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Health Tips

Simple lifestyle changes have been shown to be effective in preventing or delaying the onset as well as improving control of type 2 diabetes. That includes: maintaining an optimal body weight and waist circumference; eating healthier; being physically active; avoiding smoking; and refraining from alcohol use.

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Diabetes Mellitus :

A Major Public Health Challenge in the 21st Century

Diabetes mellitus (often simply referred to as diabetes) is a chronic disease in which the level of blood glucose, also called blood sugar, is above normal. It occurs either when the pancreas does not produce enough insulin, a hormone that lowers blood sugar, or when the body cannot effectively use the insulin it produces. There are 3 main types of diabetes: type 1 diabetes (previously known as insulin dependent or childhood-onset diabetes), type 2 diabetes (previously known as non-insulin dependent or adult-onset diabetes), and gestational diabetes.

Type 1 diabetes is characterised by a lack of insulin production. Symptoms of type 1 diabetes, which may occur suddenly, include excessive excretion of urine (polyuria), thirst (polydipsia), constant hunger, and unexplained weight loss. It most commonly develops in children and young adults, although it can occur at any age. The exact cause of type 1 diabetes is unclear, but it often runs in families. To date, there are no known ways to prevent type 1 diabetes, and those diagnosed with this condition require insulin injection for survival.^{1,2}

Type 2 diabetes is much more common than type 1 diabetes. In high-income countries, type 2 diabetes makes up about 85% to 95% of all cases of diabetes. In type 2 diabetes, the pancreas is able to produce insulin, but the body is not responding to its effects due to insulin resistance. Its symptoms are usually less marked than those of type 1 diabetes. Type 2 diabetes used to occur only in adults, but is now increasingly seen in children and adolescents. Before people develop type 2 diabetes, almost all of them go through an asymptomatic clinical phase called 'prediabetes', in which the blood sugar level is higher than normal but not yet high enough to be in the diabetic range. Prediabetes can be detected through routine or opportunistic blood sugar screening by either a fasting plasma glucose test (FPG test) or an oral glucose tolerance test (OGTT). Depending on the screening test used, prediabetes is also called impaired fasting glucose (IFG) or impaired glucose tolerance (IGT). People with prediabetes are at higher risk of developing type 2 diabetes. They are also at increased risk for developing cardiovascular disease. Risk factors for type 2 diabetes (and prediabetes) are diverse; some are modifiable, while others are not. Modifiable risk factors are usually lifestyle-related, including overweight and obesity (particularly

central obesity - fat distributed around the trunk of the body), physical inactivity, poor nutrition, smoking, and heavy alcohol use. Non-modifiable risk factors include increasing age, family history of diabetes (i.e. parents or siblings with diabetes), ethnicity (Asians, particularly South Asians; Hispanics; African-Americans; or indigenous people in the US, Canada and Australia), history of gestational diabetes, and low birth weight.^{1,2}

Gestational diabetes (or gestational diabetes mellitus, GDM) refers to diabetes that starts or is first diagnosed during pregnancy. In most cases, GDM causes no symptoms and is diagnosed through blood sugar screening. When symptoms are present, they are similar to those of type 2 diabetes. Although most women with GDM do not remain diabetic after the baby is born, women who have had GDM (and their offspring of gestational diabetes pregnancies) are at increased risk of developing type 2 diabetes later in life.^{1, 2} As reported in a meta-analysis, women with GDM had approximately 7 times the risk of developing type 2 diabetes compared to those without GDM.³

Global Overview

Diabetes is one of the priority non-communicable diseases that the World Health Organization has identified as requiring urgent global actions, along with cardiovascular disease, cancer, and chronic respiratory disease.⁴ According to the International Diabetes Federation (IDF), some 366 million people around the world (or 8.3% of adults) are estimated to have diabetes in 2011, and an estimated 4.6 million people aged 20 - 79 worldwide died from diabetes in the same year, accounting for 8.2% of global all-cause mortality of people in this age group.

Of note, as many as 183 million people globally may have the disease but are unaware of it, and another 280 million people (or 6.4% of adults) have impaired glucose tolerance (IGT) and are thus at high risk of developing type 2 diabetes. If no urgent action is taken, the global number of people with diabetes will rise to 552 million (or 9.9% of adults), with a further 398 million people (or 7.1% of adults) at high risk of developing diabetes by 2030.^{2,4}

Among children and adolescents, diabetes is also one of the most common chronic diseases. The IDF estimated that some 490 000 children around the world are living with type 1 diabetes in 2011, with about 78 000 new cases diagnosed each year.² In parallel with the global epidemic of type 2 diabetes in adults, many countries also witnessed a dramatic rise in the incidence of type 2 diabetes in children and adolescents over the past two decades⁵, largely due to the escalating rates of obesity and physical inactivity in childhood.² More importantly, the increasing prevalence of childhood type 2 diabetes suggests impending future morbidity from diabetic complications and sequelae (Box 1) in a large number of relatively young adults.

