Common Health Risks and Associated Symptoms of Diabetes

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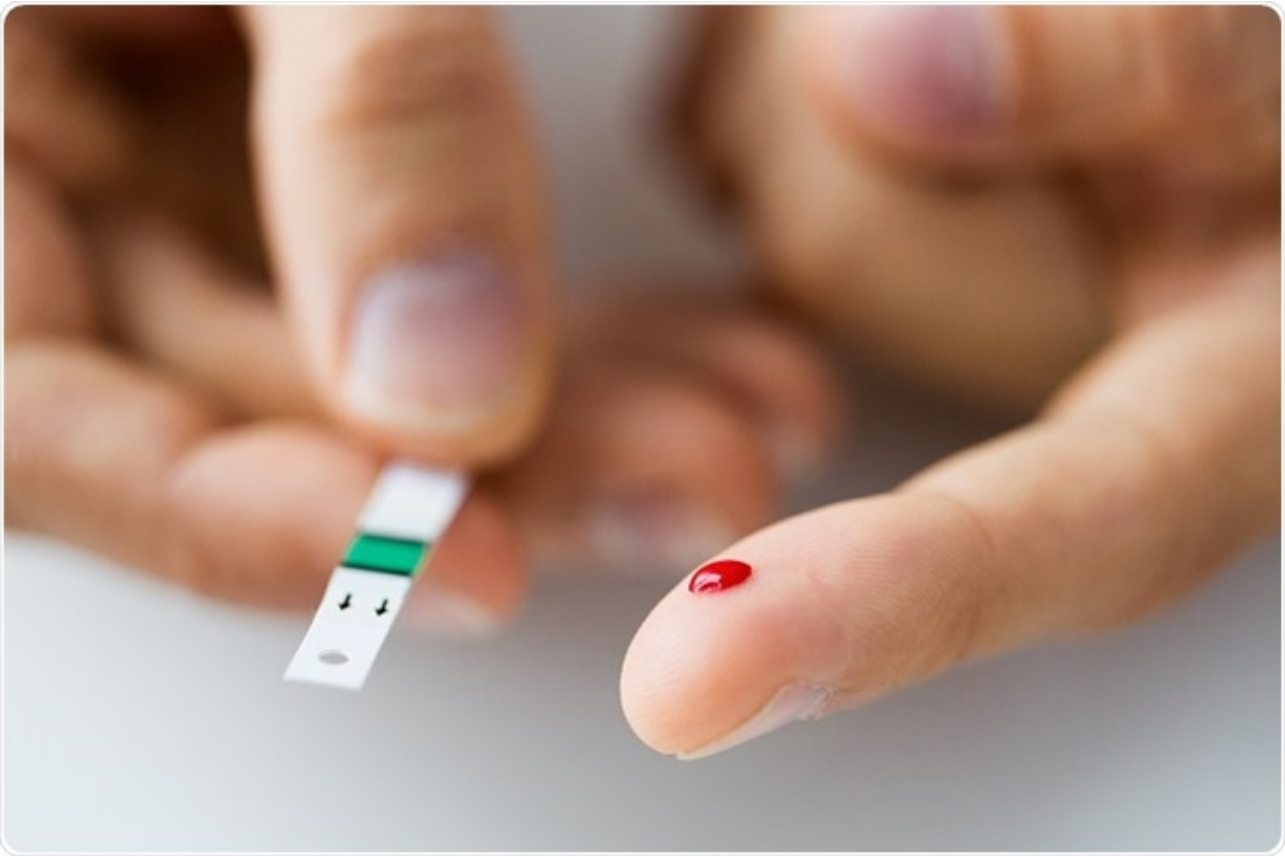
Diabetes is a chronic metabolic disorder that affects blood glucose control, and has become a growing problem across the world. From 1980 to 2014, the prevalence of diabetes grew from 4.7% to 8.5% worldwide, with the number of individuals affected by this disease increasing from 108 million to 422 million, respectively.[1]



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It is estimated that the number of people worldwide with diabetes will increase to 642 million by 2040, according to the IDF diabetes atlas, indicating a serious healthcare crisis for both providers and patients in the future.[2]

