RSSDI Indian Diabetes

EDUCATOR JOURNAL

Theme of the Month

World Diabetes Day Special - Know Your Risk, Know Your Response

To keep Members of Diabetes Care team abreast about
DSME/DSMS - (Diabetes Self management Education/Support) Concepts

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(RESEARCH SOCIETY FOR THE STUDY OF DIABETES IN INDIA)

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*DSME: Diabetes Self-Management Education, DSMS: Diabetes Self-Management Support

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FOREWORD

Research Society for the Study of Diabetes in India (RSSDI) founded by Prof MMS Ahuja in the year 1972 is the biggest scientific association of healthcare professionals involved in promoting diabetes education and research in India. RSSDI is happy to collaborate with USV to support their endeavour to make India the 'Diabetes care capital of the world'. Through this collaboration, RSSDI would like to strengthen the cadre of diabetes educators by empowering them with recent updates in diabetes management helping bridge the gap between the physician and the patient. Today, the rule of 50% is prevailing in terms of awareness, detection, treatment and control in T2DM. Our aspiration is to achieve 90-90-90-90 i.e.90% of people with diabetes should be made aware, 90% should be detected, 90% of those detected should be treated, and 90% of those treated should reach their goals.

Indian Diabetes Educator Journal (IDEJ) is the first of its kind in India, and the longest running monthly diabetes educator journal since April 2015 & continues its endeavour to spread awareness, knowledge and enable healthcare teams to manage individuals with diabetes and empower them for self-care. RSSDI IDEJ will continue to keep the members of diabetes care team abreast with concepts of Diabetes Self-Management Education/Support (DSME/S) with a reach of 44000 doctors and diabetes educators digitally.

World Diabetes Day is celebrated every year on 14th of November. In 2023, the campaign is focused on knowing the risk of type 2 diabetes to help delay or prevent it and emphasizing on the impact of diabetes-associated complications and the importance of having access to the right information and care. This month's IDEJ issue focuses on challenges in diabetes management in our country, effective screening tools for diabetes and its complications and details out some diabetes complications and how they can be managed.

We sincerely thank our contributors for making this issue delightful reading for our readers. We dedicate this journal to all the healthcare professionals who are working relentlessly towards making "India–The Diabetes Care Capital of the World."

Sincere Regards,

Dr. Sanjay Agarwal
RSSDI Secretary

*DSME: Diabetes Self-Management Education, DSMS: Diabetes Self-Management Support

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Article: Emerging Complications of Diabetes

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Article: Diabetes Healthcare Delivery Challenges in India

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Article: Frequently Asked Questions

RSSDI Indian Diabetes
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Interview with Dr. V. Mohan

Dr. V. Mohan

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Dr. V. Mohan is an internationally acclaimed, Padma Shri recipient Diabetologist and the Chairman and Chief of Diabetology at Dr. V. Mohan's Diabetes Specialities Centre, which is an IDF Centre of Excellence in Diabetes Care. He is also the President and Director of the Madras Diabetes Research Foundation in Chennai, which is an ICMR center for advanced research in diabetes.

Dr. V. Mohan is not only a renowned clinician but also an avid researcher, teacher, administrator, entrepreneur, and philanthropist. He has published 1560 papers in peer-reviewed journals, including 1000 original papers and chapters in textbooks. His research has attracted over 176,000 citations and has an 'h index' of 145. He has also trained thousands of physicians and other paramedical professionals. He has authored several publications and won numerous awards for his contributions to the field of diabetes.

Diabetes Risk and Management in India

1. As the creator of the Madras Diabetes Research Foundation-Indian Diabetes Risk Score (MDRF-IDRS), how do you envision its role in improving diabetes prevention and early detection in India?

Ans. The MDRF-IDRS was first developed in the year 2002. Subsequently, over 30 research publications by different groups in India and abroad have confirmed its role in the early and cost-effective detection of type 2 diabetes in Indians and South Asians. The use of MDRF-IDRS helps to cut down the cost of screening by over 50%. It costs zero rupees to calculate the score, and it can be completed in less than 2 minutes. It can even be done online. Hence, it is a great tool for diabetes prevention and early detection of diabetes and pre-diabetes in India.

2. What proactive steps can individuals take to reduce their risk of developing diabetes based on their risk score results?

