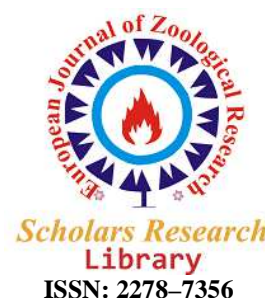




Scholars Research Library

European Journal of Zoological Research, 2014, 3 (2):86-93
(<http://scholarsresearchlibrary.com/archive.html>)



Exercise and diabetes mellitus type II (with approach to animal and human studies)

Mohammad Hassan Boostani*¹ and Saeed Khatamsaz²

¹Young Researchers and Elites Club, Zarghan Branch, Islamic Azad University, Zarghan, Iran

²Zarghan Branch, Islamic Azad University, Zarghan, Iran

ABSTRACT

Diabetes is one of the most common diseases of our era impairment of metabolism, especially the metabolism of sugar will happen. Insulin-dependent diabetes is a disease which is either wholly or partially dependent on insulin. Patients who are completely insulin dependent Type I diabetes and those who are relatively insulin-dependent diabetes have type II. Obesity is caused by the change of style diets and increasing longevity are the most important causes of this accident. Type 2 diabetes is the most common type of diabetes is usually associated with obesity. In this case, the body cannot produce enough insulin to break down glucose, blood sugar rises. Glucose levels more than twice as fast as those in America and Western Europe have increased over the past three decades. Among wealthy nations, diabetes and glucose in America, Malta and New Zealand and Spain, most cases in the Netherlands, Austria and France had the lowest. Despite the prevalence of obesity in Great Britain, but the rate of diabetes is lower than most other high-income countries. In other countries, Pacific island nations and Saudi Arabia also has one of the highest in the same manner. Blood glucose levels, especially in Southeast Asia, Latin America, the Caribbean, Central Asia, North Africa and the Middle East were high. The lowest level of glucose in sub-Saharan Africa and later in East and South East Asia. Therefore, due to the extremely important topic of diabetes, the present study examined the role of exercise in the control and prevention of type II diabetes was studied.

Keywords: Diabetes type II, Physical activity, Exercise, Prevention

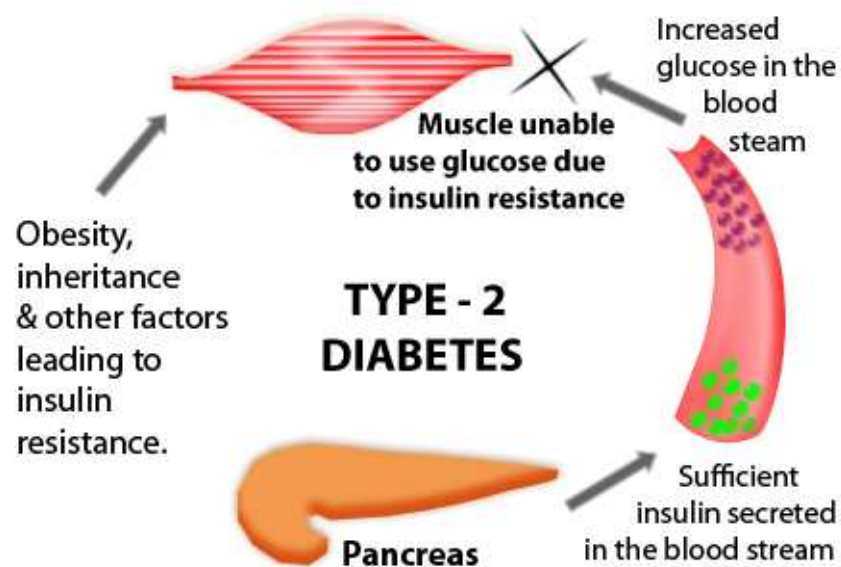
INTRODUCTION

Type II diabetes, also called non-insulin dependent diabetes, which are often due to the inability of cells to use glucose is formed. This is especially after a meal or a glucose tolerance test normal; it can be seen [1]. In type II diabetes, insulin deficiency is not necessarily a major problem, but a problem mainly target tissues, especially muscle seen so much in these tissues is insulin resistance [2]. In this case, the blood glucose levels of 7.8 mm or 140 mg per 100 ml of blood and cause hyperglycemia or hyper insulin higher fasting insulin provides numerous symptoms such as thirst, frequent urination, frequent urination and is associated with weight change [3].

