

DIABETES AND EXERCISE

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Diabetes mellitus is a group of disorders affecting glucose uptake and storage associated with either absent insulin (type 1) or resistance to the effect of insulin (type 2). The resulting high sugar levels in the blood cause the complications of diabetes. Exercise has been proven to help prevent type 2 diabetes and be useful in the management and control of the blood sugar in both type 1 and type 2. Both resistance exercise and aerobic exercise have benefits.

Benefits of exercise

The benefits of exercise to diabetics are many. If moderate activity is performed after a meal, the usual spike of rising sugar levels is blunted, even after the exercise stops; the body becomes more sensitive to insulin so there is a continued increase in the uptake of glucose into the cells. Exercise also helps in losing weight without losing muscle mass, and improves the blood pressure and cholesterol levels. These problems are often associated with type 2 diabetes, as well as risk factors for heart disease. It improves physical functioning, self confidence and quality of life. Physical activity promotes better sleep, in addition, resistance exercise increases bone density and muscle strength. In type 1 diabetics exercise enhances glucose tolerance and possibly reduces the amount of insulin needed, delays the onset of complications and prevents the decline in functional capacity of those with complications.

Pre-exercise medical

Before you embark on a new exercise endeavour, please consult your doctor. In this visit they will check for signs of complications of diabetes that may influence the best program for you. Your blood HbA1C will be checked to see how well your sugar has been controlled for the last 3 months. They will assess if you need an exercise ECG (the response of the electrical activity of your heart to increasing grades of activity) to make sure that you are not at risk of a silent heart attack (when you do not feel the typical chest pain). They will also evaluate your current treatment and advise you on how it needs to be adapted for you to exercise safely. Your doctor should also make sure you understand the symptoms of low blood sugar and that you know how to check your own sugar (and have a means of testing it), that you know when you should eat before exercising and when to delay exercise.

What changes could I expect my physician to make to my treatment?

If you are a type 1 diabetic the intensity and planned duration of exercise determines the changes. It could involve eating a meal 1-3 hours before activity, waiting until the peak action of your short acting insulin has passed, modifying the dosage of your insulin before and after exercise. If you have an insulin pump, you may need to reduce the dose an hour before exercise and remove it before contact sports. Sweating may result in it slipping and excess heat may cause it to malfunction as insulin is heat sensitive. Adjusting your treatment for exercise requires careful monitoring of your blood glucose to fine tune the plan and some trial and error is required. There is no one formula that suits every person. Type 2 diabetics on Metformin require no adjustments but those using medication from other groups such

as sulphonylureas (your doctor will know) may need closer monitoring after exercise in order to quickly re-act to hypoglycaemia.

What precautions should I take?

Look after your feet: wear closed shoes when exercising and check your feet regularly for blisters, sores etc. Seek help from a podiatrist A.S.A.P. if you have any recurrent problems such as corns or calluses. Change socks if they become wet and remember to dry between your toes.

The risk of exercising for a diabetic is hypoglycaemia or low blood sugar. Do not exercise alone, especially if you use insulin. Wear a Medic Alert bracelet and always keep hard sweets or sugar with you; if you are taking part in a prolonged activity like hiking, carry food. Know the symptoms of hypoglycaemia (low sugar) viz. shakiness, dizziness, sweating, fatigue, headache, hunger and at night, nightmares together with the above. Check your sugar before exercising and again afterwards. IF the length of your exercise exceeds one hour, you should check your sugar half hourly during exercise too. For up to 16 hours after exercise has stopped, your sugar levels may still fall, so keep checking your sugar if you did vigorous or prolonged activity. Even once you know how your body responds to your exercise routine, from time to time still check your sugar. Be aware that a very high intensity of exercise may increase, rather than decrease your sugar levels. Intermittent high intensity activities like in team sports seem to be protective against extremes of blood sugar. At the first signs of low sugar, eat sweets and then solid food, as there is a tendency to have repeated hypoglycaemic attacks. Preferably stop exercising until your sugar is back to normal. Your exercise partner should know to call for medical help if you do not improve quickly or if you start to lose consciousness. Dehydration can mimic low sugar, so make sure you remain well hydrated at all times.

