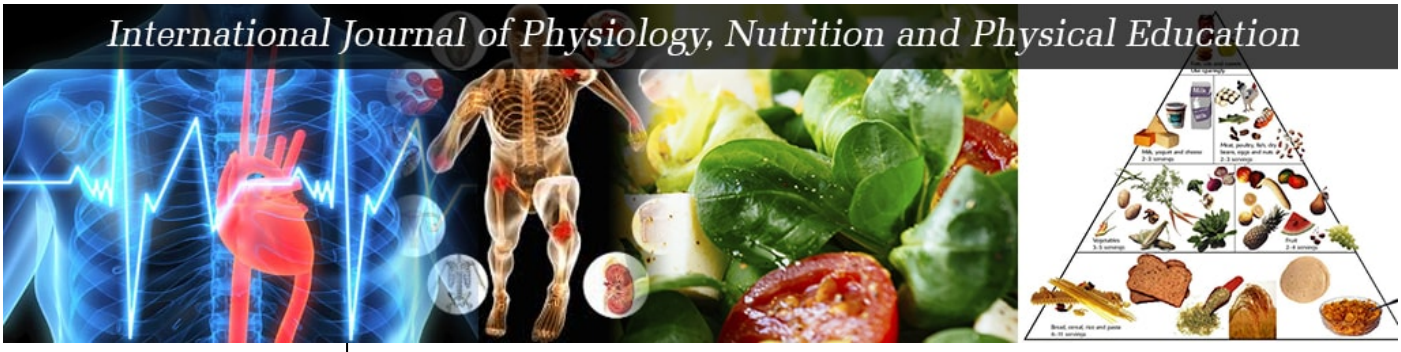

ISSN: 2456-0057
IJPNPE 2019; 4(1): 2502-2505

www.journalofsports.com
Received: 24-11-2018
Accepted: 04-01-2019

Bilal Mudasir
Scholar OPJS University Churu, Rajasthan, India

Dr. Raijudin
Assistant Professor OPJS University, Rajasthan, India

Corresponding Author:
Bilal Mudasir
Scholar OPJS University Churu, Rajasthan, India

Diabetes mellitus: Type 1 diabetes

Bilal Mudasir and Dr. Raijudin

Abstract
Type 1 diabetes is a chronic disease with hyperglycemia (high or very high blood sugar) due to a lack of insulin. Type 1 diabetes is treated with insulin, often with several injections a day.
In people with type 1 diabetes, blood sugar levels change during physical activity, mainly due to blood insulin levels. Because insulin levels are often higher during diabetes than in non-diabetes, the effects of treatment during exercise can easily lead to hypoglycemia. The tendency for hypoglycemia may continue for several hours after exercise. However, this risk can be avoided by planning diet and insulin doses in addition to exercise and exercise can most likely be reduced.

Keywords: Diabetes mellitus, hypoglycemia

Introduction
Regular exercise increases insulin sensitivity, especially in skeletal muscle, which reduces insulin needs. Because diabetes is associated with a much higher risk of cardiovascular disease, physical exercise is a particularly important issue for this group of patients, as well as non-diabetics, influencing risk factors such as increased blood fat and elevated blood pressure. In studies reported in the literature, exercise has not been shown to have a significant effect on glycemic control as measured by glucosylated hemoglobin (HbA1c). However, it is not excluded that in some cases better glucose control can be achieved by combining physical activity with other measures.
Like most people, people with type 1 diabetes should exercise for at least 30 minutes a day with at least moderate strength, such as brisk walking, cycling, and so on. The effect of aerobic fitness should be combined with physical activity/exercise/training of somewhat higher intensity at least 3 times per week, for example, a fitness class, ball sports, skiing, or similar activity depending on the person's interests.

Definition
Type 1 diabetes is a chronic disease that involves hyperglycemia (high or very high blood sugar) due to a lack of insulin. This disease was formerly referred to as juvenile or juvenile diabetes or insulin dependence, but these reports should no longer be used.

Prevalence/Incidence
Type 1 diabetes can occur at any age, but is most common in children and adolescents, and the risk increases in preschool and adolescence. This disease occurs in most countries, but the annual incidence varies greatly: in Europe in the Balkans it is 3 / 100,000, and in Scandinavia and Sardinia 30-40 / 100,000. Sweden and Norway estimate that 4/1000 type 1 diabetes develops before the age of 15, and a total of 7/1000 before the age of 35. It has long been believed that type 1 diabetes causes 10 to 15 percent of all diabetes, but this number may actually be higher due to autoimmune diabetes, forgotten by parents.
In most cases (> 90%), the disease is caused by an autoimmune process that gradually destroys beta cells that produce insulin on the islets of Langerhans. The exact cause of this disease has not been determined, but it seems complex. Environmental factors usually trigger type 1 diabetes in people with a genetic predisposition. Binary studies have shown that 30-50% of monozygotes (equivalent) and 5-15% of dysotic twins (siblings) have an attachment to the disease.