Complications related to the disease, non-insulin dependent diabetes, usually the eyes, kidneys, nervous system and cardiovascular system-cardiovascular impact. Care of these patients should include efforts to reduce, delay and possibly prevent the complications. Considering that exercise can reduce the severity of type II diabetes, and improve overall quality of life in these patients, therefore, exercise should totally include part of an overall strategy to treat patients with non-insulin dependent [2].

Type II diabetes usually remove excess sugar after a meal due to carrier proteins in insulin resistance in target tissues is disrupted [4]. Sam worsens insulin resistance by increasing insulin and therefore may be necessary to supplement [1]. Neurological disease in type II diabetic patients, seen, or in those who are treated with insulin can lead to high blood pressure [5]. There is no doubt that the combination of these factors with the insulin resistance syndrome X as it creates a mysterious killer dubbed the disease occurs [3].

Because approximately 80% of patients with non-insulin dependent diabetes are overweight, a major factor in the genesis of insulin resistance, enlarged fat tissue growth, and at the center of the body, is pooled. Some research findings suggest that, in these patients, if they find a decrease in adipose tissue, insulin resistance is also low, and therefore, a reduction in body weight can be used as one of the key recommendations for treatment Type II diabetes, and even prevent it, consider [2].



Pathophysiology of non-insulin dependent diabetes

Non-insulin dependent diabetes mellitus, insulin resistance and insulin secretion impairment is high [6]. Increase Insulin resistance means that the insulin-sensitive tissues become resistant to insulin action. Thus, the glucose into tissues is not easy; this is a consequence of the rise in blood glucose concentration. Increased blood glucose causes the beta cells of the pancreas to secrete more insulin, but blood glucose levels remain normal. Unfortunately, this extra insulin is not usually effective in lowering blood glucose as compared to tissues have become resistant to insulin. Thus, type II diabetes usually develop hyperglycemia (increased blood sugar) are. Finally, the beta cells of the pancreas to secrete insulin lose your ability and then insulin therapy should be done [7].

Approximately, 80% of patients with non-insulin dependent diabetes, are overweight, a major factor in the genesis of insulin resistance, adipose know this group of people, large fat cells, are at the center of body fat, be concentrated [6]. Because the body is low in fat, insulin resistance can be reduced, thus reducing body fat, to reduce weight, one of the major issues is the treatment of type II diabetes patients [8].

Also, people who suffer from non-insulin dependent diabetes mellitus, have a very high potential to expand their pathological effects in different systems. In a comparison between patients wit and diabetes type II is done, have observed that in patients with diabetes mellitus type II, Corey 29 times, diseases of the retina 17 times, amputation 5 times and heart disease-Coronary three times more likely to occur [9]. Mechanisms certain that these effects are responsible for the increase in type II diabetic patients are different body systems, have remained unknown. However, several potential mechanisms have been proposed. It is thought to increase blood glucose concentrations in NIDDM is associated with the development of the affected organ systems are involved [2].

Retinal cells and organs for glucose uptake by insulin does not need, and this means that glucose uptake is directly related to blood glucose concentration, however, the long-term increase in blood glucose may leads to accumulation

of sorbitol and fructose in the retina and the nerves, and the rally is likely to develop edema, electrolyte imbalance, and ultimately to abnormal tissue may result [10]. Proteins such as hemoglobin, collagen, myelin, light and heavy lipoproteins (LDL and HDL) and albumin [11] can help.