Ans. Those who have a high-risk MDRF-IDRS score should first check their glucose levels to see whether they already have diabetes or pre-diabetes. It is best to do an oral glucose tolerance test (OGTT) using a 3 sample approach, i.e., fasting, 1-hour, and 2-hour OGTT. This will help to pick up not only diabetes and pre-diabetes but also those with so-called normal glucose tolerance with a raised 1-hour value, which is like a **pre-prediabetes stage.** We call this stage **early glucose intolerance.**

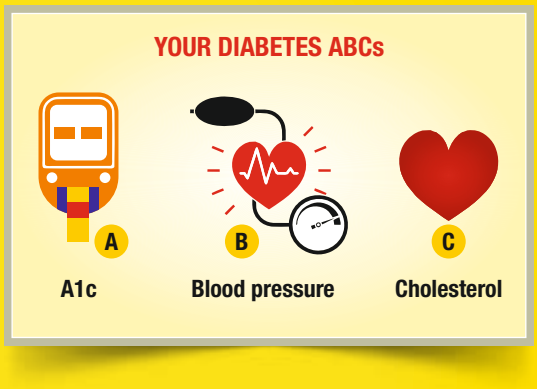
Once they know they have a high-risk, these individuals should follow the healthy plate concept. This means that half the plate or 'thali' can be filled with green leafy, non-starchy vegetables, a quarter with protein (preferably from legumes, rajma, chickpeas, etc.), and the last quarter of the plate or thali being reserved for carbohydrates like rice or wheat. Even this rice or wheat can be from whole-grain cereal, e.g., brown rice or whole-grain wheat. This will help to reduce the glycemic load of the diet.

Apart from this, regular exercise, i.e., increasing physical activity is very important to reduce insulin resistance. Those who are overweight or obese should reduce their weight to prevent diabetes.

Finally, adopting healthy lifestyle habits like sleeping on time (and sleeping enough) and reducing stress can all help to reduce their risk of diabetes. In fact, it is even possible to reverse the risk because two of the parameters used in the MDRF-IDRS, namely waist circumference and physical activities are modifiable.

3. The recent Indian Council of Medical Research-India Diabetes (ICMR-INDIAB) study reports only 7.7% of people with diabetes in India achieve their treatment goals, which are needed to prevent complications. What strategies or advice can you offer to help individuals stay committed to their diabetes management plans and achieve their treatment goals?

Ans. We have to ensure better compliance with the ABC goals of diabetes therapy:



A stands for A1c or HbA1c (glycated hemoglobin) which should be kept below 7% for everyone with diabetes.

B stands for Blood Pressure, which should be maintained in the normal range for the given age group.

C stands for Cholesterol [LDL (low-density lipoprotein) or bad cholesterol], which should also be kept under control.

A combined effort of healthcare professionals, diabetes educators, individuals with diabetes and their families, and governmental and non-governmental organizations is required. Only then can we help to improve the situation in India and get people with diabetes to stay committed to their diabetes management plan and achieve their treatment goals. Most importantly, it is important for people with diabetes to visit the diabetes clinic at least 3-4 times a year. This will help to prevent clinical inertia, which is the main cause of not achieving the ABC goals of treatment.

4. In a country as diverse as India, how can healthcare providers and policymakers work together to ensure equitable access to diabetes care and resources for all populations?

Ans. Policymakers should listen to healthcare providers especially those who provide valuable Indian data, so that the priorities when making policies can be got right. Hence, non-communicable diseases (NCDs) like type 2 diabetes, hypertension, cardiovascular disease, etc., should be given priority since, NCDs now contribute to over 70% of all deaths, i.e., mortality in India. Adopting a public-private partnership (PPP) model can help ensure equitable access to diabetes care and resources for all populations. The government alone may not be able to do this, as 70% of healthcare in India is currently 'out-of-pocket' or private care. Providing health insurance to people with diabetes would be a good first step.

5. Finally, what message or advice would you like to share with the public on World Diabetes Day to promote awareness and proactive management of diabetes in India?

Ans. My dream is to have **'A Diabetes Complicated free India'**. This can be achieved by sustained screening for diabetes, good control of diabetes, preventing clinical inertia, and achieving the ABC goals of treatment. However, we all have to work together if we are to achieve this goal.