Several genes are thought to be responsible for the genetic background, and genes encoding HLA (DR-3 and DR-4) have the strongest association in the large compatibility complex (MHC) with interval 6. Type 1 diabetes and other autoimmune diseases such as goiter lymphomatosis (thyroiditis) Hashimoto), peripheral anemia and Addison's disease increase simultaneously.

Risk factors

Among the external factors that can stimulate the endocrine autoimmune processes of the pancreas, the discussion is mainly focused on viral infections. Increased development of type 1 diabetes in autumn and winter may be associated with viral and influenza epidemics (which may lead to decreased glucose tolerance and increased insulin). Other presented risk factors, although shown to be important, include dietary nitrosamines and early exposure to cow's milk protein. And finally, it is likely that the autoimmune process of the pancreas can be accelerated in people who develop rapidly (such as adolescents), infections and stressful events.

Pathological mechanisms

Even before the onset of clinical diabetes in the islets of Langerhans, symptoms of chronic inflammation, called insulitis, with infiltration of macrophages, T and B lymphocytes, and permanent damage to beta cells were observed. In most patients with chronic type 1 diabetes, beta cells are completely absent. In the clinical phase, the patient had an increase in the titer of antibodies to antibodies to glutamic acid to decarboxylase (GAD) by almost 80% and IA-2 tyrosine phosphatase by more than 55%. Combining GAD and IA-2, the positive titer is more than 90 percent. Insulin antibodies have also been shown. Studies have shown that an increased antibody titer occurs before the onset of clinical symptoms. However, it is not clear whether these antibodies play an active role in beta cell destruction or appear to be secondary.

Symptoms and prognosis

Untreated type 1 diabetes leads to severe insulin deficiency with hyperglycemia and ketoacidosis. Symptoms of this condition include a very high amount of urine (polyuria), excessive thirst (polydipsia), fatigue, and tiredness. Even with optimal insulin treatment, there is a risk of acute complications of hypoglycemia and hyperglycemia, as well as advanced complications involving the eyes, nervous system, kidneys, and cardiovascular system. These difficulties can affect a patient's ability to exercise.

Diagnostic

Diabetes is defined as fasting plasma glucose 7.0 mmol / l or more, symptoms of diabetes and random measurement of plasma glucose more than 11.0 mmol / l, glucose greater than 11.0 mmol / l two hours after ingestion of 75 g glucose (oral glucose test). At the onset of type 1 diabetes, plasma glucose levels are usually greater than 20 mmol / l and are often associated with increased ketone production in the body and sometimes acetosis. Blood C-peptide levels may be low, and patients generally have positive titers for GAD and IA-2 antibodies.

Care/Treatment

The treatment for type 1 diabetes is insulin. This often happens with several injections a day, such as fast-acting insulin before meals and moderate insulin at night or mixed insulin (fast and medium effect) before breakfast and dinner. Insulin can also be delivered via an insulin pump.

The effect of physical activity

Sharp training effect

In people with type 1 diabetes, blood sugar levels change during physical activity, mainly due to blood insulin levels. It is therefore important to consider the type of insulin the patient is taking (immediate or long-term) and the time between the insulin injection and the action. Blood glucose levels fall during hyperinsulinemia during physical activity if it is prolonged (more than 30-60 minutes) or intense, if more than three hours have passed since the last meal, and the patient has eaten before and if he stopped eating during activity [1, 2]. Blood sugar levels may be lower than normal 24 hours after exercise. On the other hand, blood sugar levels may increase during hypoinsulinemia, during intense exercise, or by consuming large amounts of carbohydrates before and during activity.

Effects of regular exercise

Physical activity increases insulin sensitivity, especially in skeletal muscle, which reduces insulin requirements (2 - 4). Studies in the literature [2, 4] have not shown that exercise has a significant effect on glycemic control as measured by glycosylated hemoglobin (HbA1c). It should be noted, however, that these findings were derived from a cohort of studies that conducted a standard training program and it cannot be ruled out that some individuals may achieve better glucose control by combining physical activity with other measures. Because diabetes is associated with a much higher risk of cardiovascular disease, exercise is also important for reducing risk factors for heart disease, such as a better blood lipid profile and lower blood pressure. Group of patients [6]. In contrast, in type 1 diabetes, the body appears to adapt to exercise with increased normal oxygen intake and the ability of muscles to burn energy (mitochondrial oxidation), but the number of muscle capillaries increases with exercise. Type 1 diabetes decreased slightly [8, 9]. Increasing oxidative capacity in certain exercises results in a greater share of muscle energy needs by satisfying fat burning. This means that the risk of hypoglycemia is minimized by moderate exercise in physically fit type 1 diabetics, but research data in this area are insufficient [10].