Based exercise

In normal subjects, exercise reduces the risk of cardiovascular disease, improves insulin action, and the state provides prosperity and happiness. However, there is a possibility of sports injuries in sports. It has been suggested that exercise can also have benefits similar to those of type II diabetes [2]. Effect of exercise on blood glucose levels is inconsistent. One study found that 3 to 6 weeks of exercise training, but no effect on glucose tolerance improves intravenous glucose tolerance [12]. Physical activity, it is likely that significant changes occur in the oral glucose tolerance [2].

Also, exercise by reducing insulin resistance, texture, rising to a possible improvement in NIDDM. As the muscles, an important place for the use of glucose-induced insulin, and because muscle is consistent with exercise, so we can accept the hypothesis that changes in muscle after exercise, the probability of insulin resistance in people with type II diabetes mellitus decreases. In agreement with this hypothesis, there is evidence that the statement is that, after exercise, glucose-stimulated insulin of normal individuals and patients with non-insulin dependent diabetes mellitus, 35 per cent [7]. In addition, exercise insulin response to an oral glucose meal reduces [6].

As mentioned previously, one way of treating non-insulin dependent diabetes is that the body fat is reduced. Exercise, increases energy consumption, is likely to increase the basal metabolic rate, and therefore the most likely to reduce body fat is directly associated with improved insulin resistance [13]. Combination regimen of exercise in reducing body fat, regardless of treatment regimen is successful. In other words, exercise increase glucose uptake and glucose control are better, while avoiding foods or dietary therapy alone does not have a major impact on insulin resistance [8].

Apart from that exercise may improve glucose control in type II diabetic patients and is likely to reduce body fat; it also has the desirable effect on cardiovascular disease risk factors. In patients with non-insulin dependent diabetes mellitus, ischemic heart disease in men and 2.5 in women's doubles and 3.5 times more likely to be [10]. Most people with diabetes also have high blood fat, which in turn will increase the incidence of hypertension [14].

Table 1. Summary of benefits sport activity in people have diabetes type II

Benefit	Effect
Greater metabolic control	Increased uptake of glucose (sugar) by the exercising muscles Decreased reliance on insulin Decreased reliance on other diabetes-related medications
Improved lipoprotein (fat) profile	Combining aerobic and resistance training increases lean muscle tissue and decreases abdominal (visceral) fat
Reduced cardiovascular disease risk	Exercise improves blood pressure and stops the development of atherosclerosis

In patients with NIDDM, exercise may help lower blood triglyceride levels. It can reduce blood pressure in people with moderate hypertension [12]. In addition, epidemiological studies show that exercise reduces the incidence of cardiovascular disease in the general population [15].

Exercise, may also have an important psychological impact on the patient is diabetic. Physical activity, reduces stress, feels good and makes a lot of success, and gives a good impact on quality of life [16]. Although the determination of these effects, and to bring them in quantity, so it is difficult, but the results of studies of the effects of protection, and non-insulin dependent diabetes, is an important credit [2].

The role of exercise in the management of diabetes type II

1. Blood sugar levels and insulin sensitivity

Does exercise, in healthy non-diabetic individuals, have little impact on blood sugar levels, is. However, in people with type II diabetes, moderate and high intensity exercise activities, can reduce blood sugar levels may lead. Given that, even running a training session a week, often reduces plasma glucose levels, causes [17], thus reducing blood sugar in patients with type II, the effect of physical activity and Sports can be explained, doing exercise can increase glucose transporter proteins, and improved insulin sensitivity, and ultimately, to consume more glucose can lead [18].

