



Exercise & Diabetes

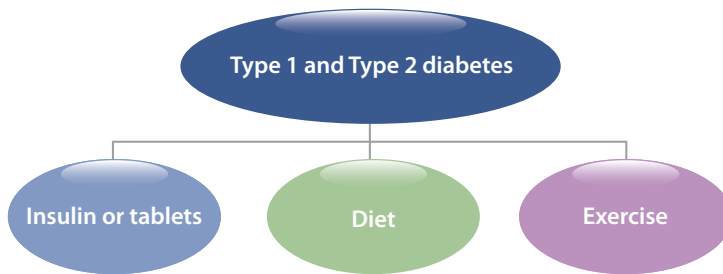
A charity supporting and listening to people who live with diabetes

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www.iddtinternational.org

- The Trust offers support, understanding and information to people with diabetes and to those who care for them.
- We listen to the needs of people who live with diabetes and do our utmost to offer help and support.
- We raise awareness of important issues for people living with diabetes and lobby governments on issues that affect people's lives.
- We fund research into ways of improving the lives of people with diabetes.

Introduction

Three important factors in the treatment of Type 1 and Type 2 diabetes



Although Type 1 and Type 2 diabetes are very different conditions, the treatment of both types of diabetes has three factors in common – medication (insulin or tablets), diet and exercise. All three are important, they all affect blood sugar levels and they all affect each other. So in both Type 1 and Type 2 diabetes there is an important relationship between medication (insulin or tablets), diet and exercise and to achieve good diabetic control we have to try to balance all three.

So exercise or physical activity is an essential part of the treatment of diabetes. In addition, it is good for your heart. This message is one that must have reached almost everyone but is it a message that many of us choose to ignore? Maybe we hear it so often that it just washes over us and we ignore it. It may simply be that for those of us that are couch potatoes, the very thought of 'physical activity' is quite off-putting! Or for many of us with busy lives, just the thought of trying to fit in time for 'exercise' is exhausting!

Maybe the words 'exercise' and 'physical activity' put us off because they conjure up visions of fit, lithe people visiting a rather expensive gym three times a week! Perhaps the messages would be more effective if they excluded the words 'physical activity' and 'exercise' and simply encouraged us to introduce more activity into our existing lives so we actually achieve greater activity and the health benefits almost without realising it!

There are estimates that although 7 out of 10 adults in the UK do not take enough regular exercise to achieve health benefits to protect their heart, 8 out of 10 adults actually think that they are fit.

Facts

- Physical activity reduces the risk of having a stroke and helps to lower blood pressure.
- It reduces the risk of Type 2 diabetes and osteoporosis.
- It helps to reduce weight in people that are overweight or obese.
- It helps to improve cholesterol levels, decreases triglycerides and increases 'good' cholesterol (HDL).
- Exercise decreases insulin resistance and in people with diabetes this may mean less medication.
- It can help to relieve stress, make you feel better and it can be enjoyable.
- There is no level of activity that has to be achieved to gain health benefits.
- The largest gain in health benefits from increasing physical activity levels is in people who are inactive and who start to take regular exercise such as walking, cycling, dancing or swimming.

Physical activity halves the risk of developing coronary heart disease

In people that have already had heart attacks, those who have been physically active are twice as likely to survive the heart attack compared to those people who have not been active.

The major risk factors for coronary heart disease are:

- Smoking
- High blood pressure
- High cholesterol levels
- Lack of exercise

Other factors that may affect your risks of having a heart attack:

- Too much alcohol
- Excessive salt intake
- Obesity

The scientific evidence

A review of 54 clinical trials involving 2,419 previously sedentary adults, published as long ago as 2002 in the *Annals of Internal Medicine*, concluded that regular exercise reduced the systolic blood pressure [the top number] by an average of 4 and diastolic blood pressure [the lower number] by an average of 2.6mm Hg. The results add to the evidence that exercise is important for treating high blood pressure and for preventing it occurring in healthy people.

While the study did not show what level of activity was ideal for lowering blood pressure, results of various types of aerobic exercise at all frequencies were beneficial to people who were previously sedentary – in other words any activity is better than none. The present recommendations are that people should have at least 30 minutes of moderate exercise on 5 or more days of the week.

The cause of coronary heart disease

It is caused when the arteries that supply blood to the heart become narrowed due to a gradual build up of fatty tissue [atheroma] within the walls of these arteries – this condition is called atherosclerosis. A heart attack is caused if a blood clot forms over the atheroma.

