Diabetes in women

Diabetes is a disease in which the body does not produce or properly use insulin, and is a serious disease in men and women. However, there are some differences in manifestations of the disease between the sexes. This article will review some of the issues affecting women with diabetes, and the effects of hormones, pregnancy, menopause, and other conditions unique to women have on diabetes. As oral health care professionals, it is incumbent upon dental hygienists to counsel their patients and assist them with the management and complications of their disease.

Statistics

In the USA, diabetes is the fifth leading cause of death in women, and sixth for the general population (1). The number of people with diabetes throughout the world is expected to double by 2030 2. The three countries with the highest prevalence of diabetes in 2000 were India, China and the United States (2).

Approximately 9.3 million or 8.7% of all women over the age of 20 years in the United States have diabetes (3). The prevalence of diabetes is at least two to four times higher among African American, Hispanic/Latino, American Indian, and Asian/Pacific Islander women than among white women (3). Women with diabetes have an increased risk of vaginal infections and complications during pregnancy. For women who do not currently have diabetes, pregnancy brings the risk of gestational diabetes. Two to five per cent of all non-diabetic pregnant women develop gestational diabetes, a form of diabetes that occurs only during pregnancy (3). Women who have had gestational diabetes are at an increased risk for developing type 2 diabetes later in life.

Women and diabetes-related complications

The risk for cardiovascular disease, the most common complication connected to diabetes, is more acute among women than men (3). Deaths from heart disease in women with diabetes have increased 23% over the past 30 years, compared with a 27% decrease in women without diabetes (3). The risk of diabetic ketoacidosis (DKA) is 50% higher among women than men (3). DKA, often called diabetic coma, is a condition that can occur if diabetes is not controlled or poorly controlled diabetes, and is marked by high blood glucose levels and ketones (by-products of fat metabolism in the blood). Although accompanied by high blood glucose levels, DKA is not caused by high blood sugar; it is caused by lack of insulin. Before insulin therapy was available, DKA was the predominant cause of death from diabetes.

Women with diabetes are 7.6 times as likely to suffer peripheral vascular disease (PVD) than women without diabetes (3). PVD is a disorder resulting in reduced flow of blood and oxygen to tissues in the feet and legs. The principal symptom of PVD is intermittent claudication (pain in the thigh, calf or buttocks during exercise).

Puberty

Women's health through the life cycles is affected by the overabundance or lack of hormones. Type 1 diabetes affects approximately equal numbers of boys and girls, and is often associated with additional autoimmune events. Nevertheless, in diabetic children older than 10 years of age, girls have much higher levels of antibodies directed against their own thyroids than boys (4). Children with uncontrolled diabetes may have a delayed puberty. A theory is that caloric starvation because of enormous glucose losses through the urine may effect growth of bones and may delay puberty (5). The American Association of Pediatrics has suggested that low-dose oral contraceptives (those with 50 mcg of estradiol per day) should be prescribed for amenorrhoeic girls over the age of 16 years to protect against osteoporosis, whether or not they have diabetes (6).

Chronic hyperglycaemia can also delay puberty, so girls with diabetes or those eating disorders (specifically bulimia) where they intentionally cause considerable caloric loss through manipulation of insulin dose, need nutritional counselling (7). Menstrual irregularity may be prevalent in young girls, but poor diabetic control can increase it by 50% (8). As girls progress through puberty, their insulin requirements increase to compensate for the escalating anti-insulin hormones of growth and maturation (9). Oral contraceptives can affect blood glucose levels and diabetic control. The intrauterine device

(IUD) can cause infection. As people with diabetes are more prone to infection, most women with diabetes should not use an IUD.

Pregnancy

Hyperglycaemia is a condition that can cause problems, but is especially dangerous during conception and pregnancy. If a mother has hyperglycaemia, it may cause the foetus to prematurely secrete insulin. The Pedersen hypothesis links maternal hyperglycaemia-induced foetal hyperinsulinaemia to morbidity of the infant (10). There is an increased incidence of congenital anomalies and spontaneous abortions in diabetic women who have poor glycaemic control during the first seven weeks of pregnancy. Regulation of maternal glucose before and throughout pregnancy can lessen pregnancy-related complications to those seen in non-diabetic pregnancies (11). Conversely, even slight elevations of maternal glucose can adversely affect the foetus.

