

Fact sheet no. 20

Smoking and diabetes

Among people with diabetes, smoking aggravates the risk of serious disease and premature death. There is also a growing body of evidence to suggest that smoking is an independent risk factor for diabetes. November 2017.

INTRODUCTION

This fact sheet examines the association between smoking and diabetes including smoking as a risk factor, how smoking can lead to multiple complications of diabetes and the benefits of stopping smoking among people with diabetes.

WHAT IS DIABETES?

Diabetes mellitus is a metabolic condition which causes increased glucose levels in the blood. Glucose is a sugar that the body produces primarily from the digestion of carbohydrates and levels are controlled by the hormone insulin. Insulin is made and stored in the pancreas and helps glucose to enter the cells where it is used as fuel by the body.¹

Smoking is estimated to account for as many as 360,000 cases of diabetes in the UK.

TYPES OF DIABETES

There are two main types of diabetes:

Type 1 Diabetes develops when the insulin-producing cells in the pancreas have been destroyed, leaving the body unable to produce insulin. It is thought that the body's immune system destroys the cells but it's not known what causes this to happen. Type 1 diabetes usually appears in children and young adults but can occur at any age. People with this form of the condition are treated with daily insulin injections and account for about 10 per cent of diabetes cases in the UK.¹

Type 2 Diabetes develops while the body can still produce insulin, but not enough, or when the insulin produced doesn't work properly. This form of the condition usually develops gradually after the age of 40. However, it is increasingly being diagnosed in younger people, including children. Both genetic and environmental factors contribute to the development of diabetes but the development of Type 2 diabetes is more likely if some or all of the following factors are also present: physical inactivity; being overweight; family history of Type 2 diabetes; previous diabetes in pregnancy. The condition is also more common in people of South Asian and African-Caribbean origin.^{2,3}

PREVALENCE AND HEALTH CONSEQUENCES OF DIABETES

In the UK, 3.6 million people have been diagnosed with diabetes, equivalent to 6.0% of the population.⁴ It has been estimated that there are a further 1.1 million people with diabetes who remain undiagnosed.⁴ Around 700 people a day are diagnosed with diabetes, equivalent to one person every two minutes.⁵ Every year over 24 000 people die prematurely from diabetes in England and Wales.⁵

SMOKING AND THE RISK OF DEVELOPING TYPE 2 DIABETES

Smoking is a known risk factor for Type 2 Diabetes and has been identified as a risk factor for insulin resistance, a precursor for diabetes.^{6 7 8 9 10} A systematic review of 25 studies found that all but one revealed an association between active smoking and an increased risk of diabetes.¹¹ On the basis of this review, it is estimated that 12% of all Type 2 diabetes in the United States may be attributable to smoking.¹² If the same proportion is applied to the UK, smoking may account for as many as 360,000 cases of diabetes.

Smoking-related risk of diabetes increases with the number of cigarettes smoked. The Cancer Prevention Study 1, a cohort study of 275,190 men and 434,637 women, found that women who smoke more than 40 cigarettes a day have a 74% increased risk of developing diabetes, with men's risk increasing by 45%.¹³

Tobacco use has also been shown to deteriorate glucose metabolism which may lead to the onset of Type 2 diabetes.¹³ There is also some evidence which suggests that smoking increases diabetes risk through a body mass index independent mechanism.^{14 15}

There is also evidence, including a 2013 cohort study of over 37,000 women, to suggest that exposure to secondhand smoke is a risk factor for the development of Type 2 diabetes.^{16 17 18 19 20} Studies published in 2017 further found that exposure to secondhand smoke was a risk factor for poor glycaemic control²¹ and that there was an association between exposure to secondhand smoke and worsening glycaemic parameters.²²

PEOPLE WITH DIABETES ARE AT GREATER RISK OF:

- high blood pressure and heart disease
- stroke
- kidney disease
- nerve damage leading to limb amputation
- eye damage such as retinopathy (disorders of the retina)
- dementia and depression
- sexual dysfunction
- complications in pregnancy⁵

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SMOKING, DIABETES AND PREGNANCY