The development of this fatty tissue, or atheroma, is caused by the cells in the coronary artery walls taking up cholesterol and this is the beginning of the narrowing of the arteries. As we all know, some cholesterol is formed from the fats in the food we eat but it is important to remember that there are two types of cholesterol – the good and the bad!

LDL cholesterol [bad] forms the atheroma

HDL cholesterol [good] removes cholesterol from the circulation and appears to have a protective effect on the heart.

So ideally we should have lower levels of LDL cholesterol and higher levels of HDL.

Why is physical activity important for your heart?

Research indicates the following:

- Physical activity appears to raise HDL [good] cholesterol levels but does not affect LDL cholesterol levels.
- It helps to prevent blood clotting and so reduces the risk of a heart attack.
- It helps to lower blood pressure and also to prevent high blood pressure from developing.
- It helps to reach and maintain a healthy weight.

Physical activity and diabetes

Facts:

- Men with diabetes are 2 to 3 times more likely to develop coronary heart disease than men without diabetes.
- Women with diabetes are 4 to 5 times more likely to develop it than women without diabetes.

- In people that already have diabetes, physical activity can reduce the amount of medications needed or reduce the insulin dose.
- Moderate, rhythmic exercise seems to reduce the risk of people developing Type 2 diabetes in middle age.

Blood pressure

High blood pressure is a key concern for the general population but especially for people with diabetes. High blood pressure [hypertension] often causes no symptoms and no immediate problems. If you have high blood pressure your heart has to work harder to pump blood around your body and over time this can weaken it. It can also damage the walls of the arteries or cause a blockage and both of these situations can cause a stroke.

High blood pressure is a major risk factor for serious cardiovascular diseases such as:

- **Coronary heart disease** where the main arteries supplying blood to the heart become clogged with fatty deposits [plaques].
- **Heart attacks** where the blood supply to the heart is blocked.
- **Strokes** where the blood supply to the brain is interrupted.
- **Thrombosis** caused by blood clots in the blood vessels.
- **Aneurysm** where there is a weakness in the blood vessel wall which forms a bulge in the blood vessel.

According to NHS Choices, in 90 – 95% of cases in the general population there is no single identifiable reason for a rise in blood pressure but all the evidence suggests that lifestyle plays a significant role. The main factors influencing high blood pressure are:

- age – half of people over 75 have high blood pressure
- lack of exercise
- overweight
- poor diet
- excessive alcohol consumption.

How is blood pressure measured?

Blood pressure is measured in millimetres of mercury (mmHg). Two measurements are used:

- **Systolic pressure** – the blood pressure exerted when the heart beats to force blood around the body.
- **Diastolic pressure** – the blood pressure when the heart is resting between beats.

The measurement of the systolic pressure is given first, for instance 120 over 80 or 120/80mmHg and this means the systolic pressure is 120mmHg and the diastolic pressure is 80mmHg.

High blood pressure and diabetes

About 25% of people with Type 1 diabetes and about 80% of people with Type 2 diabetes have high blood pressure. Unfortunately, as we are aware, having diabetes already raises the risk of heart disease, stroke, kidney disease and other complications, so having high blood pressure raises these risks even more.

High blood pressure is usually defined as having sustained blood pressure of 140/90mmHg or above but if you have diabetes your doctor will probably want your blood pressure to be 130/80mmHg or lower because of the greater risks associated with diabetes and high blood pressure.

Treatment

High blood pressure can be treated or prevented in some cases by making lifestyle changes, such as eating a healthy diet, exercising regularly and reducing alcohol intake. Often medication is necessary to lower blood pressure and people with diabetes may be given drugs known as ACE inhibitors [angiotensin receptor blockers] because they are thought to also have a protective effect on the kidneys. However, other blood pressure-lowering drugs may be used. ACE inhibitors may also be given to protect the kidneys even when blood pressure is not high.

Blood pressure research

Taking blood pressure pills at night

The findings of a 5-year study have shown that the timing of blood pressure medication with the person's body clock makes it more effective and offers greater protection against heart attacks, strokes and other cardiovascular diseases. (Chronobiology International, Oct. 2010) This could well change the way blood pressure medication is given and have a significant impact on the type of treatment people with high blood pressure receive. The results were quite amazing:

- The group of patients who took at least one of their medications at night had a third of the number of cardiovascular disease episodes experienced by those taking all their blood pressure medications in the morning.
- Taking at least one blood pressure medication at bedtime was the best way to achieve normal sleep-time blood pressure but also the best way to control day-time blood pressure.