2. Glucose transporter proteins

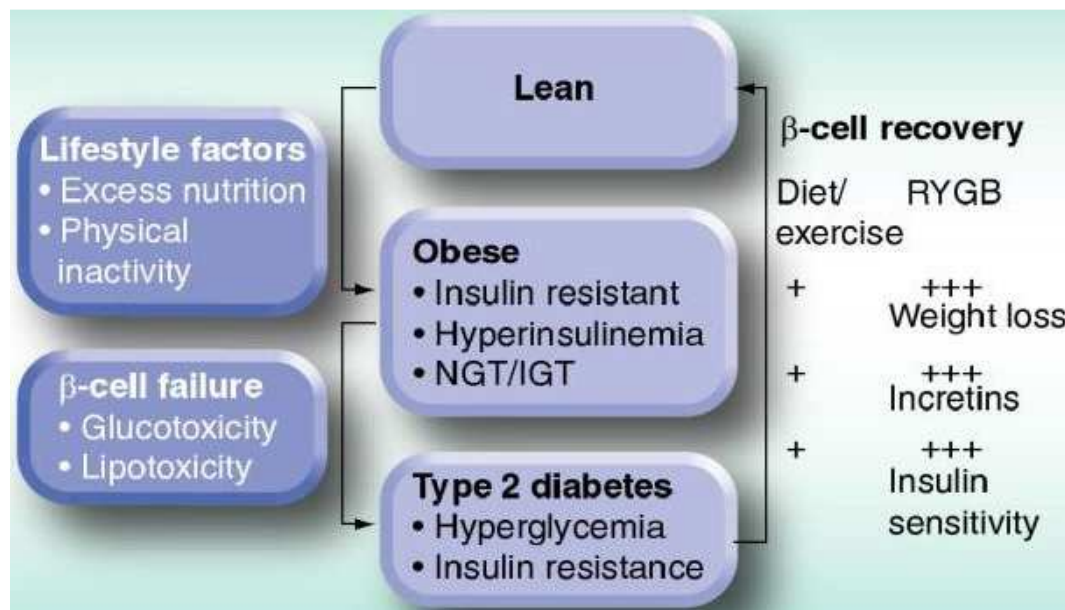
A possible mechanism for the role of physical exercise in type II diabetes, explains, is that the effect of exercise, increases glucose transporter protein levels, and thus, login glucose into muscle cells, and their use, and should be facilitated. Research findings have shown that the glucose transporter protein levels in young athletes compared with normal subjects, more [19] Thus, the glucose transporter protein levels in middle age people who work sports, and normal glucose tolerance or impaired glucose tolerance to them, or are suffering from type II diabetic patients compared with normal subjects, increases [20]. The Yen's, who have exercise, due to the increased activity of glucose transporter protein, insulin sensitivity improved [21]. On the other hand, the results of studies on rats indicate that, in patients with type II diabetes, insulin sensitivity are the problems, muscle twitching, makes that, in the absence of insulin, glucose entry into the cell muscle, and thus its use, be facilitated by them. Hence, in type II diabetic patients, doing regular exercise, can cause sugar in the cells, especially muscle cells become insulin sensitivity and improves the problem that the insulin receptors on muscle there has been overcome [22].

3. Weight control and cardiovascular risk factors-disease

Results of some studies have suggested that long-term, regular exercise in type II diabetic patients, ultimately leading to increased insulin sensitivity and metabolic control them. Sports activities, a good way to control weight is also observed that 80% of people with type II diabetes, are obese [2] and are more prone to obesity , so the becoming obese patients is avoided. On the other hand, other research findings have shown that exercise in type II diabetic patients, thereby reducing the risks of cardiovascular risk factors - disease is such that the levels of LDL, VLDL, and HDL cholesterol to increase [23].

4. The effect of physical activity in preventing type II diabetes

consider the inherited predisposition to develop Type II diabetes is not very strong and could underlie the lack of exercise and poor diet, and physical activity at work and the other one major determinant of whole body insulin and insulin sensitivity of skeletal muscle, it can be argued that there is a significant relationship between physical activity and insulin sensitivity [23] .Overall glucose by muscle cells. As mentioned, exercise and physical activity on blood insulin and glucose transporter protein and glycogen synthetase enzyme activity increases. It can be assumed that on the other hand, lack of exercise and overeating may automatically provide areas of developing type II diabetes. Thus, it can be stated that, doing regular exercise along with proper nutrition, a very good tool for preventing disease type II, especially in those areas are getting the right tool to control diabetes [17].