Local Situation

In Hong Kong, diabetes is a growing public health issue. The prevalence of diabetes and impaired glucose tolerance (IGT) for adults aged 20-79 in Hong Kong in 2011 was estimated to be 9.4% and 14.9% respectively, according to the International Diabetes Federation (IDF). By the year 2030, the prevalence is projected to increase to 11.9% for diabetes and 16.8% for IGT.²

Box 1: Sequelae of diabetes***Diabetic ketoacidosis (DKA)***

> It is a life-threatening complication that can lead to diabetic coma or even death. It is characterised by high blood levels of sugar and organic acids (called ketones) and the presence of ketones in urine, resulting from a state of absolute or relative insulin deficiency. Diabetic ketoacidosis (DKA) mainly occurs in people with type 1 diabetes. People with type 2 diabetes can develop DKA, but it is rare in the absence of a precipitating event. The most common events that precipitate DKA are infections, and missed or inadequate insulin dose. In the U.S., population-based studies showed that the incidence rate for diabetic ketoacidosis ranged from 5 to 8 per 1 000 diabetic persons per year.⁶

Cardiovascular disease

> Hypertension is common among people with diabetes, with a prevalence approximately twice that of the non-diabetic subjects.⁷ Diabetes increases the risk of heart disease and stroke. Compared with non-diabetic subjects, people with diabetes would increase 1- to 2-times the risk of heart disease⁶ and 2- to 6-times the risk of stroke.⁸ Globally, cardiovascular disease is the major cause of death in people with diabetes and accounts for 50% of all diabetes fatalities.¹

Kidney disease

> Diabetes is among the leading cause of kidney failure in both developed and developing countries. Worldwide, diabetic nephropathy is the primary diagnosis in 20% to 40% of people starting renal replacement therapy for end-stage renal disease.⁹ Globally, an estimated 10% to 20% of people with diabetes died of kidney failure.¹

Eye disease

> Diabetic retinopathy is an important cause of visual impairment and blindness. For many countries, prevalence estimates of retinopathy among people with diabetes ranged from 30% to 45%.¹⁰ In 2002, diabetic retinopathy accounted for about 5% of world blindness, representing almost 5 million blind people.¹¹ Diabetes also raises the risk of visual impairment due to cataracts and glaucoma; compared to people without diabetes, people with diabetes are 60% and 40% more likely to develop cataract and glaucoma respectively.¹²

Nerve disease

> Estimates suggest that up to 50% of people with diabetes have some degree of neuropathy (nerve damage)¹, including impaired sensation or pain in the feet or hands (peripheral neuropathy), carpal tunnel syndrome, slow digestion of food in the stomach (diabetic gastroparesis), diabetic diarrhea, bladder or sexual dysfunction.⁶

Foot disease

> Diabetic foot disease can often lead to ulceration and subsequent limb amputations. In the US foot ulcers are estimated to affect 15% of all diabetic individuals during their lifetime; the incidence of amputation in people with diabetes is 0.4% to 0.8% per year.⁶ In the UK, people with diabetes were about 23 times as likely to have lower limb amputation compared with people without diabetes.¹³

Box 1: Sequelae of diabetes (cont'u)***Oral disease***

> Periodontal disease is the most prevalent oral complication in people with diabetes. In a large epidemiological study in the US (NHANES III), individuals with poorly controlled diabetes had 2.9-times the risk of having periodontitis compared to non-diabetic subjects.¹⁴

Sleep apnoea

> Recent research demonstrates an association between diabetes and obstructive sleep apnoea (OSA), a common but often unrecognised disorder that could lead to substantial morbidity and mortality. Among people who are known to have type 2 diabetes, the prevalence of OSA ranged from 23% to 86%.¹⁵⁻¹⁷

Erectile dysfunction (in men)

> Men with diabetes have a higher prevalence of erectile dysfunction compared to the general population. Studies in different populations have reported prevalence of erectile dysfunction in men with diabetes ranging from 20% to 90%.¹⁸

