

ASSESSMENT OF RISK FACTORS FOR DIABETES MELLITUS TYPE 2

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ABSTRACT

Introduction: Diabetes is a group of metabolic diseases characterized by hyperglycemia, and represents a disease of the modern age, disease of the 21st century. Prevention of this disease is listed as imperative. Aim of this article was to evaluate questionnaires on the assessment of risk factors for Diabetes Mellitus type 2. **Material and Methods:** A total of 540 questionnaires handed out randomly to citizens of Canton Sarajevo of all ages, sexes and educational levels (in January 2016) were analyzed. **Results:** Analyzed questionnaires showed relatively low risk of getting diabetes in the next ten years in the majority of the population. These results are rather encouraging but may in some way be in confrontation with the statistics which show a rapid outburst of diabetes. **Conclusion:** The life-style is the main reason for such a thing to happen, and looking at these questionnaires, we might get the feeling that we really do live in a, conditionally speaking, physically active society. That, from our everyday experience is not entirely true. It would be wise to continue doing research on this topic on the territory of Bosnia and Herzegovina. **Key words:** Diabetes mellitus type 2, Risk factors. Sarajevo Canton.

1. INTRODUCTION

Diabetes is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both (1). The chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction, and failure of different organs, especially of eyes, kidneys, nerves, heart, and blood vessels (1). The main forms of diabetes are divided into those caused by lack of insulin secretion, due to damage of β -cells of the pancreas (type 1 DM), and those that are a consequence of insulin resistance that occurs at the level of skeletal muscles, liver and adipose tissue, with varying degrees of β -cells damage (type 2 DM). Diabetes Mellitus classification is shown in Table 1.

The prevalence of type 2 diabetes is increasing globally and represents a heavy burden on public health and socio-economic development of all nations (3). Type 2 diabetes is a multifactorial disease and due to a combination of environmental and genetic risk factors (many environmental risk factors contribute to the pathogenesis of type 2 diabetes, including lifestyles such as sedentary behavior, diet, smoking and alcohol consumption, internal environmental factors such as inflammatory factors, adipocytokines and hepatocyte factors, external environmental factors such as environmental endocrine disruptors) (3).

Genetic base in type 2 DM is complex and incompletely defined. So no isolated known defect predominates, as is

the case with HLA connection with type 1 DM. Type 2 DM is more common in certain ethnic and racial groups. It was found that the risks for diabetes in African-Americans, Hispanics, and Native Americans are approximately 2, 2.5, and 5 times greater, respectively, than in Caucasians. People can often have diabetes and be completely unaware. The main reason for this is that symptoms, when seen on their own, seem harmless. However, the earlier diabetes is diagnosed, the greater the chances are that serious complications, which can result from having diabetes, can be avoided. Most common diabetes symptoms are: frequent urination, disproportionate thirst, intense hunger, weight gain, unusual weight loss, increased fatigue, irritability, blurred vision, cuts and bruises do not heal properly or quickly, skin and/or yeast infections, itchy skin, gums are red and/or swollen—gums pulled away from teeth, frequent gum disease/infection, sexual dysfunction among men, numbness or tingling, especially in feet and hands.

2. AIM

The aim of this paper was to evaluate questionnaires on the assessment of risk factors for Diabetes Mellitus type 2 in order to get information about risk of population for getting Diabetes Mellitus type 2 on the territory of Canton Sarajevo (Bosnia and Herzegovina).

3. MATERIAL AND METHODS

A total of 540 questionnaires handed out randomly to citizens of Canton Sarajevo of all ages, sexes and educational levels (in January 2016) were analyzed. This paper has prospective and analytical character.

4. RESULTS

In a survey conducted by the students of Medical Faculty, University of Sarajevo a total of 540 people were questioned. Out of that number, there were 254 males (47%) and 286 females (53%). The research was done in Canton Sarajevo in four municipalities: Center (46% of questionnaires), Novo Sarajevo (20%), Novi Grad (27%) and Stari Grad (7%). In determining the age of the examinees there were five categories used, the first one being the group of young people under the age of 35 years and the last group categorized as elder people with the age over 64 years (below 35 years – 42%, 35-44 years 16%, 45-54 years 18%, 55-64 years 15%, over 64 years 9%). In determining the height of the examinees, the answers were of an open type, so considering all the given numbers a classification has been made in total of 8 categories with a range of 5 cm in between. The first category included the height under 150 cm and the last with height over 186 cm (the largest number of respondents, 30% of them were in the range of 170-175 cm). The weight of the patients was also of an open type, and after all the given number there has been a classification with a total of six categories, with a range of 10kg, the first one considering all the values under 49 kg and the last all the values above 90kg. The largest number of respondents were in the range 70-79 kg (32%). In the survey while asking the examinee of their body mass index (BMI), this number was only approximate considering

