

MOVEMENT AS MEDICAMENT FOR PATIENTS WITH DIABETES MELLITUS

Iveta PETRÍKOVÁ ROSINOVÁ^{1*}

¹ Faculty of Healthcare, Alexander Dubček University of Trenčín in Trenčín, Študentská 2, 911 01 Trenčín, Slovak Republic

* Corresponding author E-mail address: iveta.rosinova@tuni.sk

Received 23. 07. 2013; accepted 16. 08. 2013

Abstract

Diabetes mellitus is a very important component which influences overall metabolism of patients with significant impact on their daily activities. Regular physical exercise, especially repeated contraction of large muscle groups, is of great importance for the patients.

The following movement activities have positive effect on physical and mental health: swimming, walking, jogging, gymnastics, and cycling for at least 40 minutes three times a week, with the load intensity of about 50 - 70 % of the maximum power.

Keywords: diabetes mellitus, physical activity, healthy life–style

1 Introduction

Currently diabetes mellitus is an incurable disease. On the other side it is very good treatable. The ideal treatment is based on the active cooperation of the patient and the doctor. Treatment is a complex process, in which various components are equally important. It consists of three basic steps: in compliance with dietary measures, physical activity and in the use of medications or administering of insulin when it is needed [1-4]. In keeping with the first two points, i.e. the use of diet with reduced amount of sugar and fat, and increasing of physical activity can prevent not only the use of tablets and insulin, as well as all accompanying complications. The individual steps are not interchangeable – tablets and insulin cannot replace the non-observance of the dietary recommendations or physical passivity [5, 6].

2 Physical exercise in healthy persons

In healthy persons at the beginning of exercise first the energy is obtained from reserves of glycogen in the muscles. However, its resources are limited. Later during continuing physical activity there are used glucose and free fatty acids circulating in the blood. The amount of insulin needed for glucose uptake in the muscles below the uptake at rest. At the same time with the increasing recapture of glucose in muscle cells there is observed the formation of glucose in the liver. Initially glycogenolysis increase followed by the increase of gluconeogenesis. The production of glucose by the liver is influenced by hormonal changes. After an initial decrease in insulin levels, follows the increase of the levels of glucagon and adrenaline. Muscle tissue is used as energy source mainly through the use of fatty acids [7].

3 The beneficial effects of exercise in diabetics

In diabetics it is known that physical exercise in the form of training not only improves the sensitivity of tissues to insulin level by increasing the number of receptors, but also the insulin postreceptors could improve the glucose tolerance. In addition, it improves the lipid spectrum in the blood as it reduces the level of total cholesterol and the fraction of HDL-cholesterol. At the same time there was observed increased tolerance which positively affects the body

burden and also quality of life. It positively affects body weight in obese and blood pressure [7].

Preventive effects of physical exercise are known to have low physical training, that is linked to all the components of the metabolic syndrome. A sedentary lifestyle is a major factor in the development and rapid worsening of obesity etiologic. For physically active people have lower incidence of hypertension and a regular physical training benefic artery in the prevention of a rise in blood pressure. Physical training increases the activity of lipase in muscle, which improves the profile of lipoproteins. About 25% of diabetics 2. type lies in the way of life and are extremely sedentary making it seems that regular adequate exercise reduces the risk of DM 2. type of 30-50%.