Indication for use

Primary Prevention

There is no indication that exercise can prevent the development of type 1 diabetes.

Secondary prevention

Regular exercise is recommended for people with type 1 diabetes, but care must be taken to avoid hypoglycemia [1]. Physical activity is unlikely to lead to better glycemic control, but blood lipids and other risk factors for cardiovascular disease increase [4-6]. There are currently no studies showing that exercise can prevent complications of diabetes. However, it cannot be ruled out that this goal alone can be achieved by improving glucose control through a combination of physical activity and other measures.

Prescription

Like most people, people with type 1 diabetes should exercise for at least 30 minutes a day with at least moderate vigorous exercise, such as brisk walking, cycling, and so on. To achieve an additional health and aerobic effect on fitness, this

should be combined with slightly more intense workouts / fitness / workouts at least 2-3 times a week, such as fitness courses, bowling, skiing or similar activities for people (see also Table 1). Strength training is also recommended (Table 1). If cardiovascular symptoms occur, strength training should not be as vigorous as shown in the table, such as 12-15 reps instead of the recommended 8-12. For ocular symptoms, lower weight and 15-20 repetitions of each exercise should be used. To avoid high blood pressure, you must exhale and relax your muscles during inhalation. For aerobic fitness and strength training, each exercise should begin with a warm-up and end with a cooling cycle of 5-10 minutes, including careful stretching of tense muscles and soft tissues. Physical activity should be carefully planned by measuring blood sugar before and after (and sometimes during). The appropriate interval for blood glucose before exercise is 6-15 mmol / l. If the blood sugar level is above 15 mmol / l and / or ketosis, the person should not exercise, but if the blood sugar level is below 6 mmol / l, he should eat more before exercise. If possible, prescribe physical activity 1-2 hours after meals and more than one hour after insulin injection. Avoid injecting insulin into parts of the body that are active during exercise. If necessary, reduce your previous insulin dose by 30 to 50 percent, especially before long-term or regular exercise. Also after physical insulin dosing activity may need to be reduced [5].

Table 1: Take along some "fast carbohydrates" in the form of dextrose tablets, energy drinks or fruit during the training. During long exercise sessions, it can be necessary to take 15–30 g dextrose every 30 minutes

Type of training	Examples of activities	Frequency	Intensity	Duration
Basic activity	Walking, climbing stairs, gardening. It is also desir- able to increase standing/ walking time at work and in the home.	Daily	So talking is still possible, 30–50% of maximal oxygen uptake; 12–13 acc. to Borg's scale	> 30 min.
Aerobic fitness training	Nordic walking, jogging, cycling, swimming, skiing, skating, fitness class/ aerobics/dance, ball sports, rowing	3–5 days/week	Until out of breath Begin slowly and gradually increase to 40–70% of maximal oxygen uptake; 13–16 acc. to Borg's scale* Until or near mus- cular exhaustion for each exercise**	20–60 min.
Strength training	Movements using the body as resistance, resistance bands, weights, weight/ resistance equipment	2–3 days/week		8–10 exercises, with 8–12 reps of each exercise

Functional mechanism

Blood sugar levels are caused by a balance between the liver's ability to release glucose into the bloodstream and the tissues 'supply of glucose. The liver releases about 7.5 g of sugar per hour at rest, the central nervous system eats the most (about 6 g / hour), and the tissue lacks aerobic metabolic capacity, especially red blood cells. During exercise, the picture changes so that the intake of glucose in the working muscles increases significantly. For example, a person eats about 30 g of carbohydrates per hour of walking, of which 15-20 g is coated with blood sugar. At a moderate level, carbohydrate consumption can increase to 90 to 100 grams per hour, and about a quarter is covered by blood sugar [7].

