

Beyond Diagnosis: Making Early Prediabetes Testing and Intervention the Standard of Care

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Abstract

The present research study highlights the need for intensified global efforts to curb the progression of diabetes, advocating for strategies customized to specific countries and demographic groups. With a focus on the intersection of workplace stress and diabetes, metabolic consequences are growing more visible in younger working adults in their early 30s and 40s through a higher prevalence of prediabetes. Factors like irregular work schedules, physical inactivity, mental stress, environmental pollution, altered dietary habits, and easy access to fast food foster early warning signs—such as anxiety, gradual weight gain, borderline hypertension, and elevated triglycerides—which frequently go undetected until progression occurs. The dynamic is well known: disruption in sleep and meal schedules reduces insulin sensitivity, causing silent increases in blood glucose that remain hidden until detected by laboratory testing. Recent data published in *The Lancet Diabetes & Endocrinology* estimates that 136 million individuals (15.3% of the Indian population) have prediabetes and face an elevated risk of progressing to full-blown diabetes. Impaired glucose tolerance represents a high-risk precursor, functioning as a ticking time bomb—in this population, progression from prediabetes to diabetes is exceptionally rapid, with over 60% of prediabetic individuals transitioning to diabetes within five years. Notably, prediabetic individuals who engage in therapy or mindfulness practices experience better-regulated glycemic patterns; a calmer mind leads to improved sleep and more stable blood sugar levels. In light of the significant socio-economic burden posed by diabetes and its complications, prevention strategies centered on early detection of at-risk individuals have gained major priority. This focus has established the category of "prediabetes," defining an intermediate state of dysglycemia on the continuum between normal glucose tolerance and overt diabetes.

Key Words: Prediabetes, Dysglycemia, Work-Related Stressors, Risk-Based Diabetes Screening, Impaired Glucose Tolerance

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I. Is the risk of complications from prediabetes is greater than we recognize?

Traditionally viewed as a transitional phase between normoglycemia and Type 2 diabetes mellitus, prediabetes is now recognized as a distinct clinical condition carrying a risk of early, progressive vascular damage. Timely detection is therefore essential, offering a critical window to prevent full-blown diabetes and lessen long-term cardiometabolic complications. (1). In a 2020 meta-analysis of 129 studies involving over 10 million people, prediabetes was associated with an increased risk of all-cause mortality (13%), coronary heart disease (16%), and stroke (14%) relative to individuals with normal blood sugar levels. (2).

II. Analyzing how prediabetes develops over time in India: how many individuals advance to type 2 diabetes annually?

Evidence shows that almost half of Indian prediabetics progress to type 2 diabetes within five years, indicating a condensed natural trajectory. Data from the Chennai urban rural epidemiology study (CURES) revealed a 58.9% rate of conversion to diabetes over 9.1 years. Supporting these observations, recent research reports yearly transition rates of 8.6% for isolated impaired fasting glucose (iIFG) and 13.9% for impaired glucose tolerance (IGT), highlighting how quickly prediabetes advances in Indians. This rapid progression is largely attributed to premature β -cell dysfunction occurring alongside relatively mild insulin resistance, which leads to inadequate insulin secretion and rapid β -cell burnout. (3).

III. How diabetes mellitus develops?

Glucose is the exclusive fuel of the human nervous system and primary fuel for most of the body systems. The brain utilizes approximately 20% of all the glucose metabolized by the entire body at rest mainly via the two major alternative pathways of carbohydrate metabolism that is, glycolysis coupled to the tricarboxylic acid