Economic Burden of Diabetes Care in India

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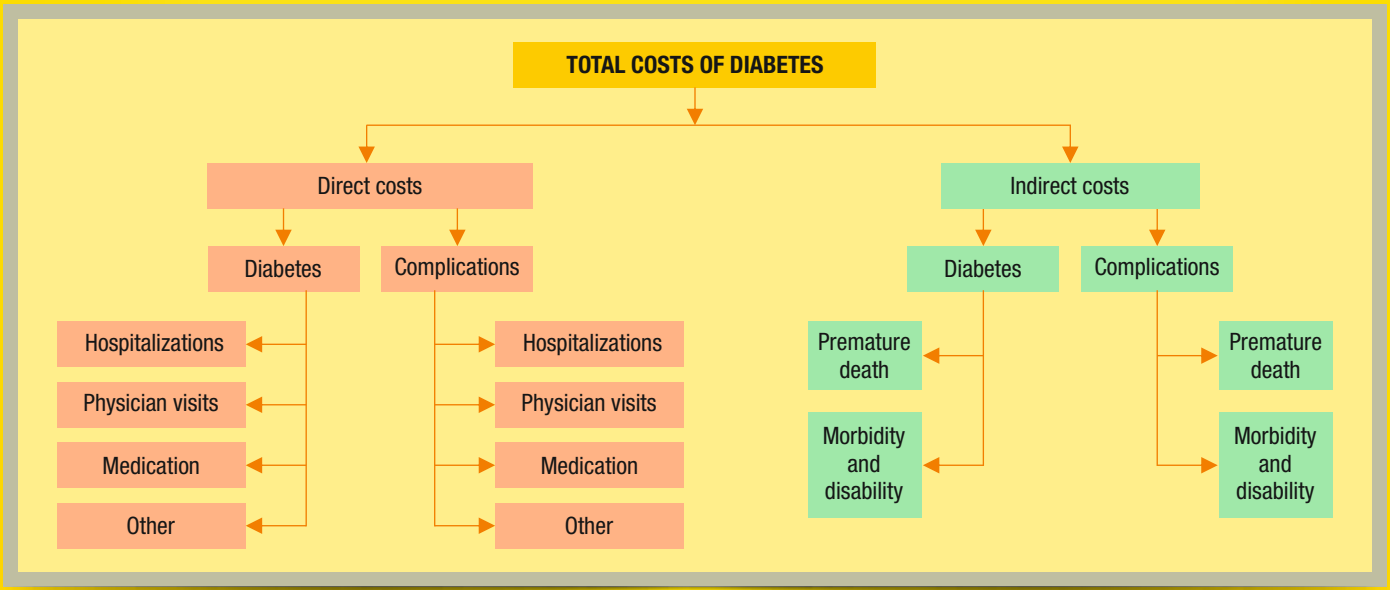
Approximately 88 million people throughout Southeast Asia have diabetes. Of these, 77 million people with diabetes (PwD) reside in India. Unfortunately, there is a sad and shocking lack of availability of affordable quality healthcare to these PwD and their families. The country is still grappling with maternal mortality, child mortality, waterborne diseases, infections, malnutrition, and the like, and hence the focus on non-communicable diseases (NCDs) has been lackadaisical, to say the least. Immediate changes in the health policy are needed so that the available resources, though limited, are put to the best use keeping in mind the vastness of our country and the sheer size of the population. Households with PwD have a high-risk of untenable costs, especially the lowest income groups, as well as those seeking care in the private sector. The economic jeopardy of diabetes can be managed by educating people about diabetes and its associated risk factors to better manage the disease and prevent complications. The economic burden of diabetes could be reduced by the government formulating new health policies and promoting the use of generic medicines.

Direct and indirect costs related to diabetes

When we talk about costs in diabetes, it is related not only to the doctor visits, tests, medicines, or indoor stays with associated costs but also needs to include man-hours lost from the work of patients and relatives, the cost of travel to doctors, and many other such variables. Besides, indirect costs due to death and disability also need to be looked into. So a simple formula to calculate costs may not be useful as too many variables need to be included in the equation.



Annual outpatient care cost			Annual inpatient care cost		
Variable	Direct (₹)	Indirect (₹)	Variable	Direct (₹)	Indirect (₹)
Urban	40,752	9,030	Urban	40,643	4,168
Rural	24,252	7,884	Rural	23,568	3,160
Male	34,080	9,600	Male	45,045	4,980
Female	37,140	10,236	Female	27,269	3,511

Manifold price rise

The Indian rupee had an average inflation rate of 6.29% a year between 1999 and 2021, while the cost inflation index (CII), which is used for calculating the increase in the prices of goods and assets year-by-year due to inflation, increased by about 200% in almost the last two decades, going by the official statistics. The data is independent of the study.