General advice and exercise for diabetics Type II

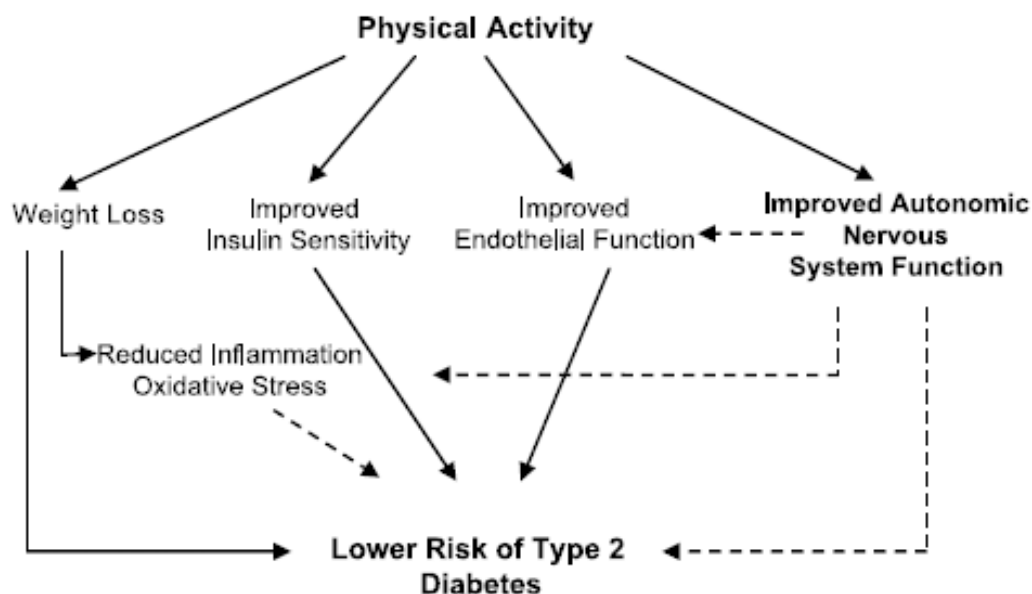
Specific recommendations for exercise in type II diabetic patients according to the degree of metabolic control, presence of associated injuries, disease duration, disease factors and varies. Because most people with non-insulin dependent diabetes mellitus, obesity and sedentary are often a major route for control their disease, develop strategies and incentives to increase their daily physical activity. This group of people before we get to run a sports program, they need to obtain permission to participate in physical activity; they have to be examined physician. Part of the treatment and diagnosis should include an exercise test also appears to be missing from cardiovascular disease. For these people, a lot of aerobic exercise is recommended, and while their company's anaerobic activities such as weight lifting should be avoided. Also, those patients with type II diabetes blood glucose lowering drugs or insulin injections are used when placed under an exercise program should regularly monitor their blood glucose to prevent hypoglycemia from occurring [2]. So:

- 1) Type II diabetes can exercise like normal people do pay.
- 2) During the exercise, the warm-up and cool-down body workout program is required.
- 3) Most of aerobic exercise such as walking, jogging, cycling, swimming, team games should be (but low-intensity activities such as weightlifting strength, but the account does not hurt).
- 4) Low to moderate intensity exercise should be about 50-40 to 70% of maximal oxygen consumption (VO_{2max}) or 50 to 85 percent of maximum heart rate [23].
- 5) Duration of physical activity at the beginning of each training session is recommended for 15 to 20 minutes and can be gradually increased to 30 minutes. If weight loss is on the agenda, you must use more energy; during a training session can be 60 minutes, and finally 90 minutes at an intensity of 50% maximum oxygen consumption increased [24].
- 6) Non consecutive exercise sessions per week to start with 3 to 5 times, and it aims to develop endurance, cardio-respiratory and energy consumption are increased. Also recommended that obese people consume more energy for physical activity and weight reduction are put on the agenda [25].
- 7) If strength training to increase muscle mass used, must be performed after aerobic activity.
- 8) Time for exercise during the day according to the severity of the condition and use of the drug is selected. If the medication cannot be like an ordinary person would exercise choice.
- 9) Exercise regularly done. If the train is released, after 3 to 10 days of training effects controlling diabetes disappears [20].
- 10) If you are doing exercise regularly, the risk of progression to diabetes or diabetes is prevented.
- 11) After exercise, drink plenty of fluids and juices will be available to prevent the occurrence of hypoglycemia.
- 12) Shoes and appropriate clothing should be used and care of wounds, particularly wounds toes if possible, because of the sensitivity of the diabetic foot due to peripheral nerve injury is reduced.