Historically, medical professionals have worked on the assumption that sleep-time blood pressure levels will drop by 10-20% from daytime levels. However, for many patients this doesn't happen and sleep-time therefore becomes a high risk period. If you are taking blood pressure tablets, then do discuss this with your doctor before making any changes.

Diastolic blood pressure too low has risks in Type 2 diabetes

Treating blood pressure so the diastolic pressure is below 70mmHg in people with Type 2 diabetes can increase the risk of cardiovascular problems according to research. (Healthcare Republic 16.11.10) The researchers, who studied 1,791 people with Type 2 diabetes and high blood pressure, said that although evidence supports the recommendations for the upper levels of blood pressure, there is little evidence on how far blood pressure should be lowered.

This research supported blood pressure levels of about 140mmHg and a diastolic [the lower number] of below 80mmHg. However, it also found that people with a diastolic pressure of below 70mmHG were

nearly twice as likely to have a cardiovascular event as those with higher diastolic blood pressure. This risk increased at even lower levels of diastolic pressure – those below 60mmHG were 28 times more likely to have a cardiovascular event. If this is something that concerns you, then you should discuss it with your doctor.

Types of activity

There are three main types of exercise:

Aerobic activity – this type of exercise benefits your heart. It is any activity that is rhythmic and repetitive, such as walking, swimming, cycling and dancing. These activities increase the body's demand for oxygen so making the heart and lungs work harder and more efficiently.

Isometric exercise - this increases muscle tension without moving a joint, such as pushing against a wall. Isometric exercise does not help the heart and circulation. It should be avoided by people with heart disease or high blood pressure because it can increase blood pressure so putting the heart under stress.

High intensity endurance exercise – as the name suggests, this type of exercise includes activities such as marathon running.

Is it safe to start exercising?

- If you already have had a heart attack or any other heart condition such as angina or you have high blood pressure, you should always discuss with your doctor how much and what sort of exercise you should do. There are certain heart conditions where exercise may not be advisable.
- Always stop exercising if you get any pain or feel dizzy, sick or unwell. If the symptoms don't go away or come back later, see your doctor.
- It is unsafe to exercise when you have a viral infection such as a sore throat.
- It is always sensible to gradually build up your physical activity in terms of both the time spent and the intensity. A sudden increase in exercise, especially vigorous exercise can be dangerous especially in middle aged people.

Tips for exercising

- Discuss the best type of exercise for you with your doctor or diabetes healthcare team.
- If you are not used to exercising, start slowly and build up gradually.
- Don't give up easily. If you get into the habit of exercising several times a week for 3 months, you are likely to continue and still be taking some exercise a year later.
- Walking or exercising with a spouse, partner or friend is more likely to be continued than doing it alone.
- Fitness can be part of a weight loss programme and just walking a few miles over a week can help.
- Exercise makes you feel better, breathe more easily and generally feel better about yourself.
- Moderate intensity exercise like brisk walking, cycling or swimming is better at lowering fat levels in the blood and increasing insulin sensitivity than low intensity exercise like walking, housework or gardening.
- Moderate to high intensity exercise four times a week has the most beneficial effect on the heart.
- Wear comfortable, well fitting shoes or trainers.



Exercise for people taking insulin or tablets which can cause low blood glucose levels (hypoglycaemia)

Keeping fit is recommended for people with diabetes, including those being treated with insulin. However, injected insulin cannot mimic the response of a healthy pancreas to exercise and a fitness programme initially may worsen glucose control until the insulin user learns how their body responds to exercise and the amount of carbohydrate and insulin that is needed.

People being treated with insulin often underestimate the impact of exercise on their blood glucose levels. Regular moderate intensity exercise, such as brisk walking or swimming, is easier to manage than high intensity endurance exercise such as marathon running.

If you have diabetes which is treated with insulin or one of the drugs for Type 2 diabetes that can cause low blood glucose levels (hypoglycaemia), it is important to eat sufficient carbohydrates before, during and after exercise to avoid hypoglycaemia.