Various studies have focused on the health costs in India, and a brief overview reveals some startling statistics

1. **"Cost of diabetes and its complications: Results from a STEPS survey in Punjab, India"** (Pooja Kansra, *et al. Glob Health Res Policy* 2023)

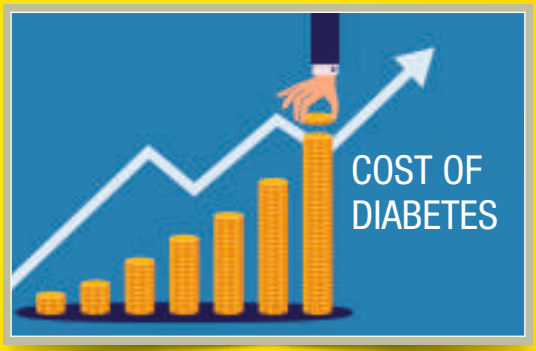
   In this study, the urban respondent's average direct and indirect costs are higher than rural respondents. The highest outpatient department (OPD) expenditure of ₹52,104 was incurred by the respondents below 20 years of age. Gender, complications, income, history of diabetes, and work status were statistically significant determinants of the total cost. This study reported a rapid increase in the median annual direct and indirect cost from ₹15,460 and ₹3,572 in 1999 to ₹34,100 and ₹4,200 in 2021.

2. **"Components of out-of-pocket expenditure and their relative contribution to economic burden of diseases in India"** (Mayanka Ambade, *et al. JAMA Netw Open* 2022)

   This study found that non-medical costs were significant and that the share of total healthcare from doctor consultation and diagnostic test charges increased with socioeconomic status. Surprisingly, this study reported annual cost as a proportion of annual income was lower for inpatient than OPD services.

3. **"Cost of diabetic care in India: An inequitable picture"** (Tripathy J P, *et al. Diabetes Metab Syndr* 2018)

   This study exposed the shocking and glaring problems faced by diabetic patients and their families and suggested that increased availability and access to essential drugs and strengthening of public facilities will significantly reduce out-of-pocket expenditure.



4. **"An economic evaluation of diabetes mellitus in India: A systematic review".** (Satyanath S, *et al. Diab Metab Syndr* 2022)

   India had an annual estimated diabetes treatment cost of Rs.10,000 to 12,000 crore in 2003, which is likely to rise to as high as Rs.1,26,000 crores by 2025. While patients spent 3% of their annual income on only OPD charges on average, complications substantially increased the total cost by more than 10%, which amounts to catastrophic health expenditure.

5. **"Economic burden of diabetic patients in India: A review"** (Bansode B, *et al. Diabetes Metab Syndr* 2019)

   This study indicates that in India, the total annual expenditure by patients on diabetes care was, on average, Rs. 10,000 in urban areas and Rs. 6,260 in rural areas. The direct costs are related to the medical and non-medical costs of people with diabetes, mostly the burden on the individual and at the family level. The indirect costs are related to society and government, which are associated with the loss of productivity.

   Thus, it is evident that diabetes can have devastating effects on the financial status of the family. The cost of diabetes, whether it is OPD-based or inpatient department (IPD) is very high because of the socioeconomic status of our country. Both doctors and policymakers need to step in to correct this anomaly and provide cheap or free treatment, especially to those in the lowest strata of society.

Resources:

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The Indian Diabetes Risk Score

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All age groups are affected by the serious public health issue of type 2 diabetes mellitus (T2DM), which has recently been linked to youth as well. Diabetes risk factors must be made known to young people because the condition is now ravaging them at an epidemic rate. A validated technique to identify those at high-risk of acquiring T2DM in the future is the Indian diabetes risk score (IDRS), developed and created by Dr. V. Mohan and other researchers at the Madras Diabetes Research Foundation.

Using two modifiable risk factors (waist circumference and physical activity) and two non-modifiable risk factors (age and family history of diabetes), IDRS makes it abundantly evident that the risk score can be significantly decreased if modifiable risk factors are changed. India has 101 million people living with diabetes, and more than 50% remain undiagnosed. Therefore, a diabetes risk evaluation will assist us in developing efficient screening methods to reveal the disease's hidden toll. Universal screening is not practical nor cost-effective. The benefits of IDRS include its ease of use, low cost, and suitability for mass screening campaigns.

