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A Brief Overview of Diabetes and its Complications, Prevention

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Abstract

Diabetes is a chronic disease that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces. Insulin is a hormone that regulates blood glucose. Hyperglycaemia, also called raised blood glucose or raised blood sugar, is a common effect of uncontrolled diabetes and over time leads to serious damage to many of the body's systems, especially the nerves and blood vessels.

Introduction

By contrast, the probability of dying from any one of the four main non communicable diseases (cardiovascular diseases, cancer, chronic respiratory diseases or diabetes) between the ages of 30 and 70 decreased by 22% globally between 2000 and 2019 [1].

Diabetes symptoms depend on how high your blood sugar is. Some people, especially if they have prediabetes or type 2 diabetes, may not have symptoms. In type 1 diabetes, symptoms tend to come on quickly and be more severe [2].

Some of the symptoms of type 1 diabetes and type 2 diabetes are:

- Feeling more thirsty than usual.
- Urinating often.
- Losing weight without trying.
- Presence of ketones in the urine. Ketones are a by product of the breakdown of muscle and fat that happens when there's not enough available insulin.
- Feeling tired and weak [3].
- Feeling irritable or having other mood changes.
- Having blurry vision.
- Having slow-healing sores.
- Getting a lot of infections, such as gum, skin and vaginal infections [4].

Type 1 diabetes can start at any age. But it often starts during childhood or teen years. Type 2 diabetes, the more common type, can develop at any age. Type 2 diabetes is more common in people older than 40 [5].

Risk factors for diabetes depend on the type of diabetes. Family history may play a part in all types. Environmental factors and geography can add to the risk of type 1 diabetes [6].

Sometimes family members of people with type 1 diabetes are tested for the presence of diabetes immune system cells (autoantibodies). If you have these autoantibodies, you have an increased risk of developing type 1 diabetes. But not everyone who has these autoantibodies develops diabetes.

Race or ethnicity also may raise your risk of developing type 2 diabetes. Although it's unclear why, certain people — including Black, Hispanic, American Indian and Asian American people — are at higher risk. Prediabetes, type 2 diabetes and gestational diabetes are more common in people who are overweight or obese [7].

Complications:

Long-term complications of diabetes develop gradually. The longer you have diabetes — and the less controlled your blood sugar — the higher the risk of complications. Eventually, diabetes complications may be disabling or even life-threatening. In fact, prediabetes can lead to type 2 diabetes. Possible complications include:

- Heart and blood vessel (cardiovascular) disease. Diabetes majorly increases the risk of many heart problems. These can include coronary artery disease with chest pain (angina), heart attack, stroke and narrowing of arteries (atherosclerosis). If you have diabetes, you're more likely to have heart disease or stroke [8].
- Nerve damage (neuropathy). Too much sugar can injure the walls of the tiny blood vessels (capillaries) that nourish the nerves, especially in the legs. This can cause tingling, numbness, burning or pain that usually begins at the tips of the toes or fingers and gradually spreads upward.
- Damage to the nerves related to digestion can cause problems with nausea, vomiting, diarrhea or constipation. For men, it may lead to erectile dysfunction [9].
- Kidney damage (nephropathy). The kidneys hold millions of tiny blood vessel clusters (glomeruli) that filter waste from the blood. Diabetes can damage this delicate filtering system.
- Eye damage (retinopathy). Diabetes can damage the blood vessels of the eye (diabetic retinopathy). This could lead to blindness [10].
- Foot damage. Nerve damage in the feet or poor blood flow to the feet increases the risk of many foot complications.
- Skin and mouth conditions. Diabetes may leave you more prone to skin problems, including bacterial and fungal infections.
- Hearing impairment. Hearing problems are more common in people with diabetes.

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- Alzheimer's disease. Type 2 diabetes may increase the risk of dementia, such as Alzheimer's disease.

- Depression. Depression symptoms are common in people with type 1 and type 2 diabetes.

Most women who have gestational diabetes deliver healthy babies. However, untreated or uncontrolled blood sugar levels can cause problems for you and your baby [11]. Complications in your baby can be caused by gestational diabetes, including:

- Excess growth. Extra glucose can cross the placenta. Extra glucose triggers the baby's pancreas to make extra insulin. This can cause your baby to grow too large. It can lead to a difficult birth and sometimes the need for a C-section.