- Eating a meal of slow-acting carbohydrates about an hour before exercising will keep your blood sugars steady during exercise. Examples: porridge, cereal or multi-grain bread.
- Eating fast-acting carbohydrate immediately after exercise will help to prevent hypoglycaemia and will help to re-stock the liver stores of glycogen which the body turns into glucose when needed. Examples: a piece of fruit, fruit juice or biscuits.
- Regular blood glucose monitoring is important when exercising to avoid both high and low blood sugars.

Hypoglycaemia can occur 12 – 14 hours, or even longer, after exercise. This is because the body uses up any circulating glucose to try to replace the glycogen stores in the liver. In addition, exercise increases the sensitivity of the body tissues to insulin, especially the muscles.

Vigorous exercise can raise blood glucose levels

Hypoglycaemia is seen as the main risks when taking insulin and it is often not recognised that vigorous exercise can raise blood glucose levels. This effect has been shown in several studies.

What type of exercise can raise blood glucose levels?

Here are some examples:

- Exercising at a constant speed for several minutes or longer, such as swimming, running or cycling. A good way to judge if the exercise may raise your blood glucose levels is if your breathing is deep and you cannot talk to the person next to you.
- Playing a vigorous sport which includes short bursts of speed alternating with periods of moderate intensity, such as football or tennis.

This level of exertion activates the sympathetic nervous system which in turn produces the 'fight or flight' response which helps the body meet emergency needs. Stress hormones adrenalin and others are released into the blood and they stimulate the liver to release glucose at a faster rate than normal. When this release is faster than the rate glucose is absorbed by the active muscle tissue, blood glucose levels rise. This process is similar to what can happen during a severe hypo – the body goes into a defence mechanism as a protection and the liver releases glucose to raise blood glucose levels.

With moderate intensity exercise, the stress hormones are not significantly produced and so blood glucose levels do not go up and will tend to drop, so a snack before the activity is advisable (or a lowering of the insulin dose).



Know how different types of exercise affect you

So the intensity of the activity or exercise strongly influences the blood glucose responses. Knowing how various types of exercise affect your blood glucose - is it likely to raise them or lower them - is important in trying to manage blood glucose levels. It also helps to avoid giving carbohydrate snacks when a particular type of exercise will raise glucose levels anyway as this could lead to hyperglycaemia.

The message here really is to know what happens to you and your blood glucose levels with different types of activity - light gardening or taking a walk can cause a hypo but a game of tennis may have just the opposite effect. This is what makes Type 1 diabetes such a difficult condition to manage!

Get active - from the comfort of your chair

If you have difficulty standing or walking, it doesn't have to mean exercise is out of the question. We all know that being physically active is good for us, but not everyone can take part in activities like walking, cycling or aerobics classes. If that's the case for you, but you want to keep active, then chair-based exercises could be just what you're looking for. They will help to improve mobility and prevent falls. You can use these exercises if you have trouble getting up and about, or even if you just want a change of activity on days you can't get outdoors.

If you have a heart condition, check with your GP before you start. There are specific exercise programmes for people with a heart condition that your GP, cardiologist and cardiac team can help you with.



Chair-based exercise can be done at home or in small groups and is easy to fit in to your daily routine. There are three basic types of chair exercises:

- Flexibility exercises (stretching) to help to improve mobility and help to prevent falls.
- Strength exercises to help to improve health and mobility.
- Balance exercises, again to help to improve health and mobility.

For chair-based exercises, choose a chair that is stable, solid and doesn't have wheels and avoid one with arms as this could restrict your movement. You should be able to sit with your feet flat on the floor with your knees bent at right angles. Wear loose, comfortable clothes and keep some water close by.

Set realistic goals for yourself and build up slowly. For example, you could aim to do 10 to 20 minutes every other day for two weeks. Then, if you achieve that and don't get too tired, you could plan to do more or carry on for a few more weeks and then reassess your goal. Even a small amount of activity can be a tremendous boost to your wellbeing and help you to tone and strengthen. So why not give it a go? You might be surprised at just how good it makes you feel.

NHS Choices website provides details of sitting exercises which can be found at: www.nhs.uk/exercises-for-older-people If you do not have access to the internet, ask a young person to print them off for you!

IDDT publishes a range of leaflets some of which may be of particular interest in relation to exercise:

- **Weight and Diet**
- **Carbohydrates**
- **Hypoglycaemia**

To obtain these leaflets or for a copy of IDDT's publication list contact IDDT, PO Box 294, Northampton NN1 4XS
Telephone 01604 622837 or e-mail enquiries@iddtinternational.org



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