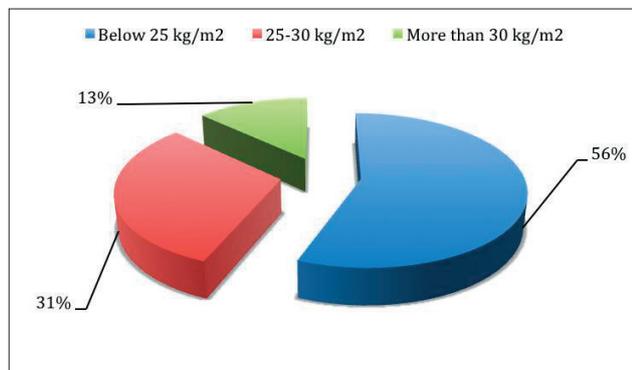


Figure 1. BMI index of examinees

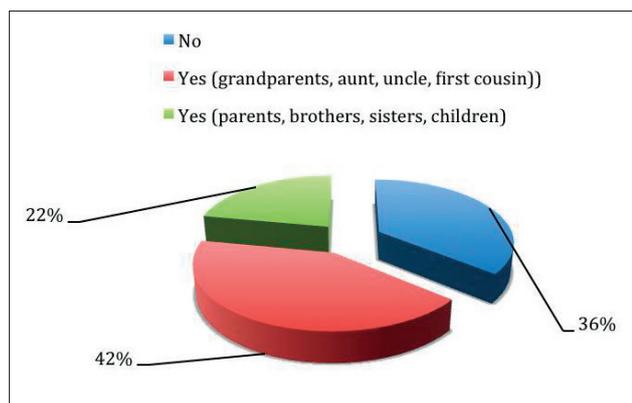


Figure 2. Family history of examinees

I. Type 1 diabetes (β-cell destruction, usually leading to absolute insulin deficiency)
A. Immune mediated
B. Idiopathic
II. Type 2 diabetes (may range from predominantly insulin resistance with relative insulin deficiency to a predominantly secretory defect with insulin resistance)
III. Other specific types
A. Genetic defects of β-cell function
1. MODY 3 (Chromosome 12, HNF-1α)
2. MODY 1 (Chromosome 20, HNF-4α)
3. MODY 2 (Chromosome 7, glucokinase)
4. Other very rare forms of MODY (e.g., MODY 4: Chromosome 13, insulin promoter factor-1; MODY 6: Chromosome 2, <i>NeuroD1</i> ; MODY 7: Chromosome 9, carboxyl ester lipase)
5. Transient neonatal diabetes (most commonly ZAC/HYAMI imprinting defect on 6q24)
6. Permanent neonatal diabetes (most commonly KCNJ11 gene encoding Kir6.2 subunit of β-cell K _{ATP} channel)
7. Mitochondrial DNA
8. Others
B. Genetic defects in insulin action
1. Type A insulin resistance
2. Leprechaunism
3. Rabson-Mendenhall syndrome
4. Lipotrophic diabetes
5. Others
C. Diseases of the exocrine pancreas
1. Pancreatitis
2. Trauma/pancreatectomy
3. Neoplasia
4. Cystic fibrosis
5. Hemochromatosis
6. Fibrocalculous pancreatopathy
7. Others
D. Endocrinopathies
1. Acromegaly
2. Cushing's syndrome
3. Glucagonoma
4. Pheochromocytoma
5. Hyperthyroidism
6. Somatostatinoma
7. Aldosteronoma
8. Others
E. Drug or chemical induced
1. Vacor
2. Pentamidine
3. Nicotinic acid
4. Glucocorticoids
5. Thyroid hormone
6. Diazoxide
7. β-Adrenergic agonists
8. Thiazides
9. Dilantin
10. γ-Interferon
11. Others
F. Infections
1. Congenital rubella
2. Cytomegalovirus
3. Others
G. Uncommon forms of immune-mediated diabetes
1. Stiff-man syndrome
2. Anti-insulin receptor antibodies
3. Others
H. Other genetic syndromes sometimes associated with diabetes
1. Down syndrome
2. Klinefelter syndrome
3. Turner syndrome
4. Wolfram syndrome
5. Friedrich ataxia
6. Huntington chorea
7. Laurence-Moon-Biedl syndrome
8. Myotonic dystrophy
9. Porphyria
10. Prader-Willi syndrome
11. Others
IV. Gestational diabetes mellitus
Patients with any form of diabetes may require insulin treatment at some stage of their disease. Such use of insulin does not, of itself, classify the patient.

Table 1. Diabetes Mellitus classification (2)

the height and weight of the examinee and wasn't taken in a professional manner. BMI from examinees was dominantly below 25 kg/m² (Figure 1).

