagođavanje svakodnevnom načinu života i efikasnu terapiju DM. Budući da DM tipa 2 čini više od 90% svih slučajeva DM, predominantno je riječ o edukaciji s ciljem modifikacije zdravstvenog ponašanja i adekvatne samokontrole DM. Strukturirana edukacija kod osoba s DM realizuje se u obliku individualnih obrazovnih intervencija, grupnih edukativnih

programa ili njihove kombinacije. Oblik edukacije zavisi od uvjerenja, znanja i vještina oboljelih i članova njihovih porodica, raspoloživosti i profesionalne sklonosti edukatora i dostupnih zdravstvenih resursa (6).

Edukacija osoba s DM u okviru primarne zdravstvene zaštite u Srbiji je propisana je Uredbom o zdravstvenoj zaštiti stanovništva od šećerne bolesti (Sl. glasnik RS, br. 18/94) i Uredbom o nacionalnom programu prevencije i rane detekcije tipa 2 dijabetes melitusa (Sl. glasnik RS, br. 17/2009). Prema ovim Uredbama, osobama s T2DM neophodno je obezbjediti sedam edukativnih sesija u prvih 12 meseci od otkrivanja bolesti. Pružaoci edukacije mogu biti ljekari specijalisti interne medicine i posebno edukovani diplomirani medicinski tehničari. U edukativnom timu mogu biti prisutni i dijetetičari, farmakolozi i psiholozi (16).

Iako samo znanje oboljelih o DM nužno ne osigurava optimalnu samonjegu, procjena razine znanja o DM, kao i identifikovanje specifičnih nedostataka u znanju oboljelih, predstavlja važan korak u unapređenju zdravstvene zaštite oboljelih (11,12,15). Naime, identifikovanje vulnerabilnih skupina oboljelih i njima manje poznatih aspekata DM-a i samonjege oboljelih omogućava oblikovanje i implementaciju edukativnih programa s ciljem optimizacije vrijednosti glukoze u krvi i posljedičnog sniženja morbiditeta i mortaliteta (6).

## Instrumenti za procjenu znanja o dijabetes melitusu

Ne postoji jedinstven, opšteprihvaćen instrument za procjenu znanja oboljelih o DM-u (15-17).

Upitnik osnovnog znanja o dijabetesu (engl. *Diabetes Basic Knowledge Tool*, DBKT) sačinila je grupa autora iz Sjedinjenih Američkih Država 1989. godine. Sadrži ukupno 49 stavki iz pet konceptualnih dimenzija znanja o DM-u: patofiziologija, simptomi i menadžment DM-a, praćenje vrijednosti glukoze u krvi, farmakološka terapija DM-a, dijeta/ishrana, prevencija razvoja dijabetesnog stopala i komplikacije DM (17).

Upitnik za samoprocjenu znanja o dijabetesu (engl. *Diabetes self-report tool*, DSRT) izrađen je 1989. godine u cilju utvrđivanja samoprocjenjenog znanja o DM (16). Upitnik sadrži 15 stavki u šest domena: patofiziologija, simptomi i znaci, dijagnostifikovanje i komplikacije DM, samoupravljanje i ishrana. Ispitanicima su ponuđena četiri potenci-

confidence to take responsibility for their own health throughout life (8).

### **The role of patients' knowledge about diabetes mellitus in the management of diabetes mellitus**

The efficient treatment of DM requires appropriate knowledge about DM and treatment modalities. Although the optimal management of DM requires other qualities and competence of patients regarding self-care, knowledge about DM is essential. Namely, patients' knowledge of DM is the basis of informed decisions about diet, physical activity, weight control, blood glucose monitoring, use of medications and regular medical examinations (1,9,10).

Patients' knowledge about DM is associated with the optimal self-care and quality of life in the studies (11-13). On the other hand, the lack of knowledge among patients is identified with the suboptimal control of DM (14,15). For example, in a study which was conducted among persons with type 2 DM in Taiwan, it was found that a significant number of patients postpone the use of insulin, often until the occurrence of irreversible multiorgan damage because they believe that the use of insulin impairs kidney function. In addition, a significant absence of self-control of blood sugar values was observed in patients who believe that they always feel an increase in blood sugar values (14). A significant number of persons with type 2 DM who participated in the study in India believed that they were not obliged to balance their diet if they were taking medicines because lifestyle change did not improve DM control. Furthermore, a certain number of participants in this study believed that the prolonged use of oral non-insulin therapy caused severe serious side effects. All of the above mentioned significantly limits good quality self-care and optimal control of DM (15).