In line with this, healthcare costs are also projected to greatly expand, in the same way that it has in recent years. In just a period of 5 years, from 2007 to 2012, the overall healthcare spending associated with diabetes increased by

41%, from $174 billion to $245 billion.[3]

Diabetes prevalence is mostly seen in developing countries, reflecting a high proportion of the economic burden of this disease. Particularly in Asian countries, there is a high prevalence of diabetes cases and these are likely to grow further.[4]

In fact, Asian countries have the highest prevalence rates, representing 60% of the global population of people with diabetes, largely due to factors associated with rapid development. The three most common factors related to this increase are industrialization, socio-economic growth and urbanization. [4]

In India, diabetes cases are increasing in epidemic proportions, affecting more than 62 million people.[5,6] Some explanations associated with the growing prevalence in this geographic region are genetic factors, improved living standards and rising levels of obesity.[7]

Diabetes: health effects

Diabetes has many long-term and short-term health effects, and each of these become worse with poor glycaemic control. Appropriate treatment and management of diabetes with prescribed therapies, lifestyle changes, and diet are important for reducing the development of related symptoms.

Short-term health effects

- **Hypoglycaemia:** When the body has love levels of blood glucose. Poor management, often caused by missing meals or taking too much insulin may result in hypoglycaemia. Other potential triggers include exercise, alcohol consumption and other behavioural factors. Sometimes occurring before an official diagnosis has been reached, hypoglycaemia can cause a raised heart rate, anxiety, headache, confusion, lethargy and a loss of consciousness.
- **Ketoacidosis**: When the body does not have adequate insulin levels to refuel cells, it will convert fat into ketones, which, in turn, are used up by the cells for energy; however, it is glucose that is the preferred source of energy for the cells as ketones are acidic. Ketoacidosis will occur if this process is allowed to continue and the concentration of ketone bodies becomes very high. Vomiting, dehydration, and comas are symptoms of

ketoacidosis. Generally, this condition is normally observed in type 1 diabetes patients or type 2 diabetes patients. In the latter case, only small amounts of insulin are produced.

- **Hyperosmolar hyperglycemic state (HHS):** Characterized as a blood glucose level over 40 mmol/l, hyperosmolar hyperglycemic state (HHS) are frequently caused by ineffective diabetes medication or illness. High blood glucose levels cause severe dehydration, which require fluids to treat. Symptoms include, a high risk of complications, increased urination and thirst, disorientation, nausea and coma.

Long-term health effects

- **Diabetic retinopathy:** Poor management of type 2 diabetes can lead to prolonged high blood glucose and can damage the tiny blood vessels present in the retina of the eye, which can lead to diabetic retinopathy. This disorder can cause blindness if left untreated. Once the symptoms of diabetic retinopathy have begun there are limited treatment options available, including anti-VEGF injections into the retina and intraocular laser photocoagulation therapy. Therefore, it's better to prevent retinopathy with good diabetes management.
- **Cardiovascular disease:** Patients with diabetes have a greater risk for developing cardiovascular disease (CVD) owing to HbA1c, oxidative stress, inflammation, and a host of other related factors.[7] Chronic high blood sugar or hyperglycaemia triggers oxidation and inflammation, and plays a role in the pathogenesis of endothelial dysfunction. This is one of the reasons why diabetes management is important to reduce potential morbidity and mortality.
- **Nephropathy:** A frequent long-term complication of diabetes is kidney disease, also called nephropathy. With hyperglycaemia, too much blood will be filtered through the kidneys, which can damage the filtering capabilities. These filters, in turn, will begin to leak small quantities of protein into the urine, resulting in a condition called microalbuminuria. When blood sugar levels continue to remain high, larger amount of protein will make their way into the urine, called macroalbuminuria. In the last stages, it will ultimately lead to end-stage renal disease. Fluid build-up, upset stomach, insomnia, difficulty in concentrating, and fatigue are symptoms of nephropathy.[9]
- **Neuropathy:** Neuropathy affects the nerves and is a long-term complication associated with uncontrolled or chronic diabetes.

