



Category: Health and Well being



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THE ROLE OF EXERCISE & NUTRITION IN DIABETES

Dr. K. ANITHA KUMARI¹, Dr. PADMINI DEVI², P. NIRMALA KUMARI³

^{1,2,3}Lecturer, Government College for Women, Guntur

INTRODUCTION

Individuals of all ages with diabetes should not be limited in their activities, and should be encouraged to participate in sports and physical activities. A person with either Type 1 or Type 2 diabetes can become an elite athlete or train and compete at a high level of exercise intensity and endurance. There is an overwhelming amount of scientific evidence on the positive effects of sport and physical activity as part of a healthy lifestyle. The positive, direct effects of engaging in regular physical activity are particularly apparent in the prevention of several chronic diseases, including cardiovascular disease, diabetes, cancer, hypertension, obesity, depression and osteoporosis.

In this context, this review article on the role of exercise and nutrition in diabetes stresses on exercise, exercise usually lowers blood glucose levels because the exercising muscles use more glucose as fuel and exercise makes the body more sensitive to insulin. Lowering of blood glucose levels (BGL's) usually occurs during exercise and for some time after exercise (can be up to 12-16 hours after exercise). It also clearly advised that, advice of diabetes specialist with good management is possible to participate in sporting activities.

Type 1 Diabetes

Type 1 diabetes is a condition more prevalent at the younger age in which the body is unable to produce insulin. Without insulin, the body's ability to use glucose as a fuel source is impaired.

Affect of Type 1 diabetes on metabolism

Insulin is a hormone produced in the pancreas. It has a number of important functions in the body, including a regulatory effect on carbohydrate metabolism. Insulin stimulates glucose to be taken up by body cells and used for fuel. It inhibits the release of glucose from glycogen in the liver and stimulates the synthesis of muscle glycogen after exercise. In the absence of diabetes, insulin is released according to the body's needs and the concentration of glucose in the blood is kept within a tight range. People with Type 1 diabetes do not produce insulin. The body is therefore unable to use glucose properly as a fuel source and starts to rely on fat and protein as fuel. This causes blood glucose levels to rise excessively and toxic byproducts from fat breakdown (ketones) to build up in the blood. If untreated, this can be fatal.

Type 1 diabetes treatment

Type 1 diabetes requires regular insulin injections. The amount and timing of insulin administration needs to be matched to factors such as food intake, individual metabolism and activity level. Blood glucose levels must be monitored regularly to ensure an appropriate amount of insulin is given. Poor use of insulin will result in abnormal blood glucose levels:

Hypoglycaemia –low blood glucose

Occurs when too much insulin is present causing too much glucose to be taken up by the body's cells and too little glucose to be released from the liver. Symptoms include sweating, rapid heart rate, drowsiness, shaking, confusion, poor coordination and nausea. If untreated, hypoglycaemic coma occurs. This is a potentially fatal condition that requires rapid medical assistance.



Hyperglycaemia - high blood glucose

Occurs when too little insulin is present. Too much glucose is released from the liver and cells cannot take up glucose adequately. Symptoms include restlessness, poor concentration, fatigue, thirst, muscle cramps, drowsiness and nausea. In the long term, regular periods of hyperglycaemia increase the risk of complications related to diabetes including cardiovascular, kidney and eye problems.

Affect of exercise to manage diabetes

Factors such as muscle contraction, increased blood flow and increased body temperature cause the body to be more responsive or 'sensitive' to insulin during and soon after exercise. In addition, when muscles contract, they can take up glucose from the bloodstream independently of insulin. Therefore, in people who do not have diabetes, insulin release decreases during exercise. People with Type 1 diabetes usually need to adjust their insulin dose to account for a reduced requirement for insulin during exercise. Management of diabetes varies for each individual. Regular monitoring of blood glucose concentrations and trial and error (under the supervision of diabetes specialist) is needed to understand and manage each individual's response to exercise. However, in general, the following factors need to be considered:

- **Intensity and duration of exercise**

Pre-exercise insulin dose generally needs to be reduced when exercise extends beyond 30 minutes. The level of reduction varies for each individual but, in general, the longer the period of exercise, the greater the reduction required. Adjustments to insulin should be made with the guidance of diabetes specialist, especially in the early stages of management.

- **Degree of metabolic control before exercise**

It is easier to manage and predict the body's response to exercise when metabolic control is good. It is dangerous to commence exercise when blood glucose levels are high and ketones are present in the urine.

- **Type and dose of insulin injected before exercise**

It is common practice to use a mixture of short and long lasting insulin to manage diabetes. It is necessary to predict the peak period of insulin activity to avoid excessive levels of insulin in the blood at the same time as exercising.

- **Site of insulin injection**

Insulin absorption is increased in exercising muscles. The abdomen is usually the preferred site for insulin injection prior to exercise.

- **Timing of previous meal**

Insulin requirements are influenced by the amount and type of food consumed.

Dietary requirements

In general, people with Type 1 diabetes have the same dietary requirements as the general population - a varied diet with plenty of fruit, vegetables, legumes, bread and cereals, moderate amounts of fish, meat, poultry, eggs and dairy products and smaller amounts of foods high in fat, refined sugar and alcohol. Including foods with a low glycaemic index (GI) is thought to assist with blood glucose control. Glycaemic index is a tool used to rank foods according to their immediate effect on blood glucose concentrations. Carbohydrate-containing foods that are broken down quickly, releasing glucose rapidly into the blood stream, are known as high GI foods. Conversely, carbohydrate-containing foods that break down slowly, releasing glucose gradually into the blood stream, are known as low GI foods. People with diabetes (and the general population) are encouraged to consume a variety of low GI foods each day. Examples of low GI foods include:

- fresh fruit - apples, unripe bananas, pears, and grapes
- fruit muffins
- multigrain bread
- porridge

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- pasta
- milk
- low fat fruit yoghurt
- baked beans

Blood glucose control is usually better when a consistent eating pattern is adopted with regular meals and snacks. People with Type 1 diabetes are encouraged to adjust their insulin regime according to food intake and activity levels rather than distorting their food intake to suit the insulin dose.

Conclusion

Sports and physical activity can make a substantial contribution to the well-being of people. Exercise, physical activity and sport have long been used in the treatment and rehabilitation of many diseases and is a cost-effective method to improve individual health. Hence, younger aged individuals can actively participate under the guidance of diabetes specialist, sports physician, sports dietitian and coach to help maximize sports performance.

References

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