Women who smoke during pregnancy are at increased risk of developing gestational diabetes and also increase the risk of their offspring developing diabetes later in life.^{23 24} Gestational diabetes mellitus is high blood sugar that develops during pregnancy.²⁵ Women who develop diabetes during pregnancy have a seven-fold increased risk of subsequently developing Type 2 diabetes compared with women who have normal levels of glucose in pregnancy.²⁶

METABOLIC SYNDROME

Metabolic syndrome is the medical term for a combination of diabetes, high blood pressure and obesity. It has been estimated that one in four adults are affected by metabolic syndrome in the UK.²⁷ There is evidence that suggests a strong association between cigarette smoking, insulin resistance and metabolic syndrome.^{28 29}

Smokers with metabolic syndrome are at increased risk of perioperative (surgical) complications³⁰ and there is also an association between smoking, metabolic syndrome and advanced chronic kidney disease in later life.³¹ There is some emerging evidence that shows that smoking with metabolic syndrome is a risk factor for atrial fibrillation, which is itself linked to an increased risk of mortality and cardiovascular disease.³²

SMOKING, DIABETES AND PREMATURE DEATH

Compared with non-smokers with diabetes, people with diabetes who smoke have an increased risk of premature death and an increased risk of heart disease.³³ Smokers have an increased risk of cardiovascular mortality, and a number of cardiovascular events including coronary heart disease, stroke and myocardial infarction, compared to non-smokers.³³ Smoking is also associated with increased risk of cardiovascular complications.³⁴

There is evidence that these risks increase with increased cigarettes smoked per day. A large prospective study of US nurses found that among those with diabetes the relative risks of mortality were 1.31 for past smokers, 1.43 for current smokers of 1-14 cigarettes per day, 1.64 for smokers of 15-34 cigarettes per day, and 2.19 for current smokers of 35 or more cigarettes per day.³⁵

THE EFFECT OF SMOKING ON COMPLICATIONS OF DIABETES

Smoking is associated with numerous complicating factors in diabetes.

Increased risks of kidney disease (nephropathy) have been shown in Type 1 diabetes patients who smoke.^{36 37} There is also evidence that both active and passive smoking increases the risks of chronic kidney disease in Type 2 diabetes patients.³⁸ Smoking has been found to increase the risk of albuminuria (the presence of protein in the urine, which indicate signs of kidney disease) in both Type 1 and Type 2 diabetes.^{39 40}

The relationship between cigarette smoking and retinopathy (disorders of the retina) is less well defined than that of other microvascular complications of diabetes. However, some studies have found an association between smoking and diabetic retinopathy⁴¹ and a 2015 study found that nicotine expedited diabetes induced retinal changes.⁴²

Smoking is a documented risk factor for both the development and progression of various types of neuropathy (damage to the peripheral nervous system).^{43 44} A systematic review and meta-analysis published in 2015 found that smoking increased the risk of diabetic peripheral neuropathy by 42%⁴⁵ and a prospective study found that cigarette smoking was associated with a twofold increase in risk.⁴⁶

People with diabetes who smoke have an increased risk of premature death and an increased risk of heart disease and other complications.

BENEFITS OF STOPPING SMOKING

Stopping smoking reduces the risk of premature death. The US Nurses' Study found that women with Type 2 diabetes who had stopped smoking for 10 or more years had a mortality relative risk of 1.11 compared with diabetic women who had never smoked.³⁵ (See also ASH fact sheet: [Stopping smoking: the benefits and aids to quitting.](#))

As diabetes also increases the risk for heart disease and stroke, smokers with diabetes are strongly advised to quit.^{13 48} However it appears that many smokers with diabetes are not receiving this advice. As part of a regular survey of its members in 2014, Diabetes UK found that 64.1% of smokers had not received support or advice to quit.⁴⁸ However, because there is some evidence to show that smoking cessation is associated with altered glycaemic control^{49 50 51} and weight gain amongst smokers with diabetes,^{49 51 52} more research is needed to explore the most effective way of helping people with diabetes to stop smoking.^{53 54 55}

In the light of evidence demonstrating that smoking is an independent risk factor for diabetes and that it is also an aggravating factor for diabetes complications, smoking cessation advice should be a routine component of diabetic care.⁵⁶ Concerns about weight gain should be addressed by health care providers whilst emphasising the fact that the health benefits of smoking cessation far outweigh post-cessation weight gain, even in people who are focused on weight management.^{56 57 58}

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