13) Try to exercise in hot environments where the temperature is high, do not. Because type II diabetic patients with potential problems in the regulation of body temperature due to nerve damage are automatic.

14) If you use insulin or oral medications to reduce blood sugar, blood glucose measurement and control more.

15) Try sugar before and after every workout can be controlled



Exercise for diabetics Type II

Physical activity and exercise may be an important adjunctive method for treating non-insulin dependent patients, but all people with diabetes do not exercise the same answer. When a sports program for these patients is used, it should be much (much) blood glucose control using insulin or glucose and other medical problems the patient down to the beats, should be considered. The possible occurrence of cardiovascular disease in diabetics, and also compared with missing a heart attack (slow) is higher, therefore, diabetic patients 40 years or older, history of diabetes disease is more than 10 years, before now, or starting an exercise program, be involved in the stress testing exercise.

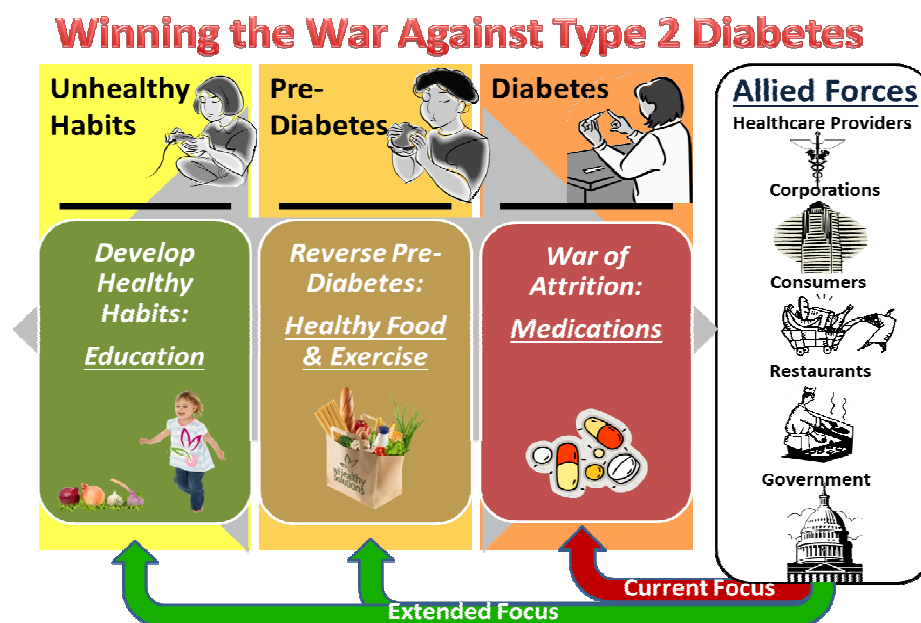
Type of exercise- Aerobic activities should be chosen exercise is a type II diabetic patient. Aerobic exercise, legs and upper part of the body's major muscle groups involved in moving and also should be done consistently. Appropriate aerobic activities include walking (march), jogging, cycling and swimming are. This type of exercise may lower glucose levels provide, improve cardiovascular health and possibly diabetes are healthier and safer. The majority (90%) of people with diabetes, obese people is, therefore, exercises and sports that do not carry their weight (such as swimming or cycling), more emphasis should be put up hiking or jogging. Possibility of joint and muscle injuries in sports that do not carry the weight, is less and may lead to improved symptoms. Anaerobic exercise (such as lifting weights) that significantly increases blood pressure, especially for those who have symptoms of retinal damage, nerve damage or vascular disease are known, is not recommended. Only with the permission and responsibility to participate in an anaerobic activity and inform a physician can be permitted [2].

