

“PREDIABETES & ITS PROGRESS TO DIABETES TYPE II- PREVENTION- A LITARETURE REVIEW.”

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ABSTRACT

Prediabetes is a serious condition that is associated with an increase in cardiovascular morbidity and mortality. A clear link between cardiovascular disease and prediabetes has emerged over the past few years. Recent studies have shown that patients with prediabetes can suffer from coronary artery disease and diastolic heart failure even before progressing to overt diabetes.

Evidence increasingly demonstrates that prediabetes is a toxic state, as well as a risk factor for diabetes, and is associated with pathophysiological changes in several tissues and organs. Unfortunately, use of available evidence-based treatments for prediabetes is low. This review seeks to explain why prediabetes must be viewed and treated as a serious pathological entity in its own right. It offers an overview of the pathophysiology and complications of prediabetes and describes how this condition can be reversed if all treatment avenues are deployed early in its course.

Prediabetes is an asymptomatic disease, so you might not even realise that you have it. Treatment of prediabetes should be done along with Diet and lifestyle modification. So in this article we should focus the definition, causes, burden, diagnosis, treatment and do & don'ts for prediabetes.

KEY WORDS: Prediabetes.

INTRODUCTION

Prediabetes:

Prediabetes etymology: Pre + diabetes

The state in which blood glucose levels are above normal but have not reached those of diabetes. Prediabetes is a “pre-diagnosis” of diabetes—you can think of it as a warning sign.

Word Origin:

1. A condition in which carbohydrate metabolism is mildly abnormal but other criteria indicating diabetes mellitus are absent.
2. A condition in which the development of diabetes mellitus is expected.

Prediabetes is defined as a state of abnormal glucose homeostasis where blood glucose levels are elevated above those considered normal, but not as high as those required for a diagnosis of diabetes. As a condition intermediate between normal glucose homeostasis and the pathological condition of diabetes, the characterization of prediabetes as a distinct pathogenic condition is controversial. Emerging evidence suggests that the condition of prediabetes is associated with pathophysiological changes in several tissues and organs, which would support its recognition as a distinct pathological entity; the recent inclusion of prediabetes and associated billable conditions in the most recent ICD-10 codes provides additional credence to this position.

Prevalence:

It is estimated that 84 million adults in the USA have prediabetes in 2015¹ and 70 per cent of these persons will develop diabetes in the long term². According to National Urban Diabetes Survey, the estimated prevalence of prediabetes is 14 per cent in India.

The World Health Organization has defined prediabetes as a state of intermediate hyperglycaemia using two specific parameters, impaired fasting glucose (IFG) defined as fasting plasma glucose of 6.1-6.9 mmol/l (110 to 125 mg/dl) and impaired glucose tolerance (IGT) defined as 2 h plasma glucose of 7.8-11.0 mmol/l (140-200 mg/dl) after ingestion of 75 g of oral glucose load or a combination of the two based

on a 2 h oral glucose tolerance test²The American Diabetes Association (ADA) includes haemoglobin A_{1c} between 5.7 and 6.4 per cent in addition to IGT of 140-200 mg/dl and uses a lower cut-off value for IFG between 100 and 125 mg/dl⁴

There are estimated 72.96 million cases of **diabetes** in adult population of **India**. The **prevalence** in urban areas ranges between 10.9% and 14.2% and **prevalence** in rural **India** was 3.0-7.8% among population aged 20 years and above with a much higher **prevalence** among individuals aged over 50 years (INDIAB Study)⁵

The prevalence of prediabetes in previously nondiabetic patients with a recent TIA or stroke ranges from 23 to 53%.⁶

The prevalence of undiagnosed diabetes and prediabetes was high and increasing.

Metabolic syndrome was more prevalent in the prediabetic population in comparison to the normoglycemic individuals with increased WC (waist circumference) being the most prevalent component.

Prediabetes:⁷

- **Total:** 88 million people aged 18 years or older have prediabetes (34.5% of the adult US population)
- **65 years or older:** 24.2 million people aged 65 years or older have prediabetes

AIMS AND OBJECTS

To study Prediabetes in detail.

MATERIALS AND METHODS

Major **phenotypes** of **prediabetic** individuals include brain insulin resistance, subphenotypes of obesity (MHO and MUHO), fatty liver, fatty pancreas and variations in perivascular fat. At the level of the pancreas both compensatory insulin hypersecretion and beta cell dysfunction are observed.⁸

Classification:

Normoglycemic, H-prediabetic [HbA_{1c} 5.7-6.4% (39-47 mmol/mol)] or F-prediabetic (FPG 5.6-6.9 mmol/L).

Facts of Prediabetes:

1. You can have diabetes (or pre-diabetes) and not know it.
2. Uncontrolled diabetes can affect every aspect of your health.
3. It is a significant risk factor for heart disease and stroke.
4. Diabetes can be managed and pre-diabetes can be stopped, if caught early and treated with relatively effective measure.
5. Stress can increase your blood sugar levels.

Causes:

Prediabetes develops when the body becomes insulin resistant or unable to use insulin.

In prediabetes, the cells in your body don't respond normally to insulin.

Pancreas makes more insulin to try to get cells to respond. Eventually pancreas can't keep up, and your blood sugar rises, setting the stage for prediabetes—and type 2 diabetes down the road.

