

DIABETES AND EXERCISE

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Abstract:

Diabetes is one of the oldest known disease. It has now become evident that diabetes is reaching epidemic proportions worldwide. Several recent alarming projections suggest that the epidemic of diabetes would nearly double by 2030 affecting 366 million people. Diabetes is a common disease that is characterized by elevated blood glucose levels. There is no magic wand to make diabetes disappear; exercise and attention to proper nutrition are two vital factors in managing diabetes. Exercise can also help lower your blood sugar without medicines. Exercise prescription for a person with diabetes depends on the type of diabetes the person has. However diabetic patients should take some precautions before during and after exercise.

Key Words: Hyperglycemia, Obesity, Insulin Resistance, Diabetic Retinopathy, Peripheral Neuropathy, Nephropathy, Hypoglycemia, Aerobic Activities, Progressive Resistance Training

Introduction:

Diabetes is one of the oldest known disease. It has now become evident that diabetes is reaching epidemic proportions worldwide. Several recent alarming projections suggest that the epidemic of diabetes would nearly double by 2030 affecting 366 million people. Diabetes is a common disease that is characterized by elevated blood glucose levels. There is no magic wand to make diabetes disappear; exercise and attention to proper nutrition are two vital factors in managing diabetes. Exercise can also help lower your blood sugar without medicines. Exercise prescription for a person with diabetes depends on the type of diabetes the person has. However diabetic patients should take some precautions before during and after exercise.

There are two principal types of diabetes *Type 1* and *Type 2* diabetes. Type 1 diabetes is an auto immune disease. This is a medical way of saying that the body attacks its own cells. With Type 1 diabetes, the cells in the Pancreas that produce insulin are destroyed. Thus, insulin cannot be produced as it normally would in response to a meal. As a result, blood glucose is not able to enter the cells, causing glucose levels in the blood to become elevated. A high level of glucose in the blood is more technically referred to as hyperglycemia. *Hyper* means a 'high' level and *glycemia* refers to 'blood glucose' concentrations. Type 1 diabetes is also known as Juvenile onset or Insulin Dependent Diabetes Mellitus (IDDM). Type 2 diabetes occurs when body cells cannot properly use the insulin produced by the Pancreas. This is called insulin resistance (i.e., body cells are resistant to the action of insulin). Insulin normally allows glucose to enter cells in the body to provide energy, but with insulin resistance, the glucose cannot enter the cells and thus remain in the blood. Type 2 diabetes is also known as adult-onset or Non-Insulin Dependent Diabetes Mellitus (NIDDM). Obesity has a definite link with the development of type 2 diabetes, in particular

upper-body fat stores (i.e; an apple- shaped physique). Approximately 90% of people with diabetics have type 2. The remaining 10% have type 1.

Focusing on Physical Exercise

Exercise plays a pivotal role in preventing as well as managing diabetes. Type 2 diabetes is a dual- defect disorder involving insulin resistance and impaired insulin secretion. Exercise significantly *improves insulin sensitivity*, which is the body’s responsiveness to glucose; this can counteract insulin resistance. In insulin uses, the improved insulin sensitivity can lead to decrease in the amount of insulin needed. Weight loss can also decrease abdominal fat, which can further reduce insulin resistance and improve glucose levels. Exercise can also help prevent the onset of diabetes. People who have pre-diabetes and a family history of diabetes should focus on both diet and exercise to promote weight loss as a way to prevent type 2 diabetes.

Exercise Prescription

Exercise prescription for a person with diabetes depends on the type of diabetes the person has. A complete exercise program should include aerobic activities, progressive resistance training and flexibility exercises. The principal goal for prescribing exercise for clients with type 2 diabetes is to burn calories. Most people with type 2 diabetes are obese, and burning calories attack the diabetes twice: first by improving insulin sensitivity; and second by reducing body fat.

Aerobic Prescription of Exercise

Aerobic activities, which help improve the efficiency of the cardiovascular system, typically are most beneficial for regulating blood glucose levels. Examples include brisk walking, jogging, swimming and cycling. If the client cannot do high impact or weight bearing activities swimming or cycling can be beneficial. For best results, patients should gradually increase the duration and frequency to one hour, seven days per week. Most of the patients with type 2 diabetes start out with a low fitness level, light to moderate intensity exercises are suitable for them. Moreover, high intensity programmes may lead to greater dropout rates. However it is a good idea to encourage clients to increase the intensity within their level of tolerance as their exercise progress.