Intensity and duration- Intensity or duration of exercise should be between 50-40% and 70% VO_{2max} between 20 to 60 minutes a day. The intensity and duration of exercise most likely will lead to weight loss and improved blood glucose control. Diabetic patients with severely impaired autonomic nervous not possible through exercise heart rate control, pressure equivalents MET why they should be administered to these patients [2].

Repeat the exercise- Exercise should be between 4 to 7 days a week to be held. Exercise 5 days a week is better than 3 days a week because it will increase the overall energy costs and thereby facilitate weight loss. People with diabetes who require insulin injections to control their blood glucose, they need to practice 7 days a week, because it will help to control glucose-induced insulin regimen, along with exercise and better retention of the [2].

Finally, in the case of non-insulin dependent diabetics who must woo:

- 1) People with non-insulin dependent diabetes mellitus [NIDDM] are generally insulin resistance and insulin secretion is small.
- 2) Non-insulin dependent diabetes, suffered various injuries in other parts of the body, including retinal damage, kidney damage, damage to the nervous system, and cardiovascular disease.
- 3) Regular physical activity where the muscle groups involved in that, if 4 to 7 days a week, every day for 20 to 60 minutes with an intensity of 50 to 70 percent of maximum oxygen uptake (VO_{2max}) implemented, likely to spread and syndrome and various other parts of the body to reduce damage.
- 4) Considering that 80 to 90 percent of people with non-insulin dependent diabetes, are overweight, so walking (march) and other low-intensity physical activity, such as a good practice that need to decrease body fat and to minimize the incidence of injury to be enforced. Such individuals should exercise extreme weightlifting and other physical activity that increasingly raise blood pressure, stay away because this type of exercise can increase risk of injury.
- 5) Type II diabetic patients before starting an exercise program should be examined by a doctor and consult with him to do. Before prescribing any exercise program, these people should be involved in an exercise stress test.
- 6) Choosing a lifestyle that is based on a lot of physical activity, may reduce the complications associated with NIDDM, reduce health care costs, and improves quality of life [2].



Practical approach

- 1) To evaluate the effects of exercise on blood glucose, blood glucose should be controlled before the next exercise.
- 2) When insulin injections or oral medications are used to lower blood glucose, blood glucose should be monitored more frequently.
- 3) Carbohydrates that are rapidly absorbed, such as fruit juice, while the sport should be available to respond in case of exercise-induced hypoglycemia occurs, may be used.
- 4) People with type II diabetes because of potential problems with the automatic temperature adjustment are related to nerve damage, high temperatures do not exercise.
- 5) The feet should be cared properly because diabetics sensitive feet due to peripheral nerve injury, is reduced, so the feet should be checked regularly and the suits will care.
- 6) Patients with non-insulin dependent diabetes mellitus during exercise should wear costumes that represent their diabetes is. Also, these patients need to exercise with a friend or colleague. A person with a person with diabetes, exercise should be aware that if a friend was unconscious, what action do [2].

Differences diabetes type I and II

In general, four groups of type 1 diabetes, type 2 diabetes, gestational diabetes and diabetes are classified as miscellaneous. 15-10% of all cases of diabetes, type 1 diabetes, which constitutes the pancreas to produce insulin (pancreas) due to the loss of insulin-producing cells, stops, so the people with this type of diabetes, the initial diagnosis of insulin if the body needs to supply daily injections. Type 1 diabetes usually occurs in children under 30 years. In type 2 diabetes in obese adults over 30 years and is seen in 90-85% of cases of pancreatic diabetes include insulin, does not function. In fact, either the pancreas does not secrete enough insulin or the insulin due to insulin resistance, especially in obese patients, it is not efficient enough. Gestational diabetes is diabetes that is first diagnosed during pregnancy. This type of diabetes is usually transient and resolves after pregnancy. Later, women with gestational diabetes are at risk for type 2 diabetes. Other causes of diabetes such as surgery, drugs (such as corticosteroids), poor nutrition, infection and pointed.