Particulars	Score
Age (years)	
<35 (reference)	0
35-49	20
>50	30
Abdominal obesity	
Waist <80 cm (female), <90 cm (male)	0
Waist ≥80-89 cm (female), ≥90-99 cm	10
Waist ≥90 cm (female), ≥100 cm (male)	20
Physical activity	
Vigorous exercise or strenuous (manual) labor at home/work	0
Mild to moderate exercise at home/work	20
No exercise or sedentary activities at home/work	30
Family history	
No family history	0
Either parent	10
Both parents	20
Minimum score	0
Maximum score	100

Subjects with an IDRS of <30 are categorized as low-risk, 30-50 as medium risk, and those with ≥60 as high-risk for diabetes.

A study conducted by Singh MM *et al*., 2019, using the IDRS to assess the risk of T2DM with other factors among 290 young medical students found that as per IDRS categorization, 77% of students were in a low-risk, 22% in moderate risk, and 1% of students in the high-risk category. A significant association of moderate-high diabetes risk with male gender, positive family history of diabetes, no/mild physical activity, and body mass index (BMI) ≥23 kg/m^2 was seen.

Large epidemiological studies find it extremely challenging to screen for metabolic syndrome as a sign of elevated cardiovascular risk, particularly in developing nations like India. Given this situation, the IDRS seems to be extremely important because it can identify those who are at higher cardiovascular risk, particularly at the normal glucose tolerance stage as IDRS includes three risk factors [age, physical activity, and waist circumference] for these. IDRS also helps to discriminate T2DM from other forms of diabetes. One big advantage of the IDRS is that it can even be done online and thus can reach millions of people in India. Thus, to conclude, IDRS is a simple, very low-cost screening tool that has multiple applications in clinical and epidemiological settings in India.

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Emerging Complications of Diabetes

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Diabetes mellitus, a prevalent and potentially devastating medical condition, has exhibited increasing prevalence in recent decades. Traditional complications encompass macrovascular and microvascular conditions. Although these complications still impose a significant disease burden, their rates are declining due to improved diabetes management. Increased life expectancy in individuals with diabetes has led to the identification of novel complications such as cancer, infections, liver disease, affective disorders, sleep apnea, and physical as well as cognitive disability.

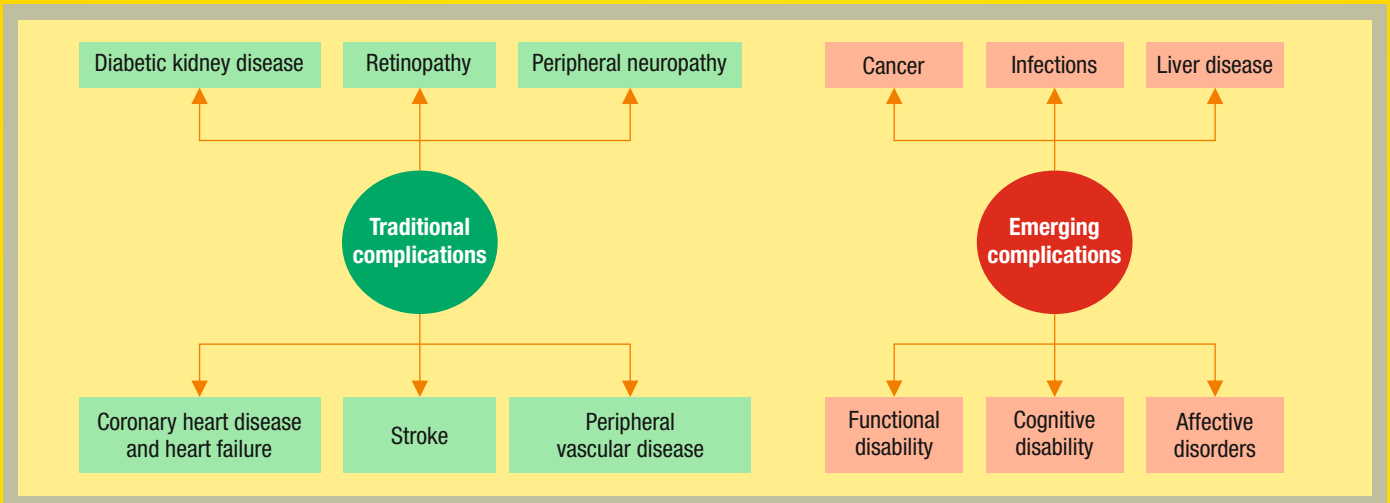


Figure 1: Major traditional complications and emerging complications of diabetes mellitus

