

Diabetes in Women: How Unique is She?

This year on World Diabetes Day, the World Health Organization theme is “Women and Diabetes—Our Right to a Healthy Future”. A woman is unique as she has to play multiple roles in her lifetime through the various stages of her life. Hence, taking care of women’s health by health care providers is a prime concern.

Who is a WOMAN?

- W—Wonderful mother
- O—Outstanding friend
- M—Marvelous daughter
- A—Adorable sister
- N—Nice gift to men from God

Diabetes is the ninth leading cause of death in women globally. According to the International Diabetes Federation (IDF) Diabetes Atlas,¹ among South Asians, the mortality in women with diabetes is the second highest, and India contributes the largest number of deaths. The most important risk factor identified for the diabetes epidemic is obesity along with genetic susceptibility because of higher levels of glutamic acid decarboxylase antibodies. When it comes to health care, diabetic women in India find themselves at a great disadvantage compared with men because of gender differences in the social culture. They also lack access to care and medications and follow-up. They often do not agree to lifestyle modifications. Women with diabetes face the same joys and problems, but with an added element. They battle a chronic disease along with facing various social and personal challenges every hour of the day.

Some special conditions are unique to a woman, which include menarche, menopause, pregnancy, and polycystic ovarian syndrome (PCOS). Cardiovascular disease is the most common complication and is more serious among women at a younger age with diabetes than women without diabetes and men. Diabetes in women could be relatively worse because the disease can affect both the patient and the family.

GENDER DIFFERENCE IN DIABETES

According to the IDF Diabetes Atlas 2015, prevalence of diabetes in men was 215.2 million, whereas in case of females, it was 199.5 million. It is likely to reach 328.4 million and 313.3 million by 2040 in males and females respectively.¹ As the aging advances, the prevalence of diabetes in both the genders will likely increase and will reach a plateau after the age of 75 (Graph 1).

Following are the risk factors for type II diabetes mellitus (DM):

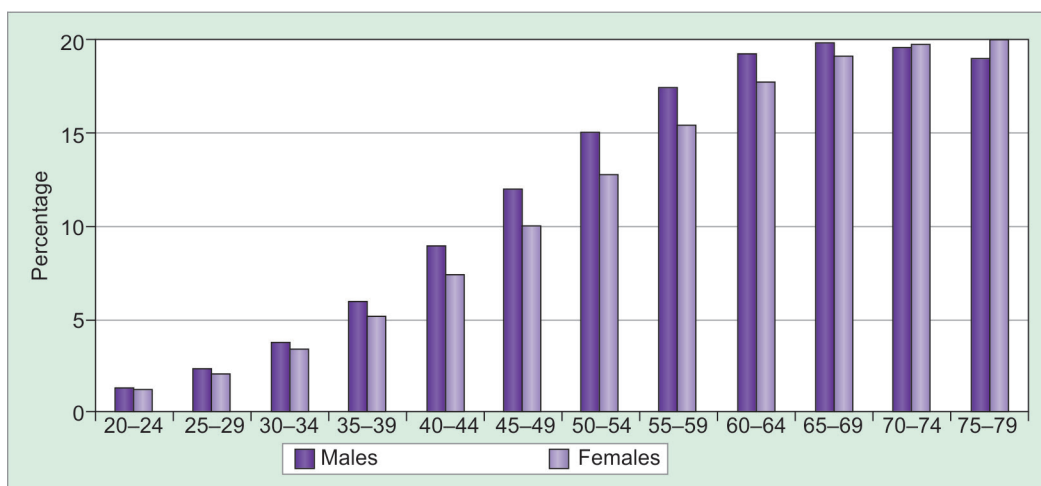
- Metabolic syndrome (MS)
- Age
- Obesity
- Level of physical activity
- PCOS
- History of gestational diabetes (GDM)
- Genetic predisposition.

Factors influencing the Prevalence of MS Syndrome

Metabolic syndrome is known as a common villain. The MS represents a cluster of risk conditions including:

- Insulin resistance (IR) with or without glucose intolerance [(impaired fasting glucose (IFG) or impaired glucose tolerance (IGT)]
- Dyslipidemia: Increased triglycerides (more than 150 mg/dL, low-density lipoprotein, low high-density lipoprotein <50 mg/dL)
- # Hypertension: (more than 130/85 mm Hg), use of antihypertensive drugs
- *Abdominal obesity*: Waist circumference more than 80 cm in women. Waist circumference strongly correlates with C-reactive protein and fibrinogen levels. Inflammatory markers and cytokine levels appear to predict future development of IGT and vascular events.





