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THE IMPORTANCE OF PATIENTS KNOWLEDGE AND THEIR FAMILIES ABOUT THE RISK, SYMPTOMS, TREATMENT AND PREVENTION OF TYPE 2 DIABETES

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Summary

Introduction: *Diabetes mellitus* is the most common metabolic disease in the world. There is very important influence of patients knowledge and their families knowledge about type 2 diabetes to the risk reduction, treatment and prevention of disease.

The aim: The aim of the research was to estimate the connection between the knowledge of patients and their families about the risk factors, symptoms, treatment and prevention of type 2 diabetes and occurrence of diabetes.

Participians and methods: The study was conducted by randomly interviewing 102 volunteers in Tuzla. The main instrument of the research was self-designed questionnaire on risk, symptoms and the treatment of diabetes. We measured values of glucose in blood for all volunteers.

Results: The results of this study suggest that patients and their family members are not informed enough about the risks, symptoms and treatment of type 2 diabetes.

Conclusion: There was a significant connection between the number of correct answers with the knowledge of diabetes.

Keywords: diabetes mellitus, risk factors, symptoms, treatment and prevention, insulin

Introduction

Diabetes mellitus (DM) is a medical condition defined by high level of glucose in blood (Ryde'n L. 2013). It is a metabolic disorder of multiple etiology characterized by chronic hyperglycemia when metabolism of charbohydrates, proteins and fats is deranged, and is a result of the pancreas not producing enough insulin or the cells of the body not responding properly to the insulin produced, or both. It can lead to serious health complications, even premature death, but people suffering from this disease can control it and decrease the risk relating the complications. There are many causes of diabetes. First of all, genetic predisposition has a significant role, following constitution, different pancreas anomalies, different inflammations, tumors, obesity, etc. (Imamovic Kuluglic, 2008).

The meaning of the word *diabetes mellitus* (sugar diabetes) suggests high level of sugar in blood and urin in people who do not treat diabetes. Diabetes sets on when the pancreas do not produce enough insulin, and so the level of sugar, i.e. glucose in blood is uncontrolable. With the absence of insulin, glucose is stacked in blood causing various biochemical damage (Barnard 1981).

Classification of *diabetes mellitus* is based on recommendation of World Health Organisation (WHO) and American Diabetes Association (ADA). Glycated hemoglobin A1c (HbA1c) is recommended as a test fot determining *diabetes mellitus* although there are some doubts relating its sensitivity in determination of diabetes. HbA1c values > 6,5% do not exclude diabetes. There are four types of diabetes, and they are: *Diabetes mellitus* type 1 (T1DM), type 2 (T2DM), gestational *diabetes mellitus* and other specific