(TCA) cycle and the pentose phosphate pathway. A healthy level of glucose in the blood is, therefore essential to maintain and sustain life and health. Hypoglycemia or reactive hypoglycemia is a state of low blood sugar that results from a reaction to rapid absorption of sugar. Sugar in and of itself is not a bad thing; it occurs naturally in many food stuffs. The body evolved over many generations to process the sugar consumed from natural sources. Sugar from natural sources is absorbed slowly and is metabolized as it is being released. Sugar from refined sources is concentrated, causing higher quantities to be consumed in a short time and without the associated fiber and other nutrients to slow down the absorption and release process. When excess sugar goes into the blood, the pancreas reacts instantly by releasing a large quantity of insulin into the blood. Since this is an “emergency” release, the insulin is generally in excess of what is required to maintain a steady state level and too much sugar is removed from the blood. When the blood sugar swings below the threshold level, a different panic response is triggered because a low level poses a serious crisis in the body. This response called hypoglycemia causes the adrenal glands to release glucocorticoid hormones which facilitate conversions of glycogen in the liver and muscle tissue into glucose. This results in the glucose level to rise again and, since this was a panic response, the glucose level will likely exceed its base level triggering yet another insulin release. The swing from high glucose levels to low glucose levels and back again may continue as a dampened oscillation for several hours. This is exactly what is observed in a glucose tolerance test (GTT). The patient fasts for 12 hours, has a blood sample taken to determine his base line, and then swallows defined amount of glucose. The blood sugar level is taken at half an hour to one hour intervals for the next several hours. In an individual demonstrating the reactive hypoglycemia response, the glucose level will rise sharply within half an hour. This rise is followed by a sharp drop and in the one to two hour interval; the blood sugar will be sharply lower. At this point, women become irrational and hysterical, men become aggressive and abusive and sweet old ladies curse like sailors. When the blood sugar level rises, the mood and behavior return to normal. The same response occurs when large amounts of refined sugar are consumed, although it is usually not as extreme. The amount of sugar consumed may not be as large as the 100 gram hit of glucose, and other food which releases glucose slower, is usually consumed with the sugar. When the insulin level is high, a lot of glucose is removed from the blood quickly, more quickly than it can be metabolized. This glucose is converted into fat in the cells. In addition, the individual craves for food, especially sweets, when the blood sugar is low, causing excess food consumption. This pattern of blood sugar swings contributes to the development of obesity and cumulative stress on the pancreas, adrenal glands and liver. The prolonged stress of compensating for the blood sugar swings contributes to the development of diabetes (4).

IV. Who is most likely to progress from prediabetes to type 2 diabetes mellitus and why?

Key factors predicting this progression comprised increasing age, family history of diabetes, glycated hemoglobin A1c (HbA1c) levels, reduced high-density lipoprotein (HDL) cholesterol, and a sedentary lifestyle. While lifestyle intervention remains the primary pillar of managing prediabetes, data from the Indian Diabetes Prevention Programme-1 (IDPP-1) study revealed that 39.3% of participants with impaired glucose tolerance developed diabetes within three years regardless of lifestyle changes, highlighting the need for supplementary preventive measures in select high-risk populations. (5).

V. Which first step is essential to stem the spread of prediabetes?

Simply put, the solution lies in expanded screening. With 136 million Indian adults currently living with prediabetes—nearly 50% of whom do not know they have it—early detection through routine screening is crucial. Identifying the condition early ensures prompt intervention and support, ultimately curbing the onset of type 2 diabetes and its associated health risks. (6). According to the American Diabetes Association (ADA) 2026 Standards of Care, adults should undergo risk-based screening for prediabetes and diabetes using glycated hemoglobin A1c (HbA1c), fasting plasma glucose (FPG), or 2-hour plasma glucose (2-h PG) following a 75-g oral glucose tolerance test (OGTT) (7). Furthermore, the International Diabetes Federation (IDF) identifies a 1-hour plasma glucose value of ≥ 155 mg/dL during a 75-g oral glucose tolerance test (OGTT) as a marker of intermediate hyperglycemia, which helps pinpoint high-risk individuals who could be missed using conventional screening methods (8). Should the results be normal, rescreening is recommended at least once every three years, though more regular testing may be warranted based on early findings and personal risk profile(9).

VI. Lifestyle changes are essential, yet are they always adequate in real-life situations?

According to the American Diabetes Association (ADA) 2026 guidelines, this therapy is recommended for select high-risk adults with prediabetes to prevent progression to Type 2 diabetes mellitus (T2DM). When lifestyle modifications alone are insufficient, it can be utilized alongside lifestyle changes in specific high-risk individuals. In addition to glycemic management, it delivers extra cardiometabolic and vascular protection, having demonstrated a 31% relative risk reduction in diabetes incidence in the Diabetes Prevention Program (DPP) study (10).

VII. What is the standard clinical approach to assessing and diagnosing prediabetes?

A critical task for clinicians is to view prediabetes as a window of increased vascular and metabolic risk instead of a mere prelude to diabetes. Embracing this perspective will encourage prompt, opportunistic screening, enabling proactive intervention in individuals with prediabetes.

VIII. What are the primary clinical takeaways and translational insights for practice?

Prediabetes is more than a precursor to diabetes; it is a clinically actionable condition associated with increased cardiovascular risk and an opportunity for proactive early intervention. In Indians, where progression from prediabetes to Type 2 diabetes mellitus (T2DM) can be rapid, routine risk-based screening and timely risk stratification are critical to identifying those most likely to benefit from preventive strategies. The greatest opportunity to curb the diabetes epidemic may lie not in treating established disease, but in acting early; through timely intervention, sustained lifestyle modification, and appropriate use of metformin in high-risk individuals.