### **Education of patients about diabetes mellitus**

According to the current standards and guidelines of the American Diabetes Association for successful self-care and support for people with DM, it is necessary that all people with DM participate in the well-structured education aimed at acquiring knowledge, skills and abilities necessary for the good-quality self-care,

adaptation to daily life and efficient treatment of DM. Considering that type 2 DM accounts for more than 90% of all cases of DM, this education is predominantly aimed at modifying the health behavior and adequate self-control of DM. Structured education in persons with DM is realized in the form of individual educational interventions, group educational programs or their combination. The type of education depends on beliefs, knowledge and skills of patients and their family members, the availability and professional inclinations of educators and available health resources (6).

The education of people with DM within primary health care in Serbia has been prescribed by the Regulation on the health protection of the population against diabetes (Official Gazette of RS, NO. 18/94) and the Regulation on the national program for the prevention and early detection of type 2 diabetes mellitus (Official Gazette of RS, NO. 17/2009). According to these Regulations, it is necessary to provide seven educational sessions to people with Type 2 DM during the first 12 months from diagnosis. Providers of education can be specialists in internal medicine and specially educated graduate medical technicians. Dietitians, pharmacologists and psychologists can also be present in the educational team (16).

Although patients' knowledge about DM does not necessarily ensure the optimal self-care, the assessment of the level of knowledge about DM, as well as the identification of specific gaps in patients' knowledge, is an important step in improving the patients' health care (11,12,15). Namely, the identification of vulnerable groups of patients and those aspects of DM and self-care that are less known to them enables the creation and implementation of educational programs aimed at optimizing blood glucose values and consequently reducing morbidity and mortality (6).

### **Instruments for assessing knowledge about diabetes mellitus**

There is no single, generally accepted instrument for assessing patients' knowledge about DM (15-17).

Diabetes Basic Knowledge Tool (DBKT) was created by a group of authors from the United States in 1989. It contains a total of 49 items from five conceptual dimensions of knowledge about DM: pathophysiology, symptoms and

jalna odgovora: „Uopšte se ne slažem”; „Ne slažem se”; „Slažem se”; „Potpuno se slažem” (17).

Kratki test znanja o dijabetesu (engl. *Brief diabetes knowledge test*, DKT1) objavljen je 1998. godine. Sa ukupno 23 stavke omogućava procjenu opšteg znanja o dijabetesu i znanja o upotrebi insulina. Tokom 2011. godine pojednostavljen je u cilju prilagođavanja osobama sa ograničenom pismenošću (Pojednostavljen test znanja o dijabetesu, *Simplified diabetes knowledge scale*) (18).

Revidirani upitnik znanja o dijabetesu (engl. *Diabetes knowledge test 2*, DKT2) razvijen je ažuriranjem DKT1. Izmjenjeno je ukupno 13 stavki (2 pravopisne ispravke, 4 izmjene usljed prilagođavanja važećim nacionalnim standardima, 7 izmjena u cilju pojednostavljenja pitanja ili odgovora). Kao i DKT1, DKT2 sadrži 2 podtesta sa ukupno 23 stavke (17). Prvi podtest je opšti podtest znanja o dijabetesu (engl. *General knowledge part*, GKP), a drugi je podtest upotrebe insulina (engl. *Insulin use part*, IUP). Dijelovi upitnika se mogu koristiti pojedinačno (18,19).

Upitnik za samoprocjenu znanja o dijabetesu (engl. *Diabetes self-report tool*, DSRT) izrađen je 1989. godine u cilju utvrđivanja samoprocjenjenog znanja o DM-u (16). Upitnik sadrži 15 stavki u šest domena: patofiziologija, simptomi i znaci, dijagnostifikovanje i komplikacije DM, samoupravljanje i ishrana. Ispitanicima su ponuđena četiri potencijalna odgovora: „Uopšte se ne slažem”; „Ne slažem se”; „Slažem se”; „Potpuno se slažem” (17).

Upitnik znanja o dijabetesu (engl. *Diabetes knowledge questionnaire*, DKQ) od 24 stavke izveden je iz originalnog upitnika od 60 stavki koji se koristio u Studiji obrazovanja o DM-u među Amerikancima meksičkog porijekla oboljelih od DM-a i članovima njihovih porodica u okrugu *Starr* (od 1994 do 1998). DKQ-24 posjeduje 17 pozitivno formulisanih stavki i 7 negativno formulisanih stavki unutar tri domena: osnovna znanja o DM-u, kontrola vrijednosti glukoze u krvi i prevencija komplikacija DM-a. Ispitanicima su ponuđena tri potencijalna odgovora: da, ne i ne znam. Ukupan rezultat predstavlja zbir tačnih odgovora, sa višim ocjenama koje ukazuju na postojanje optimalnog znanja o DM-u (20-24).