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types of diabetes. (Ryde'n L. and others, 2013).
Diabetes type 1 is characterized by lack of insulin due to destructiopn of beta cells of the pancreas, which progresses to absolute lack of insulin. Typically, T1DM is common in young, skinny people who suffer from polyuria, increased thirst, weight loss, with slight tendency to ketosis. However, T1DM can appear in any age. In another form, latent auto-immune diabetes of adults (LADA) develops over a longer period of time. People with auto-antibodies to beta cells of the pancreas such as proteins glutamic acid decarboxylase, inhibitors of protein tyrosine phosphatase, insulinoma-associated auto-antibodies, or zinc transporter auto-antibodies will probably cause an accute attack or a slow progressive insulin addiction (Lars Ryde'n and others, 2013). Patients suffering from this type of diabetes are obligated to inject themselves with a daily dose of insulin in order to prevent comatose state. (Insel and Roth, 2004).
Diabetes type 2 is characterized by a combination of insulin resistance, weakness of beta cells. Obesity and sedentary life style are the major risk factors causing T2DM. Insulin resistance and stage one low production of insulin cause postprandial hypoglycemia as an early stage of T2DM. This stage is followed by relapse, and in the second stage appears persistent hyperglycemia. T2DM usually develops after middle age and includes more than 90% of the adult population suffering from diabetes. It does not show any specific symptoms for many years which explains the fact that half of the cases of T2DM are not diagnosed in time. Hypoclycemic screening is very useful in cardiovascular risk assessment as well as determining the right diagnosis on time. Early detection of T2DM reduces the risks of cardiovascular diseases (Griffin and others, 2011). The most common symptoms of T2DM are: excessive thirst, frequent urination, blurry vision, recurrent infections, slow healing cuts, irritability, prickling sensation, loss of sense in arms and legs. With T2DM the pancreas usually produces some or enough insulin, but there is a significant insulin resistance due to cell disorder in the pancreas, liver and the muscles. Insulin resistance is a pathological condition in which cells fail to respond to the normal actions of the hormone insulin. The body produces insulin, but the cells in the body become resistant to insulin and are unable to use it effectively. Insulin resistance plays an important role in pathophysiology of T2DM as well as lifestyle factors and genetics. More than 90% of people with T2DM is obese, and have elevated plasma levels of free fatty acids (FFA) which are known to cause peripheral (muscle) insulin resistance. T2DM can be controlled by balanced diet, weight loss and regular physical activity. If that is not enough, patients should take some oral antidiabetic medications or insulin shots. Around 1/3 of the patients with T2DM have to inject themselves with the insulin shots, while the rest of the mentioned patients use some kind of oral medication which lead to increase of insulin production or cell stimulation to absorb glucose (Insel and Roth, 2004).
There is also the third type of diabetes which occurs in 2-4 % of all pregnancies. This type of diabetes, also known as gestational diabetes, may improve or disappear completely after delivery. However, after pregnancy half of the women with gestational diabetes are found to have diabetes mellitus, most commonly type 2 (Insel and Roth, 2004). Big Canadian research has shown that probability of developing *diabetes mellitus* after gestational diabetes is 4% in period of 9 months after delivery, and 19% in period of 9 years after delivery (Lars Ryde'n and others, 2013).
Healthy and balanced diet is very important for preventing any complications related to diabetes mellitus. We can distinguish two types of diet in diabetes patients, standard one during the illness, and acidosis diet. Standard diet includes information about weight, height, and age of a patient. If the weight is desirable, a diet of 25 calories per kilogram of patient's weight is determined. Obese patients should try to reduce weight gradually. Acidosis diet consists of giving insulin, fluids and carbohydrates in dietary measures. In extreme cases, such as shock, blood transfusion is required (Imamovic, Kuluglic, 2008).
There are many tests used to diagnose diabetes, such as: determining the level of glucose in blood, the oral glucose tolerance test (OGTT), the intravenous glucose tolerance test, determining ketone bodies in urine, determining insulin levels, C-peptides, and others. DETECT 2 study

has analyzed the results of 44 000 people in 9 studies in 5 countries. It is concluded that HbA1c > 6,5 % (48 mmol/L) and values of fasting blood glucose test > 6,5 mmol/L (117 mg/dl) is diagnostic parameter for diabetes mellitus, and for values of HbA1c 6,0-6,5 %, it is necessary to do fasting blood glucose in order to determine a diagnosis. The value of fasting blood glucose test to diagnose *diabetes mellitus* is 7,0 mmol (126 mg/dl) in venous plasma (which is recommended). It is also necessary to determine the values of glucose 2 hours after OGTT is done. Definite diagnosis of the disease is following values: 11,1 mmol (200mg/dl) in venous plasma, 9,4 mmol (169 mg/dl) in venous blood and 10,3 mmol (185 mg/dl) in capillary blood (WHO, 2006/2011; ADA 2003/2012).

According the global assessment for year 2011, International Diabetes Federation has shown that 52 million Europeans aged 20 to 79 have diabetes and that number will have increased to more than 64 million by the year 2030. 281 million of male and 317 million of female diabetes patients died in 2011. around the world, mostly from cardiovascular diseases. Costs of treating diabetes in Europe were about 75 billion Euros in 2011. and it is estimated that the costs will increase to 90 billion Euros in 2030. (Lars Ryde'n and others, 2013)

According to the data gathered by Association of diabetologists of Federation of Bosnia and Herzegovina, it is estimated that more than 200,000 people suffer from some type of diabetes. The number of T2DM patients is increasing significantly. At least half of the T2DM patients do not have proper diagnosis and are not aware of their illness. In 2010. in Federation of Bosnia and Herzegovina there are more than 50,000 registered people who suffer from diabetes. In Republic of Srpska, there are about 60,000 registered patients, of which 15,000 receive insulin therapy. The number of young people and children who suffer from T2DM, which usually affects older adults, is in significant increase in Federation of Bosnia and Herzegovina.

The aim of this paper is to assess the connection between knowledge of basic risks, symptoms, treatment and prevention of diabetes and family relations of T2DM patients in Tuzla Canton.

