

RISK FACTORS FOR DIABETES TYPE 2 DEVELOPMENT. COMPARISON OF 6 MAJOR RISK FACTORS PREVALENCE BETWEEN NEWLY DIAGNOSED DIABETES PATIENTS FROM BIHOR COUNTY AND THE POPULATION WITH NORMAL GLUCOSE TOLERANCE FROM PREDATORR STUDY

Vesa Cosmin Mihai^{1,2}, Popa Amarin Remus^{1,2}

¹Clinical County Emergency Hospital of Oradea, v_cosmin_15@yahoo.com

²Faculty of Medicine and Pharmacy from Oradea, University of Oradea

Abstract

Diabetes mellitus represents a public health problem because of its growing prevalence and the enormous costs for its treatment and complications. There are numerous risk factors for diabetes mellitus development but the most important ones are the modifiable factors. In Bihor County the prevalence of obesity and sedentary behaviour in the population of newly diagnosed patients are increased compared to their prevalence in the population without diabetes. Promotion of healthy eating habits and increased physical effort are the most important measures to prevent diabetes mellitus type 2, which accounts for 90-95% of total diabetes cases. Public health programs that bring together physicians, nutritionists, teachers and target groups (children, young people, obese and overweight people) must be initiated in general population from an early age and maintained in order to promote the adherence to a healthy lifestyle.

Key word: risk factors for diabetes mellitus development

Rezumat

Diabetul zaharat reprezintă o problemă de sănătate publică din cauza prevalenței în creștere și costurilor enorme asociate tratamentului și complicațiilor acestuia. Sunt numeroși factori de risc pentru apariția diabetului zaharat, dar cei mai importanți sunt cei modificabili. În județul Bihor, prevalența obezității și a sedentarismului sunt crescute comparativ cu prevalența acestora în populația fără diabet. Promovarea unei alimentații sănătoase și a activității fizice sunt cele mai importante măsuri de prevenție a diabetului zaharat de tip 2, care reprezintă 90-95% din totalul de cazuri de diabet zaharat. Programele de sănătate publică în care comunică medici, nutriționiști, profesori și grupuri țintă (copii, tineri, persoane supraponderale, obeze) trebuie să fie inițiate de la vârste mici și menținute pentru a crește aderența la un stil de viață sănătos.

Cuvinte cheie: factori de risc pentru apariția diabetului zaharat.



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Introduction

Diabetes mellitus prevalence in 2017 was about 424 million cases, with the prediction that in 2045 there will be 628 million cases of diabetes mellitus worldwide. Healthcare cost regarding the treatment of diabetes mellitus and its complications are of approximately 727 billion dollars yearly⁽¹⁾. This epidemic is highly preventable; the increase of diabetes cases worldwide appears as a consequence of an increase of type 2 diabetes cases and the most important risk factor for diabetes type 2 is obesity⁽²⁾.

Material and methods

Identification of the main risk factors, modifiable and non-modifiable, responsible for type 2 diabetes development was performed with the help provided by scientific data. In patients newly diagnosed with diabetes mellitus from Bihor County in 2016 and 2017 we identified the prevalence of obesity, hypertension, sedentary behaviour, dyslipidaemia, smoking, and family history of diabetes in order to compare the prevalence of these risk factors with their prevalence in the population with normal glucose tolerance from PREDATORR study.

Results and discussions

Obesity represents the most important modifiable risk factor for diabetes type 2. This

causative association maybe is best illustrated by the fact that in the United States of America 64 to 74% of diabetes cases would be prevented if the body mass index would be lower than 25kg/m²⁽²⁾.

Obesity is associated not only with high diabetes risk but also with high blood pressure and atherogenic dyslipidaemia⁽³⁾. Also obesity is associated with metabolic syndrome. Metabolic syndrome represents an association between obesity, hypertension, dyslipidaemia, glucose intolerance and dyslipidaemia⁽⁴⁾. These factors are known to increase the cardiovascular risk, considering the fact that insulin resistance is the main element responsible for type 2 diabetes apparition⁽⁵⁾, and that insulin resistance is responsible for most components of metabolic syndrome the patients with type 2 diabetes have an increased risk of cardiovascular morbidity and mortality.

Hypertension is another risk factor for diabetes, although here the association is not causal⁽⁶⁾. The explication is that both hypertension and diabetes type 2 are caused in great majority by obesity.

Education programs addressing diabetes prevention are necessary in Bihor County considering the increasing prevalence of diabetes with a doubling of the number of cases from 2000 to 2009⁽⁷⁾.

PREDATORR study performed between 2013 and 2014 in Romania identified a prevalence of 11.6% of diabetes mellitus⁽⁸⁾. Presence of

different risk factors known to influence the development of diabetes mellitus was determined both in the diabetic population and in the population with normal glucose tolerance.