Graph 1: Prevalence of people with diabetes by age and sex, 2015

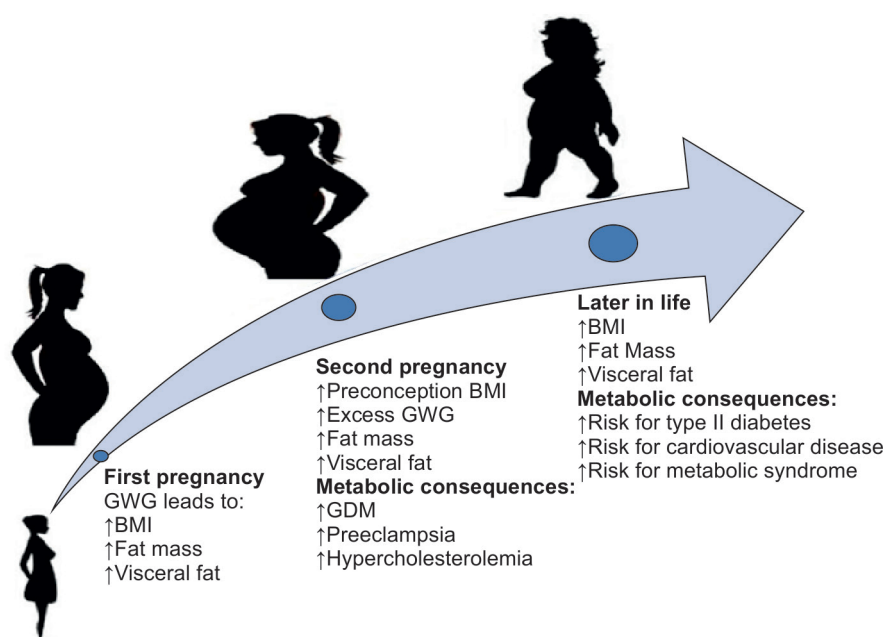


Fig. 1: Long- and short-term metabolic consequences of excess gestational weight gain and postpartum weight retention in reproductive age²

Presence of three or more risk conditions are needed to diagnose MS. Women with MS have an increased prevalence of subclinical disease.

There is a higher prevalence of MS in women, than in men (30–45 *vs* 25%). According to recent studies, the prevalence of MS in premenopausal period is 19.2% and in postmenopausal women, it is 32.4%. There is a strong relation between MS and depression, particularly in women with a 70% prevalence.

OBESITY

India has a growing obesity problem. The study shows that there were 20 million obese women in India in 2014. India's women are more likely to be obese than their male counterparts, according to recent research. There were 20 million obese women in India in 2014 compared with 9.8 million obese men. According to a recent National Family Health Survey, 22% of Indian women are overweight/obese.

Obesity is a risk factor of critical importance (Fig. 1) because it contributes to the development of type II DM and is an independent risk factor for cardiovascular disease. In the Framingham study, which involved 2,818 women and 2,252 men aged 28 to 62 years at study entry, obesity was a significant predictor of cardiovascular disease throughout the 26 years of follow-up, particularly among women. In the Nurses' Health Study, obese women had a

three times greater risk for coronary heart disease (CHD) than lean women, and women who had significant adult weight gain had a further increase in CHD risk. Obesity also increased CHD risk specifically among the subset of women with type II DM.

Obesity in Women and Risk of Type II DM

The Nurses' Health Study followed 84,000 female nurses for 16 years and found that being overweight or obese was the single-most important predictor of DM. A recent meta-analysis noted the strongest association between body mass index (BMI) and the incidence of type II DM in females.

Diabesity is defined as a form of diabetes that increasingly develops in later life with associated obesity.³

Physical Inactivity in Women

Levels of physical activity have been reported to be lower in Indian populations as compared with the general population. A recent study showed that more number of women (18.4%) in India were found to be more physically inactive than men (12.7%), pointing to a society that believes in traditions where men work and women look after the home.⁴ Physical inactivity causes 6 to 10% of the major noncommunicable diseases of CHD, type II DM, and breast and colon cancers.