Participians and methods

A cross-sectional research has been conducted. The sample of population from primary care practice is provided by stratified sampling where random units have been divided into two groups depending on the values of glucose in blood. Research tool has been a self-designed questionnaire about risk factors, symptoms and treatment of T2DM patients. The questionnaire consists of 12 questions and is divided into 3 parts. The first part consists of questions about general characteristics and types of diabetes (definition of diabetes, type of diabetes T1DM, T2DM, gestational diabetes, diabetes insipidus). The second part consisted of knowledge questions about symptoms of diabetes (itchy skin, extensive thirst, frequent urination, frequent infections, and impairment of vision, kidneys, nerves). The third part of the questionnaire consisted of knowledge questions about risk factors (genetic predisposition, infection, obesity, old age, pregnancy). There have been 2-4 options given for each question, but only one is correct answer. At the end of the questionnaire, there has been a question about family relations with the patient. Immediate family members are spouse, parents, children, brothers and sisters. The given options are following: I suffer from diabetes, my immediate family member suffers from diabetes, no one in my family suffers from diabetes, and I do not know anyone suffering from diabetes. The connection between correct answers in the questionnaire and family relations of *diabetes mellitus* type 2 patients is assessed through these optional answers that were given.

This cross-sectional research has been conducted in Tuzla. During filling out the questionnaire, the subjects have had their capillary blood taken before the meal and the value of fasting blood glucose test has been determined. Experimental group consisted of subjects who did not have high values of fasting blood glucose test. The subjects of this research consented to participate in this study. Control group consisted of volunteers who had higher values of fasting blood glucose test, above 6,7 mmol/l. The research included people of both sexes, age between 20 and 65 (table 1).

Table 1. Structure of volonteers by gender and age
Tabela 1. Struktura ispitanika po spolu i godinama

Gender	Age					
	20-30	30-40	40-50	50-60	60-65	Total
Female	6	9	24	17	4	60
Male	4	6	11	19	2	42
Total	10	15	35	36	6	102

People excluded from this research are under 20 years of age and older illiterate people. There were 102 volunteers who participated in this study, of which 50% of subjects were in experimental group, and 50% of them were in control group. There has not been a single form of education relating this study of the included subjects before they joined the research. Completion of the questionnaire has been according to ethical code and terms of anonymity.

Results

The highest number of test subjects answered with 60% correct answers. It has been recorded that 24,5% of the test subjects answered less than 50% of the questions correctly. It has also been recorded that 24,5% of the test subjects answered above 50% of the questions correctly (picture 1).

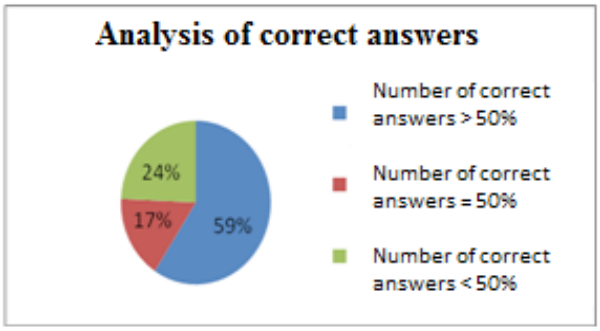

Figure 1. Assessment of correct answers in relation to the total number of participants testing
Slika 1. Procjena tačnih odgovora u odnosu na ukupan broj ispitanika

In this questionnaire, there was also a question about type of relationship that test subjects have with DM patients. 2/3 of the total number of test subjects said they knew a DM patient, or they themselves were DM patient. 29,4% of the test subjects did not know anyone suffering from diabetes while 9,8% of the test subjects were non-committal (picture 2).

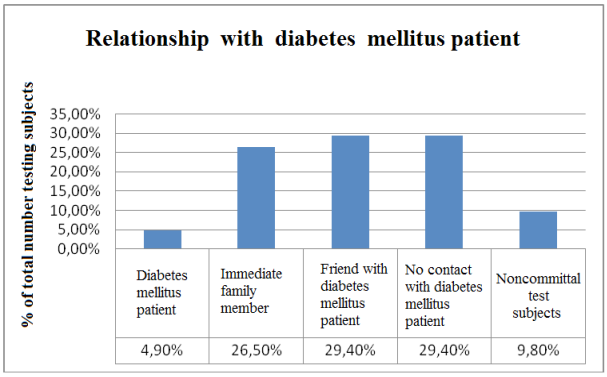

Figure 2. Knowing people with diabetes
Slika 2. Poznavanje oboljelih od dijabetesa

A significant connection has been established between the number of correct answers and the relationship with people suffering from diabetes. Three out of five test subjects who were in fact DM patients scored less than 33,3% correct answers, and seven out of twenty-seven test subjects who have a family member suffering from DM scored less than 50% correct answers (picture 3).