After evaluating these basic information on phenotype characteristics of the examinees, the next group of questions referred to risk factors on diabetes type 2 and it's possible manifestation. Did any of your close relatives have diabetes – is the basic information in every family history which can roughly show us the history of this disease amongst the closest relatives of our examinee (Figure 2).

Our further questions were related to the risk factors concerning the environment but which have the effect on the progress of diabetes. These questions are as follows: Do you have at least 30 minutes of physical exercise daily (including regular daily activities) and how often do you eat fruit, vegetables, grains. The question: do you suffer from high blood pressure is a manifestation of some other

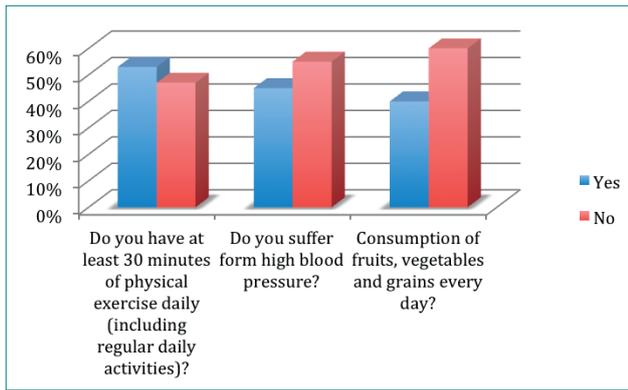


Figure 3. Risk environment factors

chronic disease for which the examinee also has got or not genetic predispositions.

Was a high blood sugar level ever detected earlier (e.g. during regular testing in pregnancy or during other illness) is a question from the patients history and can also roughly show us the history of blood sugar levels in our patients (answer Yes was given from 35% of examinees). The last question: do you have any of the listed symptoms (fatigue, paleness, excessive sweating, heart thumping, shaking, reduced vision, itching, often infections, cramps in legs, problems with concentration, excessive hunger, dry mouth and excessive thirst, excessive urinating, urinating at night) is a question whether or not there are already visible manifestations of diabetes and are there chronic illnesses which may imply on further progress of diabetes type two. In the first group of symptoms we have: paleness, fatigue, excessive sweating, heart thumping, shaking, reduced vision, itching, often infections, cramps in legs, problems with concentration, excessive hunger and dry mouth. In the other group of symptoms we have: excessive thirst, excessive urinating, urinating at night (Figure 4).

5. DISCUSSION

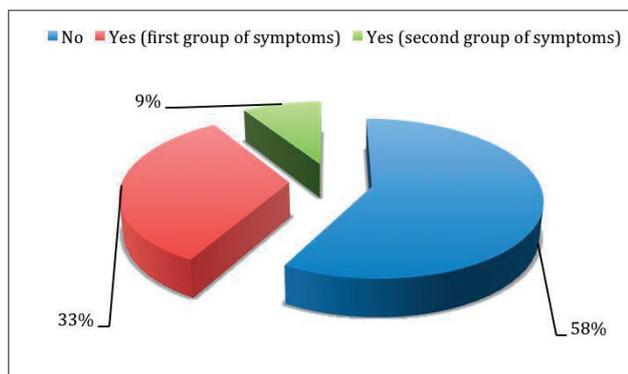


Figure 4. Symptoms of disease

The fact is that by development of Bosnia and Herzegovina and approaching European standards and norms, the awareness of the disease is growing, and also awareness of the importance of therapy including pharmacological and lifestyle changes. At the end after finalizing the points that each question carried and after finalizing the risk factor for the onset of diabetes type two in the next ten years, a total of five categories was used to describe these probabilities (Table 2, Figure 5).

Less than seven points – Low: 1 out of 100 will develop diabetes
7 out of 11 points – Fairly low: 1 out of 25 will develop diabetes
12 out of 15 points – Moderate: 1 out of 6 will develop diabetes
16 out of 20 points – High: 1 out of 3 will develop diabetes
Over 20 points – Very high: 1 out of 2 will develop diabetes

Table 2. Risk groups of patients

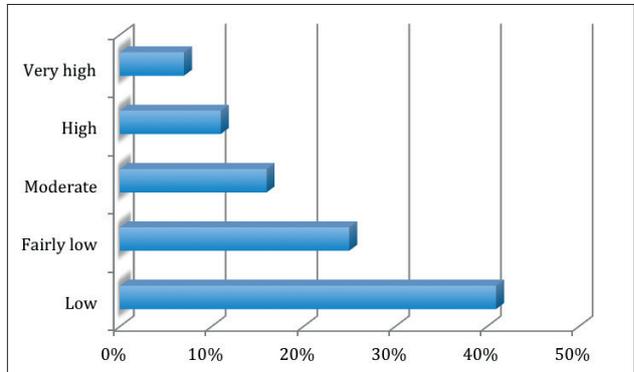


Figure 5. The amount of risk for the onset of diabetes type two in the next ten years

Type II DM patients generally carry a number of risk factors for CVD, including hyperglycemia, abnormal lipid profiles, alterations in inflammatory mediators and coagulation/thrombolytic parameters, as well as other ‘nontraditional’ risk factors, many of which may be closely associated with insulin resistance. Therefore, successful management of CVD associated with diabetes represents a major challenge to the clinicians.