- Low blood sugar. Sometimes babies of mothers with gestational diabetes develop low blood sugar (hypoglycemia) shortly after birth. This is because their own insulin production is high.

- Type 2 diabetes later in life. Babies of mothers who have gestational diabetes have a higher risk of developing obesity and type 2 diabetes later in life.

- Death. Untreated gestational diabetes can lead to a baby's death either before or shortly after birth.

Complications in the mother also can be caused by gestational diabetes, including:

- Preeclampsia. Symptoms of this condition include high blood pressure, too much protein in the urine, and swelling in the legs and feet.

- Gestational diabetes. If you had gestational diabetes in one pregnancy, you're more likely to have it again with the next pregnancy.

Prevention:

Type 1 diabetes can't be prevented. But the healthy lifestyle choices that help treat prediabetes, type 2 diabetes and gestational diabetes can also help prevent them:

- Eat healthy foods. Choose foods lower in fat and calories and higher in fiber. Focus on fruits, vegetables and whole grains. Eat a variety to keep from feeling bored.

- Get more physical activity. Try to get about 30 minutes of moderate aerobic activity on most days of the week. Or aim to get at least 150 minutes of moderate aerobic activity a week. For example, take a brisk daily walk. If you can't fit in a long workout, break it up into smaller sessions throughout the day.

- Lose excess pounds. If you're overweight, losing even 7% of your body weight can lower the risk of diabetes. For example, if you weigh 200 pounds (90.7 kilograms), losing 14 pounds (6.4 kilograms) can lower the risk of diabetes [12].

But don't try to lose weight during pregnancy. Talk to your provider about how much weight is healthy for you to gain during pregnancy. To keep your weight in a healthy range, work on long-term changes to your eating and exercise habits. Remember the benefits of losing weight, such as a healthier heart, more energy and higher self-esteem [13].

Sometimes drugs are an option. Oral diabetes drugs such as metformin (Glumetza, Fortamet, others) may lower the risk of type 2 diabetes. But healthy lifestyle choices are important. If you have prediabetes, have your blood sugar checked at least once a year to make sure you haven't developed type 2 diabetes [14].

Over time, diabetes can damage the heart, blood vessels, eyes, kidneys, and nerves.

- Adults with diabetes have a two- to three-fold increased risk of heart attacks and strokes (2).

- Combined with reduced blood flow, neuropathy (nerve damage) in the feet increases the chance of foot ulcers, infection and eventual need for limb amputation.

- Diabetic retinopathy is an important cause of blindness and occurs as a result of long-term accumulated damage to the small blood vessels in the retina. Close to 1 million people are blind due to diabetes.

- Diabetes is among the leading causes of kidney failure.

- People with diabetes are more likely to have poor outcomes for several infectious diseases, including COVID-19.

Discussion

Early diagnosis can be accomplished through relatively inexpensive testing of blood glucose. Treatment of diabetes involves diet and physical activity along with lowering of blood glucose and the levels of other known risk factors that damage blood vessels. Tobacco use cessation is also important to avoid complications. Interventions that are both cost-saving and feasible in low- and middle-income countries include:

- blood glucose control, particularly in type 1 diabetes. People with type 1 diabetes require insulin, people with type 2 diabetes can be treated with oral medication, but may also require insulin;

- blood pressure control; and

- Foot care (patient self-care by maintaining foot hygiene; wearing appropriate footwear; seeking professional care for ulcer management; and regular examination of feet by health professionals) [15].

Other cost saving interventions includes:

- screening and treatment for retinopathy (which causes blindness)

- blood lipid control (to regulate cholesterol levels)

- Screening for early signs of diabetes-related kidney disease and treatment.

Conclusion

In 2014, 8.5% of adults aged 18 years and older had diabetes. In 2019, diabetes was the direct cause of 1.5 million deaths and 48% of all deaths due to diabetes occurred before the age of 70 years. Another 460 000 kidney disease deaths were caused by diabetes, and raised blood glucose causes around 20% of cardiovascular deaths. Between 2000 and 2019, there was a 3% increase in age-standardized mortality rates from diabetes. In lower-middle-income countries, the mortality rate due to diabetes increased 13%.

Acknowledgement

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Conflict of Interest

None

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