The most important factor in the world of fast food increase diabetes

Researchers, the main cause of the increasing number of diabetics in the world and the Western diet of fast food in developing countries know that to increase the level of the severity of the Obesity. Obesity is caused by the change of style diets and increasing longevity are the most important causes of this accident. Type 2 diabetes is the most common type of diabetes is usually associated with obesity. In this case, the body cannot produce enough insulin to break down glucose, blood sugar rises. Glucose levels more than twice as fast as those in America and Western Europe have increased over the past three decades. Among wealthy nations, diabetes and glucose in America, Malta and New Zealand and Spain, most cases in the Netherlands, Austria and France had the lowest. Despite the prevalence of obesity in Great Britain, but the rate of diabetes is lower than most other high-income countries. In other countries, Pacific island nations and Saudi Arabia also has one of the highest in the same manner. Blood glucose levels, especially in Southeast Asia, Latin America, the Caribbean, Central Asia, North Africa and the Middle East was high. The lowest level of glucose in sub-Saharan Africa and later in East and South East Asia.

REFERENCES

- [1] A Lwas; GM Reavon. *Ann Behav Med*, **1991**, 13, 125-132.
- [2] A Gaeini. *Olympic J*, **1998**, 11, 19-27.
- [3] N Bonen. *Can J Appl physiology*, **1995**, 20, 261-279.
- [4] A Klip; MR Paquet. *Diabetes Care*, **1990**, 13,228-243.
- [5] M Saffaran. *Trends Exp Med*, **1989**, 58-59.
- [6] E Horton. *Am J Med*, **1983**, 30, 32-37.
- [7] RA DeFronzo; E Ferrannini; V Koivisto. *Am J Med*, **1983**, 74, 5281.
- [8] RR Wing; LH Epstein; M Paternostro-Bayle; A Kriska; MP Nowalk; W Gooding. *Diabetologia*, **1988**, 31, 902-909.
- [9] JB Jaspén. *Metabolism*, **1987**, 2, 22-27.
- [10] ME Moltich. *J Am Optometric Assoc*, **1988**, 59, 842-852.
- [11] B Zinman; M Vranic. *Med Clin N Amer*, **1985**, 69, 145-157.
- [12] NB Ruderman; OP Ganda; K Johansen. *Diabetes*, **1979**, 28, 89-92.
- [13] P Bjorntorp; M Krotkiewski. *Acta Med Scan*, **1985**, 217, 3-7.
- [14] AR Chrislieb. *Diabetes care*, **1982**, 5, 50-58.
- [15] RS Paffenbarger; AL Wing; RT Hyde. *Am J Epidemiol*, **1978**, 108, 101-175.
- [16] JJ Vasterling; ME Sementilli; TG Burish. *Diabetes Educator*, **1988**, 14, 197-201.
- [17] H Wallberg; H Wallberg-Henriksson; J Rincon; JR Zierath. *Sports Med*, **1998**, 25, 25-35.
- [18] R Burstein; Y Epstein; Y Shapiro; I Charuzi; E Karnieli. *J Apple Physiolog*, **1990**, 69, 299-304.
- [19] PH Andersen; S Lund; O Schmitz; S Junker; BB Kahn; O Pedersen. *Aeta physiol Scand*, **1993**, 149, 4, 393-404.
- [20] JL Ivy. *Sports Med*, **1997**, 24, 321-336.
- [21] A Alijani. *Olympic J*, **2001**, 19, 63-72.
- [22] KE Berg. *Life Enhancement Publications, Champaign, Ill*, **1986**.
- [23] A Albright; M Franz; G Hornsby; et al. *Med Sci Sport Exer*, **2000**, 32,7, 1345-1360.
- [24] C Bouchard JP Deprés A Tremblay. *Obes Res*, **1993**, 1,133-147.
- [25] A Albright. *Am College of Sports Med*, **1997**, 94-98.