> Hyperglycaemia can damage the tiny blood vessels that supply the nerves and prevent the transport of essential nutrients. Sensory, motor, and autonomic are three types of neuropathy.[10]

Patients with diabetes should take measures to lower their blood sugar levels and prevent the development of both long-term and short-term health effects. In type 2 diabetes, exercise can improve the sensitivity of the cells to insulin and enhance a well-formed treatment procedure that includes pharmacological (insulin therapy) support and a healthy diet.[11]

The effect of therapy can be monitored by taking routine analytic measurements with a glucose analyser, and the most appropriate treatment strategy can be assessed based on individual requirements of a patient.

Detection

Early detection and monitoring are key to reducing the worldwide prevalence of diabetes, in particular if the symptoms can be recognised in the pre-diabetes phase.

Point-of-Care-Testing (POCT) devices have become an essential tool for detecting diabetes. POCT instruments can analyse lactate, blood glucose levels, and even glycated haemoglobin (HbA1c), which is not only a risk marker for diabetes but also a predictive risk marker for heart disease.

Point-of-Care devices are employed for detecting HbA1c. EKF Diagnostics' Quo-Lab® A1c and Quo-Test® A1c analysers are designed to detect high levels of HbA1c, guiding diabetes care.

Aside from HbA1c and glucose analysers, there are Glycated Serum Protein (GSP) assays that can help identify risk markers for diabetes. One example of GSP assays is the GSP LiquiColor® Assay provided by EKF Diagnostics. The assay gives a description of normal blood glucose level over a period of two to three weeks.

Some group of patients like individuals with pancreatic disease and pregnant women are not eligible for HbA1c testing. In such cases, a GSP assay can provide an accurate means of predicting and measuring the diabetes status.

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About EKF Diagnostics

The EKF range of analysers is unique in their ease of use, accuracy and portability which is why we are a trusted brand in GP surgeries, pharmacies, blood banks, sports clinics, hospitals and laboratories for the measurement of glucose, lactate, hemoglobin, hematocrit and HbA1c.

EKF Diagnostics products' reputation for quality, accuracy and ease of use stems from our beginnings as a technology business founded in Barleben in Germany in 1990. In the following years we have invested in developing a portfolio of analysers and consumables for the near patient care sector that deliver laboratory accuracy and reliability without the high costs and maintenance associated with lab devices.

In 2010 EKF Diagnostics acquired HbA1c developer Quotient Diagnostics based in Walton-on-Thames, UK and Argutus Medical in Dublin, a specialist research and distribution company engaged in kidney and liver diagnostics. The following year the company expanded further through the acquisition of Stanbio Laboratory, a manufacturer and distributor of diagnostic products with a worldwide customer base.

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EKF Diagnostics is a global medical diagnostics business with a long history in point-of-care testing and central laboratory manufacturing. Our products have a hard earned reputation for ease of use, reliability and accuracy.

Our core focus is the Point of Care market with over 80,000 hemoglobin, A1c, glucose and lactate analyzers in regular use in more than 100 countries running more than 50m tests every year.

Our range of HbA1c analyzers and glucose analyzers are used in GP surgeries, sports clinics, and diabetes clinics. They deliver fast and reliable results that provide both practitioner and patient with the information they need to make

clinical or lifestyle decisions in minutes.

EKF Diagnostics offer the largest range of hemoglobin and hematocrit analyzers on the market, giving physicians and specialists a choice of product with different methodology, measurement speed, connectivity and price options. Our aim is to make blood donation and anemia screening easier, more affordable and more accessible than ever before.

The EKF Maternal & Women's Health Point of Care range aims to improve healthcare outcomes for women and children by providing physicians with a suite of products covering pregnancy testing, anemia screening, fetal scalp lactate testing and post birth creamatocrit measurement.

EKF Diagnostics is also a global manufacturer of central laboratory products including Stanbio Chemistry reagents, benchtop laboratory analyzers, rapid tests and centrifuges. Our chemistry reagents can be used on the majority of analyzers found in hospital laboratories around the world.

The ordinary shares of EKF Diagnostics Holdings plc are traded on the AIM market of the London Stock Exchange.