Svi gore navedeni instrumenti za procjenu znanja oboljelih o DM-u imaju odgovarajuću pouzdanost i unutrašnju konzistentnost (15-24). Najveći broj istraživanja o znanju oboljelih o DM koristio je DKQ-24 upitnik. Naime, DKQ-24 upitnik

je citiran preko 440 puta i preveden na više od 30 jezika (1).

## Istraživanja o znanju o dijabetes melitusu

Značajan broj autora je istraživao znanje oboljelih o DM. Najveći broj istraživanja je obavljen uz pomoć DKQ upitnika među oboljelim od DM tipa 2. U svim ovim istraživanjima nije postojao adekvatan nivo znanja oboljelih o DM (25-27).

U istraživanju oboljelih od DM tipa 2 u Tajlandu pomoću DKQ upitnika čak 96,7% oboljelih imalo je manje od 50% tačnih odgovora (26). Na sveprisutno, suboptimalno znanje oboljelih o DM ukazala su i istraživanja oboljelih od DM-a tipa 2 u Meksiku i Peruu. Naime, u navedenim istraživanjima procenat oboljelih s adekvatnim znanjem o D iznosio je 7% u Meksiku i 17% u Peruu (27). Nešto viši nivo znanja oboljelih o DM, utvrđen je u Indiji, u kojoj je adekvatno znanje o DM ustanovljeno u 32% oboljelih s DM tipa 2 (28). Deficitarno znanje o DM-u je utvrđeno i u oboljelih u Grčkoj i Indoneziji (29,30). U sistematskom pregledu znanja oboljelih o DM u Jugoistočnoj Aziji (Vijetnam, Tajland, Kambodža, Laos, Mjanmar, Malezija, Singapur, Indonezija, Brunej, Filipini i Istočni Timor), koji je obuhvatio sedam studija (od ukupno pregledanih 6210 studija) i 17.489 osoba s DM tipa 2, razina znanja o DM je bila nezadovoljavajuća (15). Slični rezultati su nađeni u sistematskom pregledu literature o znanju o DM-u u Iranu, koji je obuhvatio 10 studija (od pregledanih 546 studija), odnosno 1556 ispitanika (oko 156 ispitanika u svakoj studiji) (31).

Pojedinačna istraživanja ukazuju na zabrinjavajuće nisku svijest oboljelih o patofiziologiji, kliničkim manifestacijama, komplikacijama i liječenju DM (28,30,32-34). U istraživanju autora iz Nepala, Etiopije i Hrvatske, s etiologijom DM bilo je poznato manje od trećine oboljelih od DM tipa 2 (32-34). Najveći broj oboljelih od DM tipa 2 u Indoneziji je bio mišljenja da DM uzrokuje prekomjerno konzumiranje šećera i druge slatke hrane (30). Svega 12% oboljelih od DM tipa 2 u Indiji poznavalo je tipove DM (28). Čak 79,8% oboljelih od DM tipa 2 koji su učestvovali u istraživanju u Hrvatskoj vrijednost šećera u krvi natašte iznad 11 mmol/L nisu smatrali previsokom (34). Istraživanja u Etiopiji, Nepal, i Hrvatskoj otkrila su zabrinjavajuće nisku svijest oboljelih o komplikacijama DM (32-34). Niti jedan oboljeli od DM tipa 2 u istraživanju u Nepal nije doveo DM u vezu s oštećenjem krvnih sudova (32). S komplikacija-

management of DM, blood glucose monitoring, pharmacological therapy of DM, diet/nutrition, prevention of diabetic foot development and complications of DM (17).

Diabetes self-report tool (DSRT) was created in 1989 with the aim of determining self-reported knowledge about DM (16). The questionnaire contains 15 items in six domains: pathophysiology, symptoms and signs, diagnosis and complications of DM, self-management and diet. The respondents are offered four potential answers: "I do not agree at all"; "I do not agree"; "I agree"; "I agree completely" (17).

Brief diabetes knowledge test (DKT1) was published in 1998. With a total of 23 items, it enables the assessment of general knowledge about diabetes and knowledge about the use of insulin. In 2011, it was simplified in order to adapt to people with limited literacy (Simplified diabetes knowledge scale) (18).

Diabetes knowledge test 2 (DKT2) was developed by updating DKT1. A total of 13 items were changed (2 spelling corrections, 4 changes due to adaptation to valid national standards, 7 changes aimed at simplifying questions or answers). Like DKT1, DKT2 contains 2 subtests with a total of 23 items (17). The first subtest is the general knowledge part (GKP), while the second is the insulin use part (IUP). The parts of the questionnaire can be used separately (18,19).