Infections

> People with diabetes are more susceptible to a range of infections. For example, a meta-analysis showed that the prevalence of asymptomatic bacteriuria in people with diabetes was about 3 times that of non-diabetics.¹⁹ A population-based study showed that the influenza and pneumonia mortality rate in patients with diabetes was 1.7 times that of the general population.²⁰ Diabetes could also exacerbate other major infectious diseases, including tuberculosis, HIV/AIDS and malaria.⁴

Cancer

> Epidemiological studies have linked diabetes to an increased risk of some cancers, including pancreatic cancer, liver cancer, biliary tract cancer, colorectal cancer, bladder cancer, breast cancer, non-Hodgkin's lymphoma, and endometrial cancer (in women).^{21, 22} Furthermore, diabetes was associated with a 16% increased risk of mortality across all cancer types²³. People with diabetes also had a 50% greater risk of death after cancer surgery than those without the disease.²⁴

Mental disorders

> People with diabetes have about twice the risk of having major depression as those without diabetes.²⁵ A meta-analysis also showed a significant and consistent association between diabetic complications and depressive symptoms with the effect size ranging from small (e.g. retinopathy) to modest (e.g. sexual dysfunction).²⁶ Compared to the general population,²⁶ people with diabetes were found to have a 93% increased risk of anxiety disorders as well.²⁷

Adverse pregnancy outcomes

> GDM is associated with increased risks for various adverse pregnancy outcomes. Women diagnosed with GDM had a respective 69% and 37% increased risk of preeclampsia and cesarean delivery compared with women without GDM. The babies of women with GDM had a respective 53%, 81%, and 55% increased risk of large for gestational age, macrosomia, and perinatal mortality.²⁸

For GDM, it is also an increasing problem. The annual statistics of the Department of Obstetrics and Gynaecology, the University of Hong Kong, has shown a progressive increase in the prevalence of GDM, from 5.9% in 1988 to 10.8% in 2002.²⁹ Moreover, women with GDM have a higher risk of developing type 2 diabetes later in life. A cohort study of Chinese postpartum women seen in a diabetes centre of Kwong Wah Hospital between 2000 and 2008 found that among the 238 women with GDM and postpartum IGT detected 4 to 8 weeks after delivery, 20% developed type 2 diabetes after a mean follow-up of 4.3 years.³⁰

As for diabetes in children and adolescents, data showed that the incidence rate, especially that of type 2 diabetes, is also gradually increasing. A retrospective population-based study in Hong Kong reported that the age-adjusted annual incidence rate of type 1 diabetes among children aged 14 and below significantly increased from 1.4 per 100 000 persons for the period 1984 - 1996 to 2.4 per 100 000 persons for the period 1997 - 2007. Further analysed by age group, the age-specific incidence rates (per 100 000 persons) for the period 1997 - 2007 increased slightly with age, from 2.2 among children aged 0 - 4 years to 2.4 for both age groups 5 - 9 years and 10 - 14 years. Regarding type 2 diabetes, the standardised annual incidence rate for boys and girls aged 18 and below for the period 1997 - 2007 was 1.1 and 1.5 per 100 000 persons respectively. Analysed by age group, the age-specific incidence rates (per 100 000 persons) increased from 0.1 among children aged 5 - 9 years to 2.3 among children aged 10 - 14 years, but dropped to 2.0 among adolescents aged 15 - 18 years.³¹

In the past 10 years, the crude death rate of diabetes for males in Hong Kong dropped from 9.2 per

100 000 population in 2001 to 6.9 per 100 000 population in 2010. The corresponding rate for females also dropped from 10.9 per 100 000 population to 7.9 per 100 000 population over the same period. In 2011, with 457 registered deaths, diabetes was the tenth commonest cause of deaths in Hong Kong.³² Meanwhile, it brought about over 22 000 episodes of in-patient discharges and deaths in public and private hospitals.³³ As shown in Table 1, the rates of registered deaths and in-patient discharges and deaths due to diabetes rose substantially with age.

However, the current figures about diagnosed diabetes have very probably under-estimated its actual prevalence, because many people with diabetes have remained undiagnosed. For example, a local survey on 3 376 Chinese professional drivers with no history of diabetes found that the prevalence of undiagnosed diabetes and prediabetes was 8.1% and 10.0% respectively.³⁴ The true burden of diabetes in terms of mortality and hospital care is also possibly higher as many deaths and hospital admissions categorised under other principal diagnosis can actually be attributed to the various late complications of diabetes.