If your activity is planned in advance, adjust your insulin as instructed by your doctor, if it is unplanned, increase your carbohydrate intake. If your blood sugar is more than 17 mM before exercise, check for the presence of ketones in your urine with a dipstick. If they are present, delay your exercise and first get your sugar under control as exercise in these circumstances may paradoxically increase your sugar. If your sugar is less than 5 mM before exercise, eat some carbohydrates before commencing your exercise; but not so excessively that you do not lose weight! If you use insulin, change the site of injection before exercise to the abdomen as the increased blood flow to the legs from exercise would result in faster than normal absorption from that site and an unpredictable response.

How much exercise is recommended?

It is recommended that diabetics exercise for 30 min on most days of the week. This should add up to 150 minutes of moderately intense aerobic activity per week and at least 90 min vigorous activity. The minimum would be at least 3 days a week with never more than 2 consecutive rest days. For example: Mon, Wed, Fri with Sat and Sun as rest as opposed to exercising Fri, Sat and Sun consecutively with nothing for the rest of the week. Also resistance exercise should be included, targeting all major muscle groups. This should be started slowly and progressed over 6-12 weeks and increasing in strength difficulty, so you can always complete 3 sets of 8-10 repetitions. Resistance exercise will help prevent you losing muscle mass when you are reducing your kilojoule intake and should be done at least once a week. By keeping your routine varied, you will enjoy exercising and not get bored. The aim in

your exercise for a type 2 diabetic is fat (not water) loss together with an increase in fitness and sensitivity to insulin. In a type 1 diabetic, it is improved glucose control and functional capacity.

What if I already have complications?

Retinopathy – abnormalities of the blood vessels in the eye. Avoid activities that increase the pressure in the eye such as weight lifting, bungy jumping and high impact such as group class aerobics or contact sports. Other aerobic exercises such as cycling and swimming are ideal for you. Exercise may delay the progression of retinopathy.

Nephropathy – damage to the kidneys resulting in protein in the urine. Low impact aerobic exercise started very gradually, will help delay the progression of nephropathy. It is very important to wear well cushioned shoes to reduce the impact that could jar your kidneys. Maintaining good hydration is imperative. Even people with renal failure benefit from some exercise, but it should be supervised carefully.

Autonomic neuropathy – damage to nerves controlling automatic function such as the control of heart rate. Your heart rate cannot be used as a guide to how hard you are exercising; ask your doctor or biokineticist about the ratings of perceived exertion to guide you. When changing positions your blood pressure may have a tendency to suddenly drop, this is known as orthostatic hypotension. To prevent the resulting dizziness avoid activities that require recurrent position changes (e.g. from crouching to standing). Exercising in the cold may be difficult due to your blood vessels not constricting properly.

Neuropathy – nerve damage resulting in pain, loss of sensation with or without weakness of your limbs. The biggest risk is damaging your feet because you don't feel the warning pain. So it is best to do exercise that does not hurt your feet. I.e. avoid jogging, long walks, step aerobics and rather swim, cycle or row. Exercise can help delay the progression of this problem. Stretching can alleviate the pain of chronic neuropathy, which in turns improves your quality of sleep.

Peripheral vascular disease – damage to the blood vessels, mostly of the legs, resulting in pain when you walk; and untreated it may lead to gangrene. Progressive exercise improves walking capacity. For example: you may not be able to currently walk from your chair to the bathroom without pain now, but you will progress to eventually walking to the shop.

Cerebrovascular disease – stroke. Physical activity is an important component in rehabilitation and return to normal functioning. You may need assistance from a team of physiotherapists, occupational therapists and biokineticists to get you started, but as you progress it will be well worth the effort with the independence you will regain.

Cardiovascular disease – angina or previous heart attack. Exercise is very important in the rehabilitation after a heart attack, but must initially be directly supervised in a rehab centre and progress must be slow. The improved control of glucose levels by regular exercise can help delay the onset of coronary artery disease. Even in diabetic cardiomyopathy (inflammation of the heart), endurance can be improved with exercise and deterioration of the heart muscle prevented.

Difficult control of type 2 diabetes – if oral medication alone has not controlled your sugar and you require insulin in addition to your tablets. A special exercise program containing intermittent high intensity resistance and endurance exercise will improve your functional capacity. Once your strength has improved, you can progress to more general exercises as described above.

Conclusion

With the proper precautions diabetics can take part in any sport they wish. Exercise is an excellent adjunct to correct eating in the treatment of diabetes. Together, they improve health, fitness, quality of life and delay the complications of diabetes. Even once complications have set in; exercise can still be useful to improve quality of life and does not worsen the complications. Set short, medium and long term goals to keep you motivated. Make use of both resistance and aerobic exercise. Have fun exercising!

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