Exercise in people with type 1 diabetes usually results in a regular balance between glucose released by the liver and tissue that is easily damaged. Exercise usually causes a sudden drop in insulin levels in the blood. This is due to the intensive activation of the sympathetic nervous system, which occurs together with physical exercise, which destroys the cells that produce insulin. The reason why muscle sugar intake increases significantly with behavior, despite low blood insulin levels, is due to increased insulin-dependent sugar permeability in muscle cells. It is sensitive in type 1 diabetes regulation may be impaired by previous doses of insulin remaining in the blood, which usually increases glucose uptake into skeletal muscle and reduces the release of glucose from the liver. As a result, hypoglycemia occurs easily during exercise and can last for several hours after exercise [1]. Increased sensitivity of bone muscles to insulin, which occurs 1-2 days after training, contributes to the existence of hypoglycemia mainly due to reduced levels of muscle glycogen [2, 3]. Exercise significantly increases the metabolic capacity of muscles (oxidative capacity of mitochondria) [8]. Certain exercises generate most of the need for muscle energy that we cover by burning fat. Reduced carbohydrate intake can be significant during exercise and can reduce glucose in the musculoskeletal circulation by at least 20% during exercise, reducing the risk of exercise-induced hypoglycemia.

In uncontrolled diabetes with high blood sugar and a tendency to ketosis, exercise can have the opposite effect, namely hyperglycemia. The reasons for this are unclear, but they are probably related to a lack of insulin, which causes high blood sugar, and at the same time to increased sensitivity of bone muscles to insulin, resulting in reduced exercise due to, for example, blood fat. Acid and ketone levels in the body [2].

Functional tests / medical examination needs

In some cases, especially in elderly patients or in the case of long-term diabetes, it may be appropriate to report stress tests or other studies to assess heart disease. The occurrence of

peripheral and autonomic neuropathy, sensory disorders, joint dysfunction and multiple retinopathy, and kidney disease should be considered. The latter is necessary because high blood pressure during activity can exacerbate eye problems and the development of kidney disease. Finally, you should check your feet for sensory disturbances, uneven tension, pressure ulcers, and the presence of hyper-riboetosis and ulcers.

Interactions with drug therapy

Physical activity increases insulin sensitivity and glucose uptake into insulin-dependent muscles, and thus increases the effect of insulin.

Contraindications

Absolute

Hyperglycemia and / or ketosis

Relative

With acute liquid heart disease.

- There is a risk of damage to the legs and joints in the treatment of peripheral neuropathy.
- In cases of multiple retinopathy, there is a risk of worsening hunger (quite rare).
- In cases of autonomic neuropathy, excessive physical exertion may be associated with risk (hypotension and absence of early warning signs for cardiac ischemia).
- In kidney disease, high blood pressure (systolic pressure 180-200 mmHg) may make the disease worse.

References

1. Er CPE, Davis SN, Shamoon H. Hypoglycemia in diabetes. Diabetes Care 2003;26:1902-12.
2. Wallberg-Henriksson H. Acute exercise. Fuel homeostasis and glucose transfer in insulin-dependent diabetes mellitus. Med Sci Sports Exercises 198;21:356-61.
3. Borghouts LB, Keizer HA. Insulin conditions and sensitivity. Classification. Int J Sports Med 2000;21:1-12.
4. Peirce NS. Diabetes and wellness. Br J Sports Med 1999;33:161-72. Quiz 172-3, 222.
5. Togra Wallberg-Henriksson H, Krook A. In: Agardh CD, Berne C, Stman J, ed. Diabetes, 3rd edition Stockholm: Liber AB 2005, 97-108.
6. Rigla M, Sanchez-Quesada JL, Ordonez-Llanos J, Pratt T, Caixas A, Jorba O *et al*. Effect of exercise on changes in lipoprotein (a) and low-density lipoprotein in patients with type 1 and 2 diabetes 49, 640-7.
7. Henriksson J, Sahlin K. Metabolism during exercise. Energy consumption, hormonal changes. I: Kjaer M, Magnusson P, Roos H, ed. Sports medicine textbook. Oxford: Blackwell Science 2003.
8. Henriksson J. The effect of physical training on skeletal muscle metabolism. Diabetes Treatment 199;15:1701-11.
9. Kivelä R, Silvennoinen M, Touvra AM, Lehti TM, Kainulainen H, Vihko V. Effect of experimental and exercise type 1 diabetes on angiogenic gene expression and skeletal muscle capillaries. FASEB J 2006;20:1570-2.
10. Ramchandani N, Cantey-Kiser JM, Alter CA, Brink SJ, Yeager SD, Tamborlane WV *et al*. Self-reported factors affect glycemic control in students with type 1 diabetes. Diabetes Educ 2000;26:656-66.
11. Diabetes Care Standards. Diabetes Care 2007;30(delivery1):S4-41.