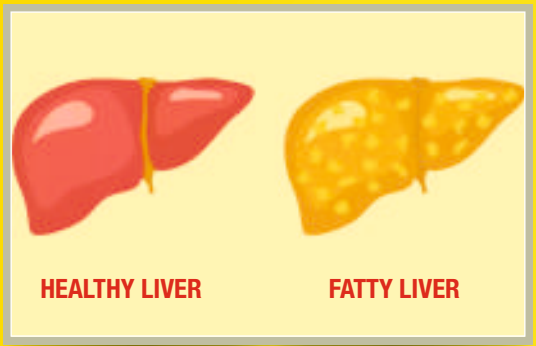
Diabetes mellitus and cancer

In several countries, cardiovascular mortality rates in people with diabetes have decreased, but cancer deaths have become more common. Potential factors in this association include hyperinsulinemia, hyperglycemia, inflammation, and cellular signaling processes. In England, cancer has now surpassed vascular disease as the leading cause of death among people with diabetes due to improved vascular disease management. This shift highlights the need for diabetes management to focus on non-vascular issues.

Diabetes mellitus and infections

Recent research has shown that diabetes significantly increases the risk of infection-related complications, leading to hospitalization. This elevated risk is especially notable for foot infections but also applies to respiratory infections, urinary tract infections, sepsis, and post-operative infections. Additionally, type 1 diabetes (T1D) is linked to higher mortality rates from infections as compared to type 2 diabetes (T2D), potentially due to more severe hyperglycemia. Both T1D and T2D increased hospitalizations for coronavirus disease (COVID-19), and also elevated hospitalization and mortality risks for various respiratory illnesses such as pneumonia, Middle East respiratory syndrome (MERS), severe acute respiratory syndrome (SARS), and H1N1 influenza.

Diabetes mellitus and liver disease



Non-alcoholic fatty liver disease (NAFLD) and its advanced form, non-alcoholic steatohepatitis (NASH), pose significant concerns for individuals with diabetes. A recent international consensus of experts suggested that NAFLD should be renamed as 'metabolic dysfunction-associated fatty liver disease' (MAFLD) to give attention to the bidirectional interplay between fatty liver and metabolic alterations. NAFLD increases the risk of developing T2D, and severe liver cirrhosis is associated with a higher prevalence of diabetes. Insulin resistance is the key link connecting diabetes to liver disease. Ectopic fat deposition, where fat accumulates in organs like the liver, contributes to both diabetes and liver disease.

Diabetes mellitus and functional disability

Functional disability is common among individuals with diabetes, especially in older age groups. Lower-body limitations and difficulties in daily activities are prevalent. Diabetes is linked to an increased risk of falls and mobility issues in adults aged 60 years and above. The exact mechanisms are not fully known, but factors like inflammation from high blood glucose, loss of muscle strength, and diabetes-related complications may contribute to functional disability.

Diabetes mellitus and cognitive disability

Diabetes mellitus is strongly linked to cognitive impairment, though the exact mechanisms are not fully understood. Elevated blood glucose levels and advanced glycation end products like glyoxal and methylglyoxal can disrupt the blood-brain barrier, potentially leading to cognitive dysfunction in both T1D and T2D. This disruption can impact the transport of molecules between the bloodstream and the brain. Additionally, insulin signaling dysfunction may play a role in the development of Alzheimer's disease, often referred to as "Type 3 Diabetes". This suggests a potential connection between diabetes and cognitive disability.

Diabetes mellitus and affective disorders

There is enough evidence in the literature of a broad range of psychological impacts of diabetes mellitus. Evidence exists for an association of diabetes with anxiety, and an association of T1D with eating disorders. Diabetes distress and burnout are common. Diabetes and depression share common biological factors, including inflammation driven by the immune system, dysregulation of the hypothalamic-pituitary-adrenal axis, and reports of hippocampal atrophy in individuals with T2D and depression. While hypertension affects cerebral atrophy in diabetes, hippocampal atrophy seems to be an independent factor contributing to the comorbidity of T2D and depression. However, the precise biological mechanisms connecting diabetes to other mood disorders remain unclear.

Improved diabetes management and longer life expectancy are leading to new complications in organs like the liver, brain, etc. To address these challenges, there should be screening guidelines for conditions such as cancer, liver disease, and depression. We should consider expanding traditional diabetes management strategies to include a more holistic and multidisciplinary approach that focuses on preventing and managing such emerging complications.

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Diabetes Healthcare Delivery Challenges in India

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