The exact cause of prediabetes is unknown. But family history and genetics appear to play an important role. Inactivity and excess fat especially abdominal fat also seem to be important factors. People with prediabetes don't process sugar (glucose) properly anymore. As a result, sugar accumulates in the bloodstream instead of doing its normal job of fueling the cells that make up muscles and other tissues.

Risk factors for prediabetes:⁹

- Being overweight
- Being 45 years or older
- Having a parent, brother, or sister with type 2 diabetes
- Being physically active less than 3 times a week
- Ever having gestational diabetes (diabetes during pregnancy) or giving birth to a baby who weighed more than 9 pounds
- Having polycystic ovary syndrome.

National Diabetes Prevention Program:¹⁰

- Working with a trained coach to make realistic, lasting lifestyle changes.
- Discovering how to eat healthy and add more physical activity into your day.
- Finding out how to manage stress, stay motivated, and solve problems that can slow your progress.
- Getting support from people with similar goals and challenges.

Pathophysiology:

Normal glucose homeostasis is controlled by three interrelated processes. These processes include gluconeogenesis (glucose production that occurs in the liver), uptake and utilization of glucose by the peripheral tissues of the body, and insulin secretion by the pancreatic beta islet cells. The presence of glucose in the bloodstream triggers the production and release of insulin from the pancreas' beta islet cells. The main function of insulin is to increase the rate of transport of glucose from the bloodstream into certain cells of the body, such as striated muscles, fibroblasts, and fat cells. It also is necessary for transport of amino acids, glycogen formation in the liver and skeletal muscles, triglyceride formation from glucose, nucleic acid synthesis, and protein synthesis. Insulin enters cells first by binding to target insulin receptors. DM and some of those with prediabetes have impaired glucose tolerance in these individuals, blood glucose rises to abnormally high levels. This may be due to a lack of pancreatic hormone release or failure of targeted tissues to respond to the insulin present or both.

Diagnosis:¹¹

Fasting blood sugar (glucose) level of:

- 110 to 125 mg/dL (6.1 mM/L to 6.9 mM/L) – WHO criteria
- 100 to 125 mg/dL (5.6 mM/L to 6.9 mM/L) – ADA criteria
- Post Prandial blood glucose: A blood sugar level from 140 to 199mg/dL(7.8 to 11.0 mmol/L) is considered prediabetes. This is sometimes referred to as impaired glucose tolerance. Glycated hemoglobin (A1C) test
- An A1C level between 5.7 and 6.4 percent is considered prediabetes.

Complications:

The most serious consequence of prediabetes is progression to type 2

diabetes. That's because type 2 diabetes can lead to: High blood pressure, High cholesterol, Heart disease, Stroke, Kidney disease, Blindness, Amputations. Research indicates that prediabetes is often associated with unrecognized heart attacks and can damage your kidneys, even if you haven't progressed to type 2 diabetes.

Prevention:

Healthy lifestyle choices can help you prevent prediabetes and its progression to type 2 diabetes even if diabetes runs in your family. Eat healthy foods, Get more physical activity, Lose excess pounds, Control your blood pressure and cholesterol.

The rationale behind treatment of prediabetes includes, prevention of development of diabetes, prevention of consequences of diabetes and prevention of the consequences of prediabetes itself. Several research studies have shown success of interventions designed for treatment of prediabetes with sustained reduction in incidence of diabetes

Treatment:

Healthy lifestyle choices can help you bring your blood sugar level back to normal, or at least keep it from rising toward the levels seen in type 2 diabetes.

To prevent prediabetes from progressing to type 2 diabetes, try to:

- Eat healthy foods. Choose foods low in fat and calories and high in fiber. Focus on fruits, vegetables and whole grains. Strive for variety to help you achieve your goals without compromising taste or nutrition.
- Be more active. Aim for 30 to 60 minutes of moderate physical activity most days of the week.
- Lose excess weight. If you're overweight, losing just 5 to 10 percent of your body weight — only 10 to 20 pounds (4.5 to 9 kilograms) if you weigh 200 pounds (91 kilograms) — can reduce the risk of developing type 2 diabetes.
- Stop smoking.
- Take medications as needed. If you're at high risk of diabetes, your doctor might recommend metformin (Glucophage, others). Medications to control cholesterol and high blood pressure might also be prescribed.

Prediabetic Diet:

A diet that can help to lose weight and manage prediabetes will normally include foods that are: Low in fat, low in calories and high in fiber.

DISCUSSION:

Prediabetes is a misnomer since it is an early stage of diabetes. It is now known that the health complications associated with type 2 diabetes often occur before the medical diagnosis of diabetes is made.

Seventy percent of patients with prediabetes will progress to type 2 diabetes in their lifetime. Despite this, prediabetes frequently goes undiagnosed and untreated.

It would be interesting to assess whether using combination pharmacological approaches plus or minus lifestyle interventions have any additive benefit. Future research should assess whether using combination pharmacological approaches plus very intensive lifestyle interventions have an additive benefit.

It is very possible to prevent prediabetes from developing into type 2 diabetes. Eating healthy whole food, addressing overweight and staying at a healthy weight, and committing to some physical activity and Ayurvedic Drug is enough to help get your blood glucose level back into the normal range. That's the key to assuring you avoid not only the onset of diabetes but all the related complications including heart disease, vision, loss, nerve damage, and kidney failure.

CONCLUSION:

Pharmacotherapy is used to treat prediabetes, such treatment plan should be initiated with predefined goals and end points by the physician. Research should be carried out to assess using pharmacological treatment and very intensive lifestyle interventions.

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