Polycystic Ovarian Syndrome: It is often called the cousin of diabetes.

The PCOS is a hormonal condition that occurs in 5 to 10% of women between late adolescence and menopause. It is one of the most common hormonal-related problems in women during their reproductive years. Not only is PCOS a leading cause of infertility, it can also be a risk factor for other health problems (Fig. 2), such as GDM, IGT, obesity, etc.

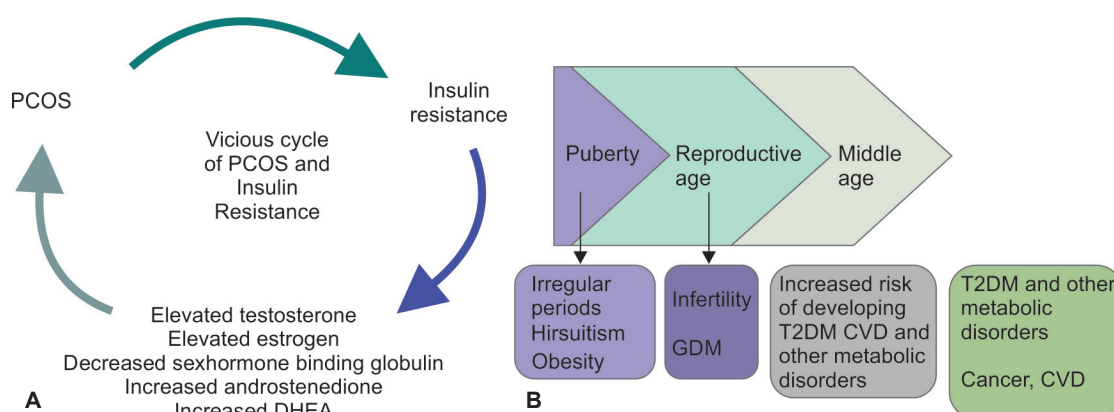
Impact of diabetes on women's health through the life stages of the woman:

- The adolescent years⁵
- The reproductive years
- The middle years
- The older years.

Prevalence of Diabetes in Adolescent Girls

According to Pima Indians Population study, type II DM among girls increased from 7.2/1,000 during 1967 to 1976 to 27.3/1,000 during 1987 to 1996 in the age group of 15 to 19 years. In the United States, the prevalence of type II diabetes is 1.7/1,000 in women younger than 20 years of age. Psychological changes and physical changes during adolescence may make it more difficult to control diabetes regardless of the level of adherence to the diabetes care regimen. Blood sugar tends to be high 3 to 5 days before, during, or after their periods. One has to adjust the insulin doses and carbohydrate intake both before and during this time to control their blood glucose.

It has also been seen in many women that premenstrual symptoms (PMS) can be worsened by poor blood sugar control. Food cravings during PMS are triggered by an increase in progesterone and can make it more difficult to control the blood sugar.



Figs 2A and B: Effects of PCOS

Usually, the craving is for chocolate or sweet foods. Extra insulin or increase in exercise will compensate for these changes.

Complications in Type II Diabetes

Acute complications like diabetic ketoacidosis are more common in adolescent girls (30%) and hypoglycemia is more common in adolescent boys (26 vs 7%). In girls, diabetic retinopathy will occur in 40 to 60% of adolescents. Diabetic nephropathy is more common in adolescent girls than in adolescence boys, 24 vs 15%.

Adherence to Diabetes Management Tasks

Mismanagement of blood glucose monitoring, exercise, and inappropriate food intake are common in 80% of the adolescents.

Eating Disorders

- The two most common eating disorders among adolescent girls with diabetes are anorexia nervosa and bulimia nervosa.
- *Treatment of any eating disorder:* A coordinated team approach that includes a therapist, a nutritionist, and a physician is needed.
- Recovering from eating disorders is difficult for adolescent girls, because of not adherence to the recommended treatment plan.
- Unfortunately, the prognosis remains guarded for diabetic adolescents with anorexia or bulimia.

Psychiatric disorders

These are bipolar disease and panic attacks in teenage girls.