Aerobic Training Recommendations for People with Diabetes

	Type 1	Type 2
Frequency	Three to Seven days per week	Three to Seven days per week
Intensity	50% to 80% of HRR(Heart Rate Reserve)	50% to 80% of HRR (Heart Rate Reserve)
Time	20-60 Min per session	At least 150 minutes per week of moderate intensity activity or 90 minutes per week of high intensity activity.
Type	Emphasize activities that use large-muscle groups in a rhythmic and continuous fashion E.g walking jogging,swimming, cycling etc.	Emphasize activities that use large-muscle groups in a rhythmic and continuous fashion E.g walking jogging, swimming, cycling etc.

- American College of Sports Medicine, 2010, P.605.

Resistance Training Prescription

The goal of resistance training is to focus on exercises involving the major muscle groups including chest, back legs, shoulders and arms. Increasing lean muscle while reducing fat tissue can decrease insulin resistance and improve blood glucose control. Increased muscle mass can also improve our balance, posture and daily functions. Resistance training may not be appropriate if you have diabetic retinopathy.

Resistance Training Prescription for People with Diabetes

	Type 1	Type 2
Frequency	Two to three days per week	Two to three days per week
Intensity	60% to 80% of I-RM (Repetition Maximum)	60% to 80% of I-RM (Repetition Maximum)
Time	8-12 repetition per exercise Two or Three sets per exercise	8-20 repetition per exercise Two or Three sets per exercise
Type	8-10 multi joint resistance exercises of all major muscle groups in the same session or sessions split into selected muscle groups.	8-10 multi joint resistance exercises of all major muscle groups in the same session or sessions split into selected muscle groups.

- American College of Sports Medicine, 2010, P.607.

Flexibility Prescription

Flexibility is also an integral part of an exercise program for people with diabetes Typically, Static stretching is recommended. This involves placing the body into a position that creates tension in the muscles and then holding that position for 15 to 30 seconds

Flexibility Training Recommendations for People with Diabetes

	Type 1 and Type 2
Frequency	Two or three days per week
Intensity	Stretch to the point of mild discomfort
Time	15-30 seconds per stretch Two to four repetitions per stretch
Type	Four to five exercises for both upper and lower body.

- American College of Sports Medicine, 2010, P.607

Precautions To Exercise for Diabetes Patients

Diabetes and exercise pose unique challenges to our body. To exercise safely, it's crucial to track your blood sugar before, during and after the exercise session. Before beginning an exercise programme, patients with diabetes should undergo an extensive medical evaluation, particularly of the cardiovascular, nervous, renal and visual systems to identify related diabetes complications. Once people with diabetes enter an exercise programme they should take special care to avoid *hypoglycemia*. *Hypo* means 'low' and *glycemia* refers to 'blood glucose'. Because both insulin and exercise reduce blood glucose, there is a potential for a dangerous fall in blood glucose during and after exercise. Symptoms of hypoglycemia are

shakiness, headache, weakness, visual disturbances, confusion, anxiety and hunger. In order to avoid hypoglycemia it is advisable to reduce the insulin taken prior to exercise and increase the carbohydrate intake too. Everyone with diabetes should have a fast acting source of sugar (e.g. Juice, candy) available during exercise to consume immediately if hypoglycemic symptoms occur). Hypoglycemia requires immediate attention, because it can quickly become life threatening. Exercise with a partner or under supervision to reduce the risk of problems associated with hypoglycemic events

Some medical conditions related to diabetes may also influence exercise choices, including ***diabetic retinopathy, peripheral neuropathy and nephropathy***. Diabetic retinopathy is a disease affecting the retina of eye. If this disease is present, certain activities should be avoided to prevent further damage. Another potential concern is peripheral neuropathy, which is a nerve condition that alters the sensation of the hands and feet as well as proprioception. Falls are more common with this condition, as are joint and soft tissue injuries. Proper footwear is a must to prevent blisters or ulcers. Inspect the feet both before and after exercise for blisters and ulcers. Dehydration resulting from polyuria may contribute to a compromised thermoregulatory response. Thus patients with hyperglycemia should be treated as having an elevated risk for heat illness.

Conclusion:

It has now become evident that diabetes is reaching epidemic proportions worldwide. Several recent alarming projections suggest that the epidemic of diabetes would nearly double by 2030 affecting 366 million people. Exercise can also help lower your blood sugar without medicines. Exercise and a sound nutrition plan are the two cornerstones of managing and thriving with diabetes. Exercise programme should include aerobic activity as well as resistance training and stretching. The most important strategy for exercise is individualize the exercise programme. A balanced exercise programme not only improves health outcomes and blood glucose control but also help prevent the onset of diabetes. However diabetic patients should take some precautions before during and after exercise.

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