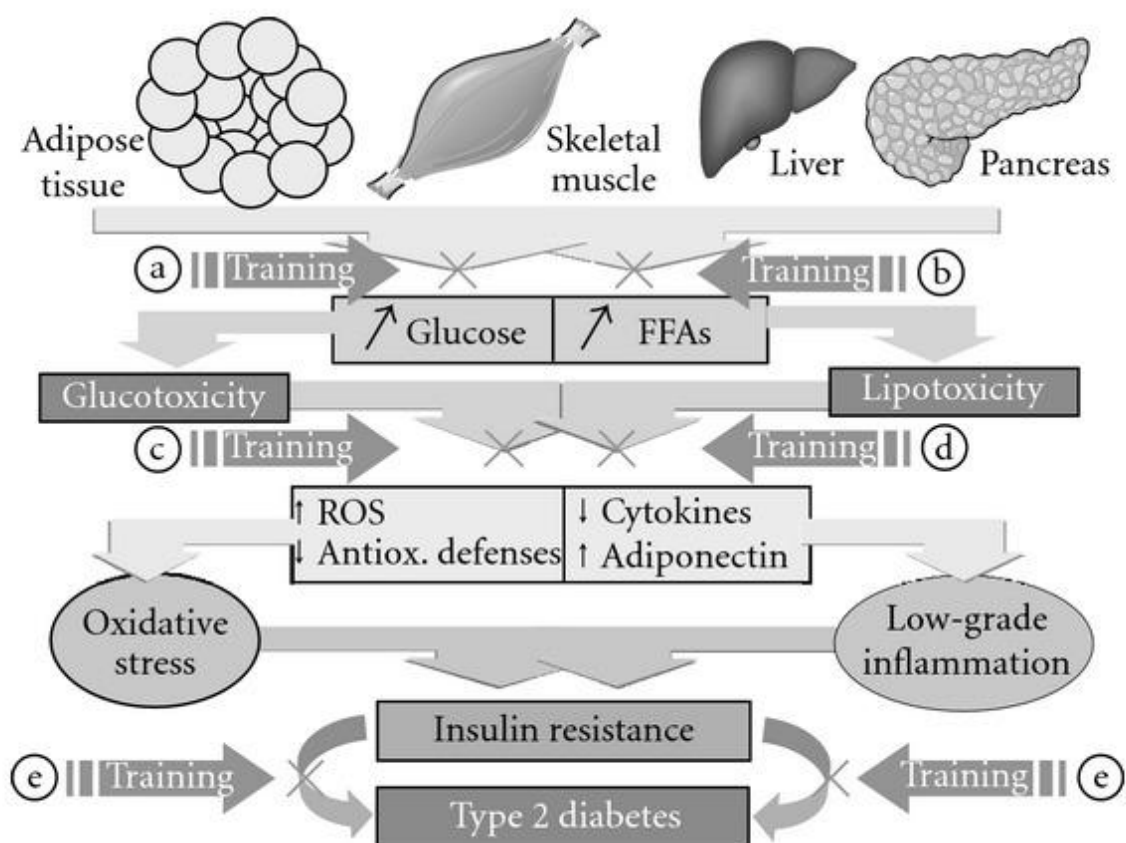


Fig. 1 Schematic illustration of the proposed effects of regular physical exercise (training) in type 2 diabetes: exercise training exerts antihyperglycaemic (a), antidyslipidaemic (b), antioxidant (c), and anti-inflammatory (d) effects and thus prevents/delays the development of T2DM (E). FFAs, free fatty acids; ROS, reactive oxygen species [10]

Population studies suggest that only a few people get adequate physical exercise. Long term participation in the programs of physical training is usually very weak and about 50% of the people retreats from them. Therefore it is important to make exercise for patients nice, preferably in the circle of his family and it should become part of the lifestyle.

Exercise is an integral part of the treatment process. The importance and effectiveness of physical activity is comparable to the medication. The movement is clearly beneficial and therefore also desirable for every diabetic. It does not depend on whether the patient has

diabetes mellitus 1. or 2. type, or whether is treated with "only" diet or diet in combination with tablets or insulin. In addition, successful prevention of exercise is the development of diabetes. It is useful for people who do not have diabetes, but has found are at increased risk of the disease (obesity, high blood pressure, use of certain medications, birth weight children was over, in the family occurs 4000g diabetes [8].

Physical activity directly affects metabolic parameters: reduces the level of sugar (glycaemia), glucose is used as a quick source of energy, increases the effectiveness of insulin and thereby; improves the utilization of glucose; increases the activity of glucose transporters; improving insulin resistance; reduces triglycerides; increases HDL cholesterol; and reduces LDL cholesterol (Fig.1) [9, 10].

4 Adverse effects of physical exercise in diabetics

In certain cases, the physical exercise could worsen complications of diabetes. Patients with diabetic neuropathy are exposed to the risk of bone fractures or skin bruising. In patients with proliferative retinopathy is exercise not suitable with sudden sharp movements of the head, or lifting heavy loads, which can cause bleeding into the vitreous. Diabetic patients with nephropathy may aggravate the proteinuria, physical exercise may increase blood pressure and in the presence of coronary artery disease may arise heart dysrhythmia. In addition, diabetic patients treated with insulin or oral antidiabetic agents could be threatened by the emergence of hypoglycaemia or hyperglycaemia (Fig. 2) [10, 11].