The Japanese trial included 458 men randomized to receive either intensive lifestyle intervention (n = 102) or standard intervention (n = 356). The aims of the intensive intervention were body weight reduction if BMI was ≥22 kg/m², to consume large amounts of vegetables while reducing the amount of other foods by 10%, reduction of fat (<50 g/day) and alcohol intake (<50 g/day), and physical activity >30–40 min/day, and result was that 4-year incidence of type 2 diabetes in the intervention group was 67% lower than in the control group (6).

Number of people living with diabetes is expected to rise from 366 million in 2011 to 552 million by the year 2030, if no urgent action is taken (this equates to approximately three new cases every ten seconds or almost ten million per year) (7). One fifth of all adults with diabetes live in the South-East Asia region (8).

The results of studies on the state of health of population in the Federation of Bosnia and Herzegovina have shown that over fifth of the population older than 18 years (21.7%) have value of blood glucose equal or higher than 6.1 mmol/l. (9) The rate of the population with diabetes in the Federation is continuously growing and the number of diseased is considered to be undervalued because Federation of Bosnia and Herzegovina has not established a register of people with diabetes, but the data is not comprehensive and monitoring of indicators is not enough.

The fact is that this is a major problem, and also it burdens already fragile health care system in Bosnia and Herzegovina (it is estimated that in Bosnia and Herzegovina in year 2011, patient with diabetes gives an average of 629 USD for the treatment of diabetes and its complications, and such funds, by development of more expensive drugs,

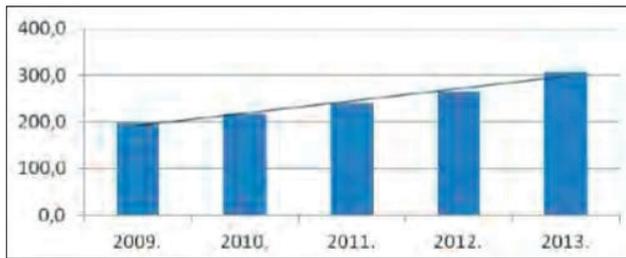


Figure 5. Diabetes disease rate of the population of the Federation of Bosnia and Herzegovina, 2009–2013–rate /10.000 inhabitants (9)

are growing from year to year). This is corroborated by the results of Study on the state of health of the population in the Federation of B&H, in which 9.6% of the population older than 18 years reported that a doctor at any time in their life diagnosed diabetes (9).

In the Federation of Bosnia and Herzegovina, according to estimates of the International Diabetes Federation (IDF), over 166,000 persons have diabetes, or about 9.2% of adult population. This percentage will grow significantly unless decisive and systematic measures on suppression for this epidemic of modern times are taken.

Establish a registry of people with diabetes in the FB&H should be one of the main goals of the health system, and after that the monitoring or continuous collection of data on the disease.

Diabetes is a social disease because it is massive and chronic, as its treatment is expensive and lifelong, which reduces the ability to work and shortens working life of the diseased, which makes it difficult to maintain social relations of the diseased in the family, school, workplace and environment. The emergence of first chronic complications in patients creates uncertainty, which is transmitted to the family and work environment (10).

This increases already high cost of treatment of these patients and sometimes beyond economic opportunities and family health insurance. Consequently, the prevention of type II DM is imperative especially in primary health care.

6. CONCLUSION

As seen earlier (Figure 4) there is a relatively low risk of getting diabetes in the next ten years in the majority of the population. These results are rather encouraging but may in some way be in confrontation with the statistics which show a rapid outburst of diabetes. The life-style is the main reason for such a thing to happen, and looking at these questionnaires, we might get the feeling that we really do live in a,

conditionally speaking, physically active society. That, from our every-day experience is not entirely true. However, good attitude and knowledge about diabetes amongst society is present which is good news and derives from all the media campaign and promotion programs in hand. This study has a lot of limitations, but it would be wise to continue doing research on this topic, perhaps making the next studies more complex, ruling out the main reasons for the onset amongst these already listed risk factors, statistically calculating each variable, and making these questionnaires more complex as well as including other means of information gathering, such as interviews, reviewing medical records etc. This is just a starting point for further research.

- All authors participated in all phases of research realization, data statistical analysis and preparing this article.
- Conflict of interest: None declared.

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