Moreover, complications of diabetes are common among diabetic patients in Hong Kong, as shown by local epidemiological studies. A study used data from over 10 000 people with diabetes from 1995 to 2009 and showed an annual event rate of 43.0 per 1 000 person-years, with events encompassing **cardiovascular disease, end-stage renal disease, cancer, and death**. Among patients with type 2 diabetes in Hong Kong, the common causes of deaths were coronary heart disease or heart failure (20%), cancer (20%), stroke (11%), and respiratory disease (11%).³⁵ Similar to many countries, diabetes remains the commonest primary cause for end-stage renal failure and renal replacement therapy in Hong Kong.

According to the Renal Registry of the Hospital Authority of Hong Kong, the incidence of **diabetic nephropathy** soared from 31.4% in 1999 to 46.2% in 2009.³⁶ Eye complications from diabetes are also common, as reflected by the high prevalence of **diabetic retinopathy** – 28.4% among people with type 2 diabetes³⁷ and 18.2% among recently diagnosed diabetic patients.³⁸ A study of over 5 000 patients with type 2 diabetes who had attended diabetic retinopathy screening sessions at a community optometry clinic between 2005 and 2009 found that the four-year cumulative incidence of any diabetic retinopathy, mild non-proliferative diabetic retinopathy, moderate non-proliferative diabetic retinopathy, and sight-threatening diabetic retinopathy was 15.16%, 14.45%, 0.69%, and 0.03% respectively.³⁹ For **obstructive sleep apnea**, it was estimated to be present in 17.5% of adult Chinese aged 18-75 with type 2 diabetes (24.7% for men; 10.3% for women), in which more than one-half

had moderate or severe OSA.⁴⁰ Although local data on **foot ulceration** rates among people with diabetes are lacking, a retrospective cohort study of 340 diabetic patients referred for foot ulcers to a diabetic foot clinic between 1995 and 2000 reported a major amputation rate of 30.3%.⁴¹ **Erectile dysfunction** is prevalent among men with diabetes. Of 313 Chinese men aged 25 - 76 with type 2 diabetes attending a diabetes centre between 2006 and 2007, 41.7% of them were found to have moderate to severe erectile dysfunction as diagnosed by the International Index of Erectile Function questionnaire.⁴² Treatment-related **stress and anxiety-depressive symptoms** were common in Chinese outpatients with type 2 diabetes, as reported by a local study. While 28.3% of patients felt that life was not worth living, 33.6% exhibited 4 or more anxiety and depressive symptoms accompanied by significant distress and/or impairment.⁴³

Table 1: Number (Rate*) of registered deaths and episodes of in-patient discharges and deaths due to diabetes by sex and age group, 2011[#]

Age group	Number (rate*) of registered deaths			Number (rate*) of episodes of in-patient discharges and deaths in public and private hospitals		
	Male	Female	Total	Male	Female	Total ⁺
14 and below	0 (0.0)	0 (0.0)	0 (0.0)	90 (21.1)	107 (26.9)	197 (23.9)
15-39	0 (0.0)	5 (0.4)	5 (0.2)	559 (49.5)	483 (34.7)	1 042 (41.3)
40-64	45 (3.4)	22 (1.5)	67 (2.4)	4 642 (354.4)	2 946 (199.7)	7 588 (272.5)
65 and above	168 (38.3)	217 (43.1)	385 (40.9)	6 423 (1 465.8)	7 607 (1 511.7)	14 030 (1 490.3)
Total⁺	213 (6.4)	244 (6.5)	457 (6.5)	11 717 (354.7)	11 143 (295.7)	22 860 (323.3)

Notes: * Rate per 100 000 population of respective sex and age group.

⁺ Total includes 3 episodes of in-patient discharges and deaths in male with unknown age.

[#] Figures are provisional.

Sources: Department of Health, Hospital Authority and Census and Statistics Department.

Prevention and Control of Diabetes

Although it is not yet possible to prevent type 1 diabetes, simple lifestyle changes have been shown to be effective in preventing or delaying the onset as well as improving control of type 2 diabetes. The lifestyle practices include the following:

Maintain an optimal weight and waist circumference. For Asians, aim to maintain a body mass index (BMI) between 18.5 and 22.9. It has been estimated that well over half of all the cases of type 2 diabetes could have been prevented by avoiding excessive weight gain in adults.⁴⁴ Do not worry if you cannot get to your ideal body weight. Losing just 7% of the body weight over 6 months (about 5.6 kg [~ 12 lbs] for person who weighs 80 kg [~176 lbs]) through healthy eating and moderate exercise can make a big difference in preventing or delaying diabetes. In addition, irrespective of their BMI, Asian men should keep their waist circumference below 90 cm (~ 35.5 in) and Asian women should keep theirs below 80 cm (~ 31.5 in).