Non-modifiable factor
Race
Genetic factor
Age
Male gender

Table 1. Non-modifiable factor for type 2 diabetes development

The modifiable and non-modifiable risk factors for diabetes mellitus^(9, 10) are enumerated in table 1 and table 2. The impact of modifiable risk factors is significant and as a consequence prevention measures have been established in order to prevent diabetes type 2. The most important measures include increasing physical effort to a minimum of 150 minutes of moderate intensity weekly and an adequate diet. Two types of diets can represent examples of healthy eating habits that reduce the risk of diabetes mellitus. Mediterranean diet consisting of an increased intake of fruits, nuts, fish, seafood, whole grains diminishes the risk of type 2 diabetes (RR=0.87). DASH diet consisting of increased intake of fruits, cereals rich in fibres, dairy products with low fat content, reduces the risk of type 2 diabetes (RR=0.81)

Modifiable factor
Sedentary lifestyle
Increased intake of lipids –quantitative
Increased intake of saturated fatty acids
Increased intake of carbohydrates with high glycemic load
Increased intake of red processed meat
Increased intake of dairy products with high fat content
Smoking
Low socio-economic status

Table 2. Modifiable factor for type 2 diabetes development

We assessed the prevalence of 6 risk factors for type 2 diabetes in newly diagnosed diabetes mellitus patients from Bihor County in 2016 and 2017. 4 of the 6 risk factors were causative risk factors as identified by data from literature: obesity, sedentarism, familial history of diabetes mellitus, smoking and 2 were risk factors with predictive value: hypertension and dyslipidaemia, they do not cause directly diabetes mellitus but their presence means the existence of metabolic alterations, for example insulin resistance,



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that can lead to diabetes development. In 2016 among the newly diagnosed diabetes patients 52.01% were obese, 68.47% had hypertension, 71.20% had dyslipidaemia, 24.32% were smokers, 29.47% had a sedentary lifestyle, and 35.70% had familial history of diabetes mellitus.

Comparing the prevalence of these risk factors with their prevalence in the population with normal glucose tolerance from PREDATORR study, we observe that the strong predictor factors for diabetes type 2 development are obesity (OR=3.28), hypertension (OR=1.31), sedentarism (OR=1.62) and familial history of diabetes mellitus (OR=2.11).

In 2017 among the newly diagnosed diabetes patients 56.93% were obese, 72.83% had hypertension, 73.40% had dyslipidaemia, 22.80% were smokers, 31.52% had a sedentary lifestyle, and 34.20% had familial history of diabetes mellitus. Comparing this prevalence of these risk factors with their prevalence in the population with normal glucose tolerance from PREDATORR study, we observe that the strong predictor factors for diabetes type 2 development are obesity (OR=4.00), hypertension (OR=1.62), sedentarism (OR=1.92) and familial history of diabetes mellitus (OR=1.98).

The high prevalence of obesity and sedentarism in the patients with newly diagnosed diabetes mellitus, and the great

impact of obesity and sedentarism on the risk of developing type 2 diabetes raises the need for public health programs focused on educating population from Bihor County about the lifestyle modification necessary to prevent diabetes development. The main recommendation would be to increase physical activity and to promote healthy eating habits with high intake of fruits, vegetables, whole grains, fish similarly to Mediterranean diet and DASH diet. Young people from our county have little information about risk factors for health⁽¹¹⁾, education for health (EFH) and health promotion (HP) are mandatory for the prevention diabetes, because type 2 diabetes, as data from literature demonstrates, is a preventable disease. The successful results of other health-programs regarding population education⁽¹²⁾ or promoting physicians communication⁽¹³⁾ active in Bihor county, gives us the hope that by gathering together diabetes physicians, primary care physicians teachers and pupils the understanding of the main principles for preventing diabetes and their application in real life will increase from early ages.

Conclusions

In 2016 and in 2017 obesity appears to be the most important risk factor for diabetes type 2 development in Bihor County. It is followed by

Risk factor	Bihor patients with newly diagnosed diabetes in 2016(n=3451)	PREDATORR population with NTG (n=1953)	OR diabetes	p-value
Obesity	52.01%	24.80%	3.28 (CI:2.90-3.71)	<0.01
Hypertension	68.47%	62.30%	1.31 (CI:1.17-1.47)	<0.01
Dyslipidaemia	71.20%	76.40%	0.7 (CI:0.67-0.87)	<0.01
Smoking	24.32%	28.30%	0.8 (CI:0.71-0.92)	<0.01
Sedentarism	29.47%	20.50%	1.62 (CI:1.42-1.85)	<0.01
Familial history of diabetes mellitus	35.70%	20.80%	2.11 (CI:1.85-2.40)	<0.01

Table 3. Risk factors for diabetes development in Bihor County in 2016. Comparison with the their prevalence in the population with normal glucose tolerance from PREDATORR study

Risk factor	Bihor patients with newly-diagnosed diabetes in 2017 (n=2705)	PREDATORR population with NTG (n=1953)	OR diabetes	p-value
Obesity	56.93%	24.80%	4.00 (CI:3.52-4.55)	<0.01
Hypertension	72.83%	62.30%	1.62 (CI:1.43-1.84)	<0.01
Dyslipidaemia	73.40%	76.40%	0.85 (CI:0.74-0.97)	<0.01
Smoking	22.80%	28.30%	0.74 (CI:0.65-0.85)	<0.01
Sedentarism	31.52%	20.50%	1.92 (CI:1.67-2.20)	<0.01

Table 4. Risk factors for diabetes development in Bihor County in 2017. Comparison with the their prevalence in the population with normal glucose tolerance from PREDATORR study



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positive familial history of diabetes and sedentary behaviour. Also hypertension is a good predictor of diabetes risk. Smoking did not represent a risk factor for diabetes and the presence of dyslipidaemia did not predict diabetes risk. These results demonstrate that lifestyle and familial inheritance play the most important role in type 2 diabetes development.

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