Polish Forum for Prevention Guidelines on Diabetes

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Kardiol Pol 2008; 66: 1020-1023

Introduction

The prevalence of diabetes is rising at an alarming rate throughout the world. By 2030 it is expected that more than 360 million people will have diabetes [1].

The dramatic rise in diabetes prevalence is mainly due to the increase in the number of people with type 2 diabetes, amounting to 85–95% of all cases. Direct causes of increased diabetes-related morbidity include increased life expectancy, obesity, high-calorie diet and sedentary lifestyle. Obesity and type 2 diabetes affect more frequently children and young adults. More than half of people with type 2 diabetes are not aware that they have the condition.

Impaired fasting glucose (IFG) and impaired glucose tolerance (IGT) are pre-diabetic states of dysglycaemia apart from diabetes.

Type 2 diabetes and pre-diabetes are frequently associated with other atherosclerotic risk factors – arterial hypertension, lipid disorders and obesity – with diabetes increasing several-fold the absolute risk of cardiovascular disease.

Clinical symptoms of diabetes are not present in more than half of people with the disease. For this reason screening is recommended for this condition.

Available evidence shows that mass population screening is not warranted; however, screening of high-risk patients is acceptable.

In almost 60% of patients with acute coronary syndromes and in almost 40% of patients with stroke, diabetes or impaired glucose tolerance is diagnosed for the first time on admission. An active search for diabetes is warranted in these groups of patients.

The Finish Diabetes Risk Score (FINDRISC) [2] is a useful pre-screening method for the detection of diabetes in the general population. The Score is used to assess the need for glycaemic control and to determine the risk of developing diabetes, myocardial infarction and stroke within 10 years.

Hyperglycaemia increases cardiovascular morbidity and mortality due to coronary artery disease, cerebral vascular disease and peripheral vascular disease. In type 1 diabetes the risk of developing cardiovascular disease is related to age and duration of the disease, being several-fold increased in patients with diabetic nephropathy. In type 2 diabetes overall risk of cardiovascular disease is increased in all patients, being higher as early as in pre-diabetic states. Type 2 diabetes-related mortality risk is equal to that found in patients with a previous myocardial infarction,

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and myocardial infarction in patients with diabetes increases the risk of reinfarction or death to 45%.

The adverse impact of diabetes on prognosis is associated with clustering of risk factors that precipitate atherosclerosis, presence of diabetic microangiopathy and metabolic cardiomyopathy, presence of diabetic cardiovascular autonomic neuropathy, and direct impact of chronic and acute hyperglycaemia. Cardiovascular mortality increases with progression of diabetes, that is progression of metabolic disorders and severity of complications.

Glycaemia at 120 min of oral glucose tolerance test (OGTT) is a better marker of cardiovascular risk than fasting glycaemia, and increased glycaemia after OGTT also increases the risk even if fasting glycaemia is normal. Premenopausal diabetic women are at higher risk of acute coronary syndromes and cardiac death than non-diabetic women and men.

Successful treatment of type 1 diabetes mellitus, i.e. maintaining near-normoglycaemia, decreases the risk of cardiovascular morbidity and mortality and reduces the risk of development and progression of microangiopathic complications. A reduction of HbA1c by 1/10 (10%) of the baseline value is associated with a 20% reduction of cardiovascular events [3].

Multifactorial treatment for type 2 diabetes is the most effective intervention; therefore all target values for carbohydrates, lipids and blood pressure should be achieved in line with lifestyle modification and overweight reduction [2, 4]. Treatment should be tailored to the patient's needs, taking into account age, and presence and severity of cardiovascular disease [5, 6].

Despite the strong relationship between glycaemia at 120 min of OGTT and risk of cardiovascular morbidity and mortality, there is still controversy regarding whether reduced postprandial glycaemia decreases the risk. However, it is recommended to combine pharmacological and non-pharmacological treatment (low-glycaemic load diet).

Because of the high risk for developing cardiovascular disease in diabetic patients, including asymptomatic without typical manifestations, it is recommended to search for coronary artery, cerebral and peripheral vascular disease.

