Metabolic Diseases
Diabetes mellitus

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History

- The first mention of the disease are dated from the period of ancient Egypt and later Greece, Rome, Arab countries, India and China
- The oldest written records have been found in Egyptian tomb at Thebes in 1552 BC
- In 1889 Minkowski and Mehring prove, a causal relationship between the pancreas and diabetes
- Edward Sharpey-Schafer determine the cause of diabetes - it is damage to the endocrine part of pancreas and the substance necessary for the metabolism of carbohydrates called Insulin
- In 1921, Frederick Banting and Charles Best first isolated insulin (in 1923 received the Nobel Prize for this discovery)

Definition of Diabetes

- metabolic diseases characterized by impaired carbohydrate metabolism. This is caused by insufficient production of insulin or reduced susceptibility to insulin

- Insulin is a polypeptide secreted by the β-cells of pancreatic islets of Langerhans and is important for normal glucose utilization in most cells of the organism. For people suffering from diabetes is the ability of cells to use glucose reduced. This leads to an increase in blood sugar levels - hyperglycemia (> 11.1 mmol / l)

Diagnostics

- The basic examination of a patient with suspected diabetes mellitus is a urinalysis for sugar and acetone. This test is indicative.

- Crucial to the diagnosis of diabetes is to determine level of blood glucose (blood sugar). The disease is proved if the value of fasting blood glucose greater than 7 mmol / l. Also, when the blood glucose at any time within 24 hours notwithstanding food is greater than 11 mmol / l.

Symptoms

- The clinical symptoms of diabetes include:
  - polyuria, frequent and profuse urination (more than 2500 ml/24 hours)
  - frequent urination at night
  - excessive thirst caused by osmotic diuresis
  - weight loss with normal appetite (ravenous hunger in children with weight loss)
  - weakness and prolonged fatigue
  - pain and muscle spasms
  - itching, purulent skin infections
  - visual disturbances
  - fungal diseases

Classification of Diabetes

- **We distinguish two basic forms of diabetes:**
  - Diabetes mellitus type I
    (insulin dependent or juvenile diabetes as well)
  - Diabetes mellitus type II
    (non-insulin dependent)

Diabetes mellitus type I

- The cause of the disease is an autoimmune destruction of β cells. Insulin deficiency is absolute and its concentration is low to nil. The actual cause of this phenomenon is not sufficiently known. It is disease with sudden onset of significant subjective complaints. This type of diabetes prone to ketoacidosis most commonly affects children, adolescents and young people to 35 years. It is not associated with obesity. In families where diabetes type I is occuring, formed on the same genetic basis other autoimmune diseases.

Diabetes mellitus type II

- The cause of this type of disease is insulin resistance, or failure of insulin secretion. The lack of insulin is relative and its concentration is normal, often elevated. Usually occurs after 40 year of the individual. The incidence is associated with overweight or obese. It is therefore a combination of genetic predisposition and external factors. The influence of external factors is reduced by physical activity and increased by intake of nutrients. Effect of reduced physical activity and excesses in caloric intake is the cause of increase in the prevalence of diabetes II. type.
- The high genetic risk of developing the disease is in its closest relatives from 50 to 100%.

Complications of Diabetes

- All complications manifested during disease are based on the basis of changes in small blood vessels - diabetic microangiopathy (specific tissue microcirculation disturbance). The main reason for the development of diabetic microangiopathy is a long-term decompensation of diabetes, hyperglycaemia, but also hypertension, high blood fats and other factors.

These are mainly:

- Kidney - Diabetic nephropathy
- Eye - diabetic retinopathy
- Nerve disorders
- Diabetic foot

Acute Complications of Diabetes

- This is especially about the situations in which is the diabetic patient in immediate danger to life.

These are mainly:

- Hypoglycemia, hypoglycaemic coma
- Hyperglycemia, hyperglycaemic coma

First Aid in addition to general practice is in both situations hypoglycemia and hyperglycemia filing sugar.

Prescription of physical activity in diabetes

- We work with only compensated diabetic patient without serious organ disease.

- Properly chosen physical activity (PA) leads to increase muscle mass - it is a storehouse of glycogen. From there, it can decrease blood glucose in the case of glucose release, so there is less blood glucose fluctuations during the day and during exercise. PA is also an important tool in weight reduction, especially at DM type II. In addition, systematic sports training increases the sensitivity of cells to insulin.

- From the viewpoint of prevention of hypoglycemia should observe the following recommendations:
  - Exercise after meals to higher baseline levels of sugar and always carry some form of sugar.
  - Observe liquid intake
  - Repeated difficulties during exercising always consult with a physician if any adjustment of insulin doses.
  - In the treatment with application of insulin to control blood glucose levels before and after exercise, and especially if it is done when the physical activity after a long time, longer than an hour, or with unusual intensity.

Principles for safe physical activity in diabetes

- It is necessary to know the patient's health condition (whether it is in the mode of insulin or oral antidiabetic use).
- know the symptomatology of acute conditions DM
- Be able to correctly resolve the acute conditions DM

- To respect the needs of diabetics to the current need for thirst, sugar .....
- Monitor heart rate, follow the appropriate intensity of load
- exercise unit adapted to age, type of DM and level of physical fitness
- Required the cooperation of diabetologists especially in children and seniors

Training Unit and its content

- Training unit begins 2 hours after a meal and two hours of application of insulin. Insulin should be injected into a muscle that is not overly burdened. Before the exercise, it is necessary to determine blood glucose.
- In the introductory part of the exercise units will focus on warm-up and activation of the body.
- The corrective part of unit will focus primarily on improving joint mobility and normalization of muscle tonus.
- In main part of unit is reduced overweight and increased cardiovascular fitness
- The final part of the unite serve to relaxation, calm down and to the total elimination of tension.

Exercising of diabetics dependent on insulin

- The intensity of the load in main part of unit should not exceed 60-70% of maximum heart rate. Aerobic and strength exercises should be interrupted by relaxation according to the needs of trainees. PA performed at least 4 times a week in length about 40 minutes

Diabetics with pharmacological treatment

- Trained diabetics without any serious organ complications may also attend regular sports clubs. Load should not exceed 70% of maximum heart rate.
- Diabetic patients with organ complications and atrophic muscles maintain the intensity of the load to 50% heart rate maximum. Exercising should be at least 20 minutes a day. Exercising is necessary consult with physician.
- As outdoor activities is walking recommended (however it increases the risk of diabetic foot). Therefore, it is preferable to include swimming, cycling, rowing, aerobic gymnastics on balls.