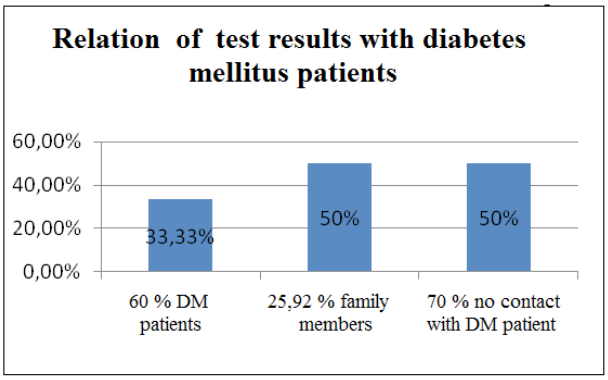

Figure 3. Relation of test results with being a *diabetes mellitus* patient or knowing a DM patients
Slika 3. Veza rezultata odgovora ispitanika sa poznavanjem osoba oboljelih od dijabetesa

It is concluded that patients and their family members need to be educated additionally about the illness in order to reduce cases of complications relating diabetes.
It is very important to emphasize the fact that 65% of the family members had the value of fasting blood glucose test above 6,7 mmol/l, and that they did not have a diagnosis established earlier (table 2).

Table 2. Data of the experimental and control group of volonteers
Tabela 2. Podaci o ekperimentalnoj i kontrolnoj skupini ispitanika

Connection with DM patient	Value of fasting blood glucose		number of test subjects
	>6,7 mmol/l	<6,7 mmol/l	
DM patient	22	6	28
Immediate family member	22	12	34
No contact with DM patient	3	27	30
Noncommittal	4	6	10
Total	51	51	102

Conclusion

Although *Diabetes mellitus* is one of the most common types of endocrine disease in the world, diabetes patients are still not educated enough about their disease. This education is conducted through individual doctor-patient conversation, work in small groups, leaflets and brochures, lectures and association of diabetologists in Bosnia and Herzegovina. Prevention of diabetes involves change of lifestyle, reducing body weight, daily physical activity and healthy diet. Inadequate diet, lack of physical activity, obesity, insufficient education relating risks, symptoms, prevention and treatment of diabetes can lead to heavy diabetes complications.

The results of the research show that diabetes patients and members of their family are not informed enough about risks, symptoms and treatment of this disease. The results of a research on how much diabetes patients know about their illness obtained in Heath centre Zajecaj show that they are well informed about their illness. Despite all that, great number of test subjects do not have fasting glycemia regulated, belong to the group of obese people and do not have five daily meals (Jovanovic i Bogdanovic-Zivkov, 2005).

Education of the diabetes patients and especially their family members promptly should be primary in diabetes prevention in order to prevent and treat any possible complications.

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ZNAČAJ ZNANJA BOLESNIKA I ČLANOVA NJIHOVIH PORODICA O RIZICIMA, SIMPTOMIMA, LIJEČENJU I PREVENCIJI DIJABETESA TIPA II

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Sažetak

Uvod: Diabetes mellitus je jedno od najčešćih endokrinoloških oboljenja u svijetu. Veliki je uticaj znanja bolesnika i članova njihovih porodica o dijabetesu tipa 2 na smanjenje rizika, liječenje i prevenciju bolesti.
Cilj: Cilj istraživanja je procijeniti povezanost znanja bolesnika i članova njihovih porodica o osnovnim rizicima, simptomima, liječenju i prevenciji dijabetesa tipa 2.
Metode i ispitanici: Studija je provedena anketiranjem 102 dobrovoljca u Tuzli metodom slučaja. Instrument za istraživanje je bio samodizajnirani upitnik o rizicima, simptomima i liječenju oboljelih od dijabetesa. Mjerene su vrijednosti glukoze na tašte kod svih ispitanika.
Rezultati: Rezultati istraživanja ukazuju da bolesnici od dijabetesa tipa 2 i članovi njihovih porodica nisu dovoljno educirani o rizicima, simptomima i liječenju šećerne bolesti.
Zaključak: Utvrđena je značajna veza između broja tačnih odgovora sa poznanstvom oboljelih od dijabetesa.

Ključne riječi: diabetes mellitus, faktori rizika, simptomi, liječenje i prevencija, inzulin