Interventions in a pre-diabetic state include instructions to reduce body weight and increase physical activity, and pharmacological treatment with metformin in high-risk patients. It is also advised to modify other cardiovascular risk factors. Prevention of type 2 diabetes in children and young adults consists of measures aiming at elimination of major risk factors, including bad dietary habits, obesity and sedentary lifestyle, mainly through education by parents, tutors, teachers and society on healthy lifestyles.

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1. Criteria for the diagnosis of carbohydrate abnormalities:
   Diabetes mellitus:
- instantaneous glycaemia ≥11.1 mmol/l (200 mg/dl) in patients with the symptoms of hyperglycaemia (excessive thirst, polyuria, weakness, decreased body mass)

or

- fasting glycaemia ≥7.0 mmol/l (126 mg/l) on two occasions irrespective of the symptoms of hyperglycaemia

or

- glycaemia >11.1 mmol/l (200 mg/dl) at 120 min after a 75-g oral glucose tolerance test (OGTT).

   Pre-diabetes:

- impaired fasting glucose: 5.6-6.9 mmol/l (100-125 mg/dl) after overnight fast and <7.8 mmol/l (140 mg/dl) at 120 min of OGTT,
- impaired glucose tolerance: 7.8-11.0 mmol/l (140-199 mg/dl) at 120 min of OGTT.

It is recommended to determine venous blood glucose concentration in a quality certified laboratory.

2. The prevalence of diabetes mellitus is increasing rapidly all over the world. In Poland 7% of men and 6% of women in the general population have diabetes. This percentage grows with advancing age and reaches 16% among men and 20% among women in the 65-74 age group. Among subjects visiting a doctor the prevalence of diabetes mellitus is higher than that in the general population, i.e. 15%, including diagnosed diabetes in 2/3 with the remaining 1/3 requiring screening. In Poland there are no reliable epidemiological data on the prevalence of undiagnosed and old-age diabetes.
3. Type 2 diabetes mellitus and type 1 diabetes mellitus with nephropathy increase the risk of atherosclerotic

cardiovascular disease (CVD) – 2-3 times in men and 3-5 times in women. Pre-diabetes also contributes to the increased risk. Glycaemia after an OGTT is a better marker of CVD risk than fasting glycaemia.

4. Successful treatment of type 1 diabetes mellitus, i.e. maintaining near-normoglycaemia, results in a 2-fold decrease in the risk of CVD morbidity and mortality and reduces the risk of the development and progression of diabetic retinopathy, nephropathy and neuropathy. In subjects with type 2 diabetes a 1% reduction of HbA_{1c} is associated with a 37% reduction in microangiopathic complications, a 14% reduction in myocardial infarction, a 16% reduction in heart failure and a 21% reduction in diabetes-related death. In subjects with type 2 diabetes the maintenance of HbA_{1c} <6% reduces the risk of myocardial infarction to the level found in non-diabetic subjects. In type 2 diabetes drugs acting by increasing insulin sensitivity have a beneficial effect on CVD risk. In subjects with impaired glucose tolerance regular physical activity and reduced body mass are associated with an almost 60% reduction in type 2 diabetes.
5. Screening for diabetes should be performed in women and men >45 years of age, and in the high-risk group irrespective of age. Subjects at high risk include those with overweight (BMI ≥25 kg/m^2), familial diabetes (parents or siblings), sedentary lifestyle, previous abnormal fasting glycaemia or glucose intolerance, hyperlipidaemia [HDL cholesterol <1 mmol/l (40 mg/dl) for both sexes and/or triglycerides >2.85 mmol/l (250 mg/dl)], arterial hypertension, cardiovascular disease, and women with a history of pregnancy-induced diabetes, polycystic ovarian syndrome and women delivering babies >4 kg in weight. Screening should be performed by general practitioners within the current healthcare system. The first-line investigation should be the determination of fasting blood glucose levels. In subjects with abnormal fasting glycaemia 5.6-6.9 mmol/l and in subjects with normal blood glucose levels but with cardiovascular disease, metabolic syndrome, glycosuria, in pregnant women and in the elderly an OGTT is recommended as an additional investigation. In subjects with normoglycaemia screening should be repeated every 3 years. Pre-diabetic subjects should be screened for diabetes every 1-2 years.
6. Type 2 diabetes mellitus and pre-diabetes are frequently associated with other modifiable atherosclerotic risk factors: arterial hypertension, lipid disorders and obesity. To reduce CVD risk diabetic and pre-diabetic subjects should undergo re-education and intensive lifestyle modification (diet, regular physical activity, weight reduction, smoking cessation), monitoring and treatment of other atherosclerotic risk factors – hypertension and lipid disorders. In the management of diabetes all target values for carbohydrates, lipids, blood pressure and body mass should be achieved. Treatment should be tailored to the patient's needs taking into account hypoglycaemia risk, patient education and the benefit-risk ratio.
7. In some subjects it may be difficult to achieve treatment goals; for this reason it is recommended to achieve values as close as possible to the target.