- Adolescents with bipolar disease:
 - may be unable to organize themselves adequately.
 - difficulty in adherence to the schedule required for diabetes care.
- *Mania:* diagnosis may be delayed until the behavior is dangerous to the adolescent or to others.

Panic Attacks Panic attacks classically appear in late adolescence and the early twenties. Because the feelings of extreme anxiety that characterize panic attacks may mimic the epinephrine release of a hypoglycemic episode, patients may react to them by decreasing their insulin doses.

Excessive blood glucose testing, especially in the absence of documented hypoglycemia, should suggest the diagnosis of an anxiety disorder.

Reproductive Years

For women with diabetes, the reproductive years are the times of greatest personal growth and responsibilities, such as schooling, marriage, career development, and raising children. Diabetes in pregnancy (GDM) and PCOS may make diabetes management more difficult. Diabetes mellitus should be considered in the differential diagnosis of menstrual abnormalities, such as oligomenorrhea and secondary amenorrhea and infertility. The reproductive period of diabetic women may be reduced due to delayed menarche and premature menopause by 5 to 10 years. Better glycemic control and prevention of diabetic complications improve these irregularities and increase fertility rates close to those that are seen in the general population. Just as with men, female sexual dysfunction can result from physiological, hormonal, neurogenic, or psychological causes, or a mix of the above, and physical discomfort can engender psychological issues.

The Middle Years

Hospitalization and death rate are three times more common in diabetic women compared with nondiabetic women. Ischemic heart disease is reported to account for 40% of all deaths, and other cardiovascular diseases for another 15% of deaths, making these conditions the leading causes of diabetes-associated deaths. As women experience approximately one-third of their life in menopause, there appears to be a greater loss of physical activity, which contributes to weight gain, IR, hypertension, and loss of ovarian estrogen, which lead to abdominal obesity and increased CAD risk.⁶ Women with diabetes present with dryness of mouth, abdominal pain, recurrent urinary tract

infections with *Pruritus vulvae*, generalized fatigue, giddiness, and sleep problems. Women have low self-efficacy with respect to their diabetes care (35% in comparison to 65% in men). Coronary heart disease, depression, chronic kidney disease, and stroke are more common in diabetic women compared with nondiabetic women as well as men with diabetes.

They are prone to have the following comorbidities:

- Metabolic syndrome
- Hypertension
- Dyslipidemia
- Thyroid disorders (hypo and hyper)
- Hypovitaminosis D
- Osteoporosis
- Psychosocial and emotional issues.

Epidemiological studies⁷ have demonstrated that vitamin D deficiency is closely related to obesity (waist circumference >80 cm, BMI >23 kg/m²) and increased risk of type II DM. A study done at our hospital in the year 2013 to 14 in women (n = 156) aged 30 to 60 years with type II DM, it was found that 92% were overweight/obese, 85% had BMI >23 kg/m², and 94% had vitamin D deficiency/insufficiency. These statistics correlate with the above statement that highlights that diabetes and thyroid disease is often a likely combination.

- Diabetic patients have a higher prevalence of thyroid disorders compared with the normal population.
 - The thyroid disease is much more prevalent in women than in men.
 - The Rotterdam study found a 10.8% prevalence of subclinical hypothyroidism among elderly women.
 - The Fremantle Diabetes study found an 8.6% prevalence of thyroid disease among women with type II DM.
- Subclinical hypothyroidism (SCH) is common among type II DM patients, especially in females.

Emotional Issues

Women feel less confident and they are less sure about being able to care for their diabetes. They are less supported by their spouses, and women often feel hassles due to spouse. They have more lapses in self-care related to diet. They have lower quality-of-life. They are less pleased with their diabetes care. Hence, they experience sadness or anxiety.⁸

Complications

Acute complications like hyperglycemic hyperosmolar syndrome and hypoglycemia need emergency care. Chronic complications of diabetes include microvascular retinopathy, neuropathy, and nephropathy. Macrovascular complications like coronary artery disease, cerebrovascular accidents, and peripheral arterial disease are more prevalent in this age group. Women with DM are suboptimally treated compared with men regarding lipid and blood pressure targets.