Diabetes self-report tool (DSRT) was developed in 1989 in order to determine self-reported knowledge about DM (16). The questionnaire contains 15 items in six domains: pathophysiology, symptoms and signs, diagnosis and complications of DM, self-management and nutrition. Respondents were offered four potential answers: "I do not agree at all"; "I do not agree"; "I agree"; "I completely agree" (17).

Diabetes knowledge questionnaire (DKQ) contains 24 items and it was adapted from the original questionnaire that contained 60 items and that was used in the Starr County Diabetes Education Study among Mexican Americans with DM and their family members (from 1994 to 1998). DKQ-24 has 17 positively formulated items and 7 negatively formulated items within three domains: basic knowledge about DM, blood glucose control and prevention of complications caused by DM. Respondents were offered three potential answers: yes, no and I do not know. The

total score is the sum of correct answers, where higher scores indicate optimal knowledge of DM (20-24).

All of the above mentioned instruments for the assessment of patients' knowledge about DM have adequate reliability and internal consistency (15-24). The largest number of studies on patients' knowledge about DM used DKQ-24 questionnaire. Namely, DKQ-24 questionnaire has been cited more than 440 times and has been translated into more than 30 languages (1).

## Research on knowledge about diabetes mellitus

A significant number of authors investigated patients' knowledge about DM. The largest number of studies was conducted with the help of DKQ questionnaire among patients affected by type 2 diabetes mellitus. In all these studies, there was no adequate level of knowledge among patients affected by DM (25-27).

In a study of patients affected by type 2 diabetes mellitus conducted in Thailand with the help of DKQ questionnaire, as many as 96.7% of patients had less than 50% of correct answers (26). Studies of patients affected by type 2 DM in Mexico and Peru pointed to the ubiquitous, suboptimal knowledge of patients about DM. Namely, in the above mentioned studies, the percentage of patients with adequate knowledge about DM was 7%, in Mexico and 17% in Peru (27). A slightly higher level of knowledge about DM was found in patients in India, where adequate knowledge about DM was found in 32% of patients with type 2 DM (28). Deficient knowledge about DM was found in patients in Greece and Indonesia (29,30). In a systematic review of knowledge about DM in patients in Southeast Asia (Vietnam, Thailand, Cambodia, Laos, Myanmar, Malaysia, Singapore, Indonesia, Brunei, the Philippines and Timor-Leste), which included seven studies (out of a total of 6210 studies reviewed) and 17,489 persons with type 2 DM, the level of knowledge about DM was unsatisfactory (15). Similar results were found in a systematic review of literature on knowledge about DM in Iran, which included 10 studies (out of 546 reviewed studies), that is, 1556 participants (about 156 participants in each study) (31).

Individual studies point to a worryingly low level of awareness among patients about pathophysiology, clinical manifestations, compli-

ma koje uzrokuje DM je bilo poznato manje od trećine oboljelih u Etiopiji i Hrvatskoj (34,35).

U većini istraživanja, porodična istorija DM, mlađa životna dob i fakultetsko obrazovanje su predstavljali nezavisne prediktore optimalnog znanja oboljelih o DM (23,29,33,36). Član porodice sa DM može predstavljati važan izvor informacija o bolesti. Nadalje, bolje znanje o DM mlađih oboljelih osoba autori su doveli u vezu sa upotrebom interneta i komunikacijom sa drugim oboljelim (29). Takođe, osobe mlađe životni dobi s DM tipa 2 nerijetko uspješnije usvajaju aktivnosti samonjege u odnosu na starije osobe. U osoba starije životni dobi narušena kognitivna funkcija otežava sticanje optimalnog znanja o DM (32). Oboljeli s višim nivoom obrazovanja češće prisustvuju savjetovanju ili edukaciju o DM. Osim toga, informacije o DM prikupljaju putem različitih sredstava komunikacije (32). Istraživanje u Etiopiji identifikovalo je značajno bolje znanje o DM oboljelih osoba muškog pola, što je objašnjeno značajno nižom stopom pismenosti kod žena (33). U većine oboljelih s DM tipa 2 nivo znanja o DM je u velikoj meri određivao vrijednost glikoziliranog hemoglobina A1c (27,34-36).