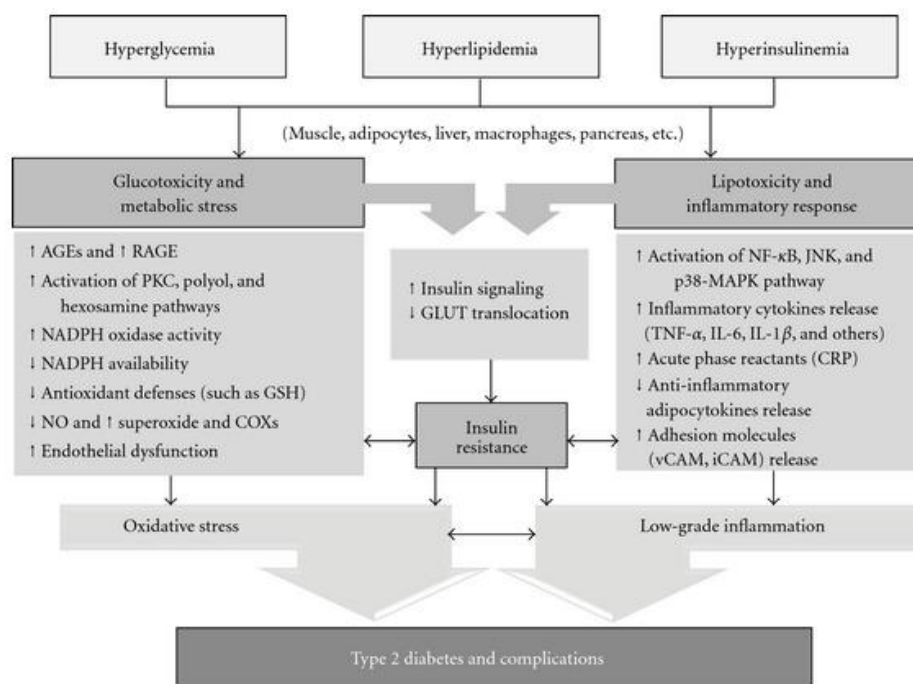


Fig. 2 Schematic illustration of some of the key pathophysiological aspects involved in the development of T2DM [10]

5 Practical guides for physical exercise in diabetics

The best forms of exercise for diabetics are those where there is a repeated contraction of large muscle groups, such as walking, jogging, swimming, gymnastics, and cycling at least 40 minutes at least 3 times a week. The intensity of the load should be about 50-70% of the maximum power specified by the frequency of the heart, or by using the oxygen consumption in spiroergometric test, depending on the degree of obesity, the state of the cardiovascular system and physical performance. Physical unit has to have a phase of warm up in the form of

calisthenics and to sitting back at the end of the exercise. General instructions for physical exercise diabetes are:

1. to use proper footwear,
2. to avoid exercise in extreme heat or cold,
3. to view the feet before and after exercise,
4. diabetes avoid exercise in a State of poor [12].

6 Conclusion

After physical activities into a daily program, there is not only to improve physical performance and mental well-being. The benefit rate is directly proportional to the intensity of its regularity and exercises. Here absolutely true "life is movement and movement is life". Never too late to start the rights step in the right direction. To protect your health is the best thing a person can do for themselves.

References

- [1] J. S. Freeman: Review of insulin-dependent and insulin-independent agents for treating patients with type 2 diabetes mellitus and potential role for sodium-glucose co-transporter 2 inhibitors. *Postgrad Med*, 2013, Vol. 125, No. 3, p. 214-26.
- [2] T. Blevins: Value and utility of self-monitoring of blood glucose in non-insulin-treated patients with type 2 diabetes mellitus. *Postgrad Med*, 2013, Vol. 125, No. 3, p. 191-204.
- [3] Z. Wang, J. Wang, P. Chan: Treating type 2 diabetes mellitus with traditional chinese and Indian medicinal herbs. *Evid Based Complement Alternat Med*, 2013, Vol. 2013, p. 343594.
- [4] K. Evans: Insulin pumps in hospital: a guide for the generalist physician. *Clin Med*, 2013, Vol. 13, No. 3, p. 244-247.
- [5] Z. Kubišová: Law aspects of health care. Conference proceedings Current policy questions, Trenčín: TnuAD, 2011 (in Slovak).
- [6] V. Uličiansky: Recommendations of Slovakia Diabetes Society for the diagnosis and treatment of type 2 diabetes mellitus, 1st Ed. Martin: P+M, 2007 (in Slovak).
- [7] J. Kasa: Sport as a socio-cultural phenomenon and human service, Conference proceedings New teaching methods and forms of physical education and sport, Trenčín: TnUAD, 2002, p. 58 (in Slovak).
- [8] A. Urvayová: Physical activity as prevention of diseases, Physical activity and sport in the lives of adults, 1st ed., Bratislava: SOV (in Slovak).
- [9] M. Mokáň, P. Galajda: The prevalence of diabetes mellitus and metabolic syndrome in Slovakia, *Diabetes a obezita*, 2006, Vol. 6, p. 18-29 (in Slovak).
- [10] E. Teixeira de Lemos, J. Oliveira, J. Páscoa Pinheiro, F. Reis: Regular Physical Exercise as a Strategy to Improve Antioxidant and Anti-Inflammatory Status: Benefits in Type 2 Diabetes Mellitus, *Oxid Med Cell Longev*. 2012, Vol. 2012.
- [11] I. Petriková Rosinová, O. Bočáková: Zdravie v kontexte správnej výživy a telesnej aktivity. 1st ed., Trenčín, TnUAD, 2008 (in Slovak).
- [12] J. Lipková: Barriers to regular physical activity. *Telesná výchova a šport*, 2003, Vol. 8, No. 4, p. 36 (in Slovak).

*Review: Marián Babčák
Petronela Šebestová*