Gestational diabetes is defined as glucose intolerance of variable severity with onset or first recognition during pregnancy and remission after delivery (12). While there is controversy over the diagnostic criteria worldwide, a consensus will be available shortly. The National Institutes of Health (NIH) has funded a multicenter international trial called hyperglycaemia and Adverse Pregnancy Outcome (HAPO) (13). Currently, guidelines of the American Diabetes Association are used in the USA, and those of the World Health Organization (WHO) are used in other parts of the world. If gestational diabetes is diagnosed, diet modification, and sometimes insulin administration, must be initiated. Oral hypoglycaemic agents are contraindicated during pregnancy. After delivery, about 90% of women will return to a non-diabetic state (3). Risk factors for subsequent type 2 diabetes include a fasting blood glucose above 120 mg/dL, diagnosis of gestational diabetes early in the pregnancy, and a history of an infant of high birth weight (more than £9) in a previous pregnancy. Women with diabetes are three to four times more likely to have a caesarean section (14). A glucose tolerance test should be given to all women with gestational diabetes after delivery. Studies of chromium and antioxidants in pregnant animals have shown improved glucose tolerance and fewer foetal birth defects.

Polycystic ovarian syndrome

Insulin resistance can have many consequences, one being polycystic ovarian syndrome (PCOS) (3). Theory holds that hyperinsulinaemia thickens the outer layer of the ovaries where androgens are produced. The ovary tries to ovulate and is restrained by the thickened outer lining. Hyperinsulinaemia can also cause pituitary secretion of luetinizing hormone to be chronically elevated. This sequence of events can cause infertility, increased secretion of androgens, and excessive facial hair. PCOS is a risk factor for development of type 2 diabetes. Treatment should involve stabilizing insulin levels.

Menopause

Post-menopausal diabetic women reduce insulin requirement by 20%. If a woman with diabetes does not have a contraindication for hormonal replacement therapy (HRT), there is a very strong benefit of hormonal replacement therapy to improve lipid profiles and decrease the risk of osteoporosis. As well, poorly controlled diabetes is an independent risk factor for osteoporosis. The effect of estrogens in preventing bone loss is one reason to replace female hormones in women with diabetes. However, this decision must be balanced with possible adverse side effects of HRT/ERT, as evidenced by the Women's health Initiative (WHI) (15). Women who are prescribed hormonal replacement therapy need guidance from their healthcare team regarding the appropriate insulin adjustments.

Prevention and risk reduction

Throughout the life cycle a woman with diabetes, health status is unequivocally dependent on nutritional status and blood glucose control. As a woman ages, to prevent the increased risk of osteoporosis and cardiovascular disease of the diabetic woman, exercise is vital and hormonal replacement therapy can minimize the ravages of diabetes *per se* on the aging process (16). Normalization of blood sugar throughout the life cycle is of vital importance in ensuring a healthy life.

A woman should follow the A, B, C rule (3). *A* is for the A1C test that measures blood glucose over the last 2–3 months, and should be <7%. *B* is for a blood pressure <130/80. *C* is for cholesterol, an LDL of <100 mg/dl. Other things a woman with diabetes can do to prevent co-morbid factors, such as heart disease and stroke are: stop all tobacco products; exercise; eat a healthy, low fat diet; ask your physician or nurse practitioner about aspirin or other chemo-preventive medications; and work closely with your health care providers. As dental hygienists, we can counsel our patients about the increased risk of all infections, including periodontal infections, and assist them in attaining optimal oral and total health.

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M. Perno Goldie
Seminars for Women's Health,
155 Normandy Court,
San Carlos,
CA 94070
USA
E-mail: mariaperno1@comcast.net