U istraživanju autora iz Gane, mlade osobe s DM tipa 1 i njihovi staratelji su posjedovali ograničeno znanje o liječenju DM. Oboljeli i njihovi staratelji su upoznati s aktivnostima samonjege i terapijom hiperglikemije, ali je njihovo znanje o zbrajanju ugljenih hidrata, liječenju teške hipoglikemije i liječenju DM tipa 1 tokom specifičnih perioda, kao što je trudnoća, marginalno (31). U istraživanju u Grčkoj osobe s DM tipa 1 imali su signifikantno više znanje o DM u odnosu osobe s DM tipa 2 (37). Istraživanje u Jordanu ustanovilo je nisko znanje o DM među oboljelim. Nije postojala značajna razlika u znanju između oboljelih s DM tipa 1 i DM tipa 2 (38).

## Zaključak

DM predstavlja veliki izazov za zdravstvene radnike i oboljele od DM. Znanje oboljelih o DM -u je temelj optimalnog upravljanja DM imajući u vidu da obezbjeđuje donošenje informisanih odluka i aktivnu ulogu oboljelih u procesu liječenja. Istraživanja u svim delovima svijeta ukazuju na sveprisutno deficitarno znanje oboljelih o DM. Nedostatak znanja o DM dovodi se u vezu s sub-optimalnim vrijednostima glukoze u krvi, visokim morbiditetom i mortalitetom. Rutinska procjena nivoa znanja oboljelih o DM putem standardizo-

vanih upitnika i prateća identifikacija vulnerabilnih grupa u ustanovama primarne zdravstvene zaštite rezultovala bi organizovanju edukacija koje bi doprinele unapređenju znanja oboljelih i usvajanju vještina neophodnih u aktivnostima samonjege i adekvatne kontrole ove bolesti.

## Konflikt interesa

Autori su izjavili da nema konflikta interesa.

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cations and treatment of DM (28,30,32-34). In a study by authors from Nepal, Ethiopia and Croatia, less than a third of patients affected by type 2 DM were familiar with the etiology of DM (32-34). The largest number of patients with type 2 diabetes mellitus in Indonesia thought that DM is caused by excessive consumption of sugar and other sweet foods (30). Only 12% of patients with type 2 diabetes mellitus in India knew the types of DM (28). As many as 79.8% of patients with type 2 diabetes mellitus who participated in the research conducted in Croatia did not consider the value of fasting blood glucose above 11 mmol/L to be too high (34). Studies that were conducted in Ethiopia, Nepal and Croatia revealed a worryingly low level of awareness among patients about the complications of DM (32-34). None of the patients with type 2 DM in a study in Nepal associated DM with blood vessel damage (32). Less than a third of patients in Ethiopia and Croatia were familiar with the complications caused by DM (33,34).

In the majority of studies, family history of DM, younger age and university education were independent predictors of optimal knowledge of patients about DM (23,28,32,35). A family member with DM can be an important source of information about the disease. Furthermore, the authors associated better knowledge about DM in younger patients with the use of Internet and communication with other patients (28). Also, younger people with type 2 DM often adopt self-care activities more successfully than older people. In elderly people, impaired cognitive function makes it difficult to acquire optimal knowledge about DM (32). Patients with a higher level of education more often attend counseling or education about DM. In addition, information about DM is collected through various means of communication (32). A study conducted in Ethiopia identified a significantly higher level of knowledge about DM in male patients, which was explained by a significantly lower literacy rate in women (33). In the majority of patients with type 2 DM, the level of knowledge about DM determined, to a large extent, the value of glycated hemoglobin A1c (27,34-36).

In a study by authors in Ghana, younger persons with type 1 DM and their caregivers had limited knowledge about the treatment of DM. Patients and their caregivers were acquainted with the activities of self-care and the treatment

of hyperglycemia, but their knowledge of carbohydrates counting, the treatment of severe hypoglycemia, and treatment of type 1 DM during specific periods, such as pregnancy, is marginal (31). In a study conducted in Greece, persons with type 1 DM had significantly more knowledge about DM than persons with type 2 DM (37). A study conducted in Jordan found low knowledge about DM among patients. There was no significant difference in knowledge between patients with type 1 DM and type 2 DM (38).

## Conclusion

DM represents a great challenge for healthcare workers and patients affected by DM. Patients' knowledge about DM is the basis of optimal management of DM, having in mind that it ensures making informed decisions and the active role of patients in the treatment process. Studies in all parts of the world point to the ubiquitous lack of knowledge among patients affected by DM. The lack of knowledge about DM is associated with suboptimal blood glucose values, high morbidity and mortality. Routine assessment of the level of knowledge about DM among patients with the help of standardized questionnaires and the accompanying identification of vulnerable groups in primary health care institutions would result in the organization of educational sessions that would contribute to the improvement of knowledge among patients and the acquisition of skills necessary for self-care activities and adequate control of this disease.

## Competing interests

The author declared no competing interests.

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