Eat healthier. Have at least 2 servings of fruit and 3 servings of vegetables a day. Choose whole-grain over refined carbohydrates; a meta-analysis found that a 2 serving per day increment in whole-grain intake was associated with a 21% lowered risk of diabetes.⁴⁵ Eat less sugar and saturated fats; this helps maintain a healthy weight and lower the risk of type 2 diabetes.

Be physically active. Regular physical activity improves insulin sensitivity and enhances glucose uptake by the muscles, which in turn helps regulate blood sugar level and reduce the risk of diabetes. For example, each 2 hours per day of standing or walking around at home was associated with a 12% reduction in diabetic risk; each 1 hour per day of brisk walking was associated with a 34% reduction in risk.⁴⁶ Physical activity before and during early pregnancy may also prevent GDM. A meta-analysis that aimed to examine the relationship between

physical activity and the development of GDM indicated a 55% lowered risk of GDM for women in the highest quintile of physical activity compared to women with the lowest activity.⁴⁷

Do not smoke. Smoking is a risk factor for insulin resistance and diabetes. A meta-analysis found that current smokers had a 44% increased risk of developing diabetes compared to non-smokers. Moreover, there was a dose-response relationship between the number of cigarettes smoked and diabetic risk.⁴⁸

Refrain from alcohol use. Heavy alcohol use can increase caloric intake and the risk of obesity. It can also affect carbohydrate metabolism and raise blood sugar level. If drinking at all, limit consumption to minimise alcohol-related harm.

Of note, if left untreated or poorly controlled, diabetes can affect many different organ systems in the body. Over time, it can lead to serious complications with devastating consequences. To live a full and healthy life and to prevent or delay complications, apart from adopting a healthy lifestyle, people with diabetes are urged to gain knowledge and skills on the management of diabetes, such as taking good care of the eyes, feet, teeth and gums. They should also take an active part in self-monitoring of blood glucose levels and blood pressure, and follow the treatment plans in accordance with healthcare professionals' advice, including adherence to prescribed meal plans and diabetic medications. For further information on the care of diabetes, please refer to the "**Hong Kong Reference Framework for Diabetes care for Adults in Primary Care Settings**" developed by the Task Force on Conceptual Model and Preventive Protocols under the Working Group on Primary Care.

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World Diabetes Day

14 November

WDD
2012

Diabetes: protect our future



World Diabetes Day (WDD) was introduced by the International Diabetes Federation (IDF) and the World Health Organization (WHO) in 1991, in response to concern over the escalating incidence of diabetes around the world. It takes place on 14 November every year. The date was chosen because it marks the birthday of Sir Frederick Banting who, along with Dr Charles Best, is credited with the discovery of insulin in 1921.

Each year, WDD is centred on a theme related to diabetes. For the WDD 2012, the campaign will mark the fourth year of the five-year theme on “Diabetes education and prevention”.

The campaign slogan for 2012 is “Diabetes: protect our future”, signifying that children and young people will be the driving force for the promotion and dissemination of education and prevention messages.

To know more about the WDD, view the WDD Campaign Video, get inspired by the WDD Heroes, or download the WDD booklet, please visit its designated website at <http://www.idf.org/worlddiabetesday>.



News Bites

A meta-analysis and systematic review reported an association between higher consumption of white rice and increased risk of type 2 diabetes.

The study identified 4 articles that included 7 distinct prospective cohort analyses in Asian and Western populations. A total of about 13 000 incident cases of type 2 diabetes were ascertained among about 350 000 participants with follow-up periods ranging from 4 to 22 years. Results showed that those who reported the highest consumption of white rice were 27% more likely to develop type 2 diabetes than those who reported the lowest consumption. The association was stronger for Asian populations (55% higher) than for Western populations (12% higher). A dose-response relation was observed in the overall population: each serving (158 g of cooked rice) per day increment of white rice consumption was associated with an 11% increase in risk of diabetes.

Compared with whole-grains such as brown rice, processed white rice has a higher glycaemic index, but lower contents of many nutrients (including insoluble fibre that can lower the risk of type 2 diabetes). Thus, substitution of whole grains, including brown rice, for white rice in the diet, may help lower the risk of type 2 diabetes. It should be noted that while the choices in a particular food group may help lower the risk of type 2 diabetes, we must at the same time also maintain an overall balanced diet.

[Source: Hu EA, Pan A, Malik V, et al. White rice consumption and risk of type 2 diabetes: meta-analysis and systematic review. *BMJ* 2012;344:e1454 doi:10.1136/bmj.e1454.]

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