   The target value for HbA_{1c} ≤6.1% is acceptable in educated patients without significant risk of hypoglycaemia. HbA_{1c} should be monitored twice a year (every 3 months in children and adolescents and in subjects with labile diabetes). In patients with high cardiovascular risk and advanced diabetes complications the target value of HbA_{1c} should be rather ≤6.5%. This target should be achieved rather slow and stepwise.

   Blood pressure should be measured during routine follow-up visits.

   In type 2 diabetes it is recommended to determine lipid values at the moment of diagnosis, and then monitor once a year in the case of normolipidaemia or more frequently if necessary until the target values are achieved. In type 1 diabetes lipid levels should be monitored every 2-5 years depending on CVD risk. In diabetes lipidogram parameters should be analyzed routinely.

   During follow-up visits body mass and preprandial and postprandial glycaemia with self-monitoring should be

Table I. Type 2 diabetes treatment goals

HbA_{1c} (%) DCCT standard	≤6.1 to ≤6.5*
Fasting and preprandial venous plasma glucose [mmol/l (mg/dl)]	≤6.0 (110)
Glucose levels with self-monitoring: fasting and preprandial [mmol/l (mg/dl)] postprandial [mmol/l (mg/dl)]	 4.0-5.0 (70-90) to 7.5 (135)
Blood pressure [mmHg]	<130/80
Total cholesterol [mmol/l (mg/dl)]	<4.5 (175)
LDL cholesterol [mmol/l (mg/dl)]	<2.5 (100)
LDL cholesterol in diabetic subjects with coronary artery disease [mmol/l (mg/dl)]	<1.9 (70)
HDL cholesterol [mmol/l (mg/dl)]	>1.0 (40), [for women + 0.275 (10)]
Non-HDL cholesterol [mmol/l (mg/dl)]	<3.4 (130)
Triglycerides [mmol/l (mg/dl)]	<1.7 (150)

checked, and patients should receive education and be pressured to comply with treatment and modify their lifestyle. Dietary recommendations should include carbohydrates 45-50% (glycaemic index <50), fats 30-35% (saturated fats <10%, trans fats <2%), protein 15-20% of the caloric value. Physical activity is an integral part of diabetes management.

8. In the pharmacological treatment of hyperglycaemia in type 2 diabetes several factors should be considered, namely insulin resistance and insulin secretion disorders, fasting and postprandial glycaemia, and progressive character of the disease. To achieve metabolic control, treatment with oral drugs should be intensified and if necessary followed by insulin therapy. Education should be offered in each stage of the disease and patients should be instructed how to self-monitor glucose levels, what the treatment goals are and how to modify their lifestyle.
9. In diabetic subjects at high risk of CVD screening for coronary artery disease, cerebral vascular disease and peripheral vascular disease should be taken into account.
10. In secondary and primary prevention of CVD patients with type 1 and type 2 diabetes >40 years of age or with additional CVD risk factors (familial CVD, arterial hypertension, dyslipidaemia or albuminuria) should receive acetyl salicylic acid.

    Diabetes is not a contraindication for thienopyridine derivatives or anticoagulation drugs, which should be administered as recommended for non-diabetic subjects.