IX. Metformin – quick take in prediabetes

Supported by robust clinical data in diverse populations, metformin has emerged as the most extensively investigated and recommended agent among current therapies for managing prediabetes. (10). According to the American Diabetes Association (ADA) 2026 Standards of Care, metformin is the only antidiabetic agent advised for consideration in prediabetes, having gained approval for this indication in no fewer than 66 countries (11). Supporting its use for early intervention, the 2026 United Arab Emirates (UAE) consensus guidelines state that metformin can be considered for preventing type 2 diabetes in targeted high-risk individuals with prediabetes when lifestyle modifications alone are insufficient (12). According to a multicenter clinical trial, individuals with prediabetes, stable angina, and non-obstructive coronary stenosis who received metformin experienced enhanced coronary endothelial function and lower 24-month rates of major adverse cardiovascular events (MACE) relative to untreated prediabetic controls, suggesting cardioprotective effects independent of glycemic management. (13).

Conflicts of interest statement

The author declares that the present review article was written in the absence of any commercial or financial relationship with anybody in any form that could be construed as a potential conflict of interest.

Ethical considerations

The review article is original, and it has not been published elsewhere. No AI tools was used during the study and writing the manuscript.

References:

- [1]. **Bantwal G, Mudalagiri M. 2025.** The Prediabetes Wake-Up Call: Time for Proactive Endocrine Care. *Indian J Endocrinol Metab.* Jul-Aug **29**: 351-354
- [2]. **Cai X, Zhang Y, Li M, Wu JH, Mai L, Li J, Yang Y, Hu Y, Huang Y. 2020.** Association between prediabetes and risk of all-cause mortality and cardiovascular disease: updated meta-analysis. *BMJ.* Jul 15.
- [3]. **Narayan KM, Kondal D, Chang HH, Mohan D, Gujral UP, Anjana RM. 2024.** Natural history of type 2 diabetes in Indians: Time to progression. *Diabetes Care*, **47**: 858-866
- [4]. **Ansari Z. 2025.** How Should India Tackle Diabetes - A Silent Syndrome Load? *IOSR Journal of Biotechnology and Biochemistry.* **11(6)**: 40-44
- [5]. **Ramachandran A, Snehalatha C, Mary S, Mukesh B, Bhaskar AD, Vijay V. 2006.** Indian Diabetes Prevention Programme (IDPP). The Indian Diabetes Prevention Programme shows that lifestyle modification and metformin prevent type 2 diabetes in Asian Indian subjects with impaired glucose tolerance (IDPP-1). *Diabetologia*, **49**: 289-297
- [6]. **Bell, K., Shaw, J. E., Maple-Brown, L., Ferris, W., Gray, S., Murfet, G., Flavel, R., Maynard, B., Ryrie, H., Pritchard, B., Freeman, R., & Gordon, B. A. 2020.** A position statement on screening and management of prediabetes in adults in primary care in Australia *Diabetes Research and Clinical Practice*.164.
- [7]. **American Diabetes Association Professional Practice Committee. 2026.** Diagnosis and Classification of Diabetes: Standards of Care in Diabetes. *Diabetes Care.* **49**: S26-S47
- [8]. **International Diabetes Federation. 2024.** Position Statement on the 1-hour post-load plasma glucose for the diagnosis of intermediate hyperglycaemia and type 2 diabetes. *Diabetes Research and Clinical Practice.*
- [9]. **Group R. 2002.** The Diabetes Prevention Program (DPP): Description of lifestyle intervention. *Diabetes Care.* **25(12)**: 2165.
- [10]. **Jill P. Dabelea CD, Knowler WC, Nathan DM, Tempresa M. 2025.** The Diabetes Prevention Program and Its Outcomes Study: NIDDK's Journey into the prevention of Type 2 diabetes and its public health Impact. *Diabetes Care.***48**:1101-1111.
- [11]. **Lim BSY, Chen M, Li H-Y, Li L-J. 2025.** Metformin use in prediabetes: A review of evidence and a focus on metabolic features among peri-menopausal women. *Diabetes Obes Metab.* 273-315
- [12]. **Fathey Al Awadi et al. 2026.** Endocrine Department, Dubai Hospital, Dubai Emirates Diabetes and Endocrine Society Consensus for the Management of Type 2 Diabetes Mellitus. *Dubai Diabetes Endocrinol J.***17**: 321-358.

- [13]. **Celestino Sardu et al. 2019.** Effects of metformin therapy on coronary endothelial dysfunction in patients with prediabetes with stable angina and non-obstructive coronary artery stenosis: the CODYCE multicenter prospective study. *Diabetes Care*.**42**: 1946-1955
- [14]. **Susan L. et al. 2026.** American Association of Clinical Endocrinology Consensus Statement: Algorithm for Management of Adults with Type 2 Diabetes. *Endocrine Practice*.32473-518
- [15]. **American Diabetes Association Professional Practice Committee for Diabetes. 2026.** Prevention or Delay of Diabetes and Associated Comorbidities: Standards of Care in Diabetes. *Diabetes Care*. **49**: S50-S60