Chronic kidney disease is also worse for women than men. In diabetes, once women have lower estrogen levels, the testosterone becomes high and replaces estrogen. Studies have shown that lower estrogen levels are associated with kidney disease.

Management

Specific investigations to be done depend on the associated complications and comorbidities. Treatment include lifestyle modifications like diet, exercise, and yoga. Strict control of blood sugar by using oral hypoglycemic agents or insulin.

Treatment of comorbid illnesses with various drugs like antihypertensive drugs, statins, antiplatelet drugs, antipsychotics should be instituted. Treatment for thyroid disorders and vitamin D and calcium supplementations are necessary. Treatment of complications like diabetic micro- and macrovascular disorders is mandatory. It may be done through conservative medical management or surgical treatment.

Treatment of Depression

Proper counseling by a psychiatrist and antipsychotic medications are needed.

Management includes invariably a multidisciplinary approach.

Increasing recognition of the importance of the patient in the medical decision making has led to the 2012 consensus recommending a patient-centered approach by the medical fraternity. This is especially pertinent in diabetes where lifestyle choices have such an influence on outcomes that this is the fundamental treatment strategy. Individualization

in the management of diabetes is based on an assessment that addresses personal attributes related to each participant's ability to engage in diabetes self-care.

These attributes include:

- Health status
- Attitudes, beliefs, experiences, and desire to participate in diabetes education
- Psychosocial status
- Literacy and learning style
- Cultural and lifespan issues
- Personal metabolic and other goals and self-care skills and access to resources.

Older Years

Age-associated factors affecting diabetes management in older women are mentioned in Figure 3.

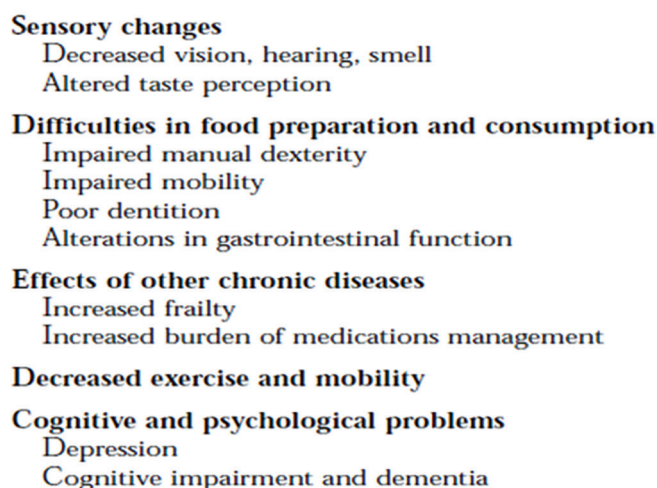


Fig. 3: Age-associated factors affecting diabetes management in older women

PREVENTION

Diabetes and its complications threaten to bankrupt the growing Indian economy. The key to prevention is to associate with simple messages that work effectively.

The current theme is to eat less, eat on Time, eat healthy food, exercise and be physically active, sleep well on time, and be mentally relaxed.

Key management strategies must center around lifestyle modifications with evidence-based algorithms for pharmacotherapy.

Recommended cultural strategies for healthy behaviors including culture-specific physical activities and knowledge and access to healthy foods including:

- Physical activity for youth and their parents.
- Interactive hands-on learning activities for healthy lifestyles and group formats for adopting healthy behaviors.

SUMMARY AND CONCLUSION

Prevalence of diabetes is increasing in women, and it is the ninth leading cause of death globally. Most important risk factors are obesity, PCOS, physical inactivity, GDM, and genetic susceptibility. Some special conditions are unique and challenges to all women. Women with overweight, obesity, PCOS, IGT, and a family history of diabetes should be screened for diabetes regularly once in a year. Death rates for women aged 25 to 44 years with diabetes are three times more than that of women without diabetes. Diabetes in women increases the risks of CHD, stroke, depression and it is twice as common as in others. Women are at greater risk for blindness, as well as chronic kidney disease than men. Lack of access to health care and medications, social and cultural disparities, and improper adherence to medications are the main concerns in women. Lifestyle modifications are rarely followed by women. The lifespan of Indian women with diabetes is reduced by 10 years compared with nondiabetic women. Being a woman who has diabetes can pose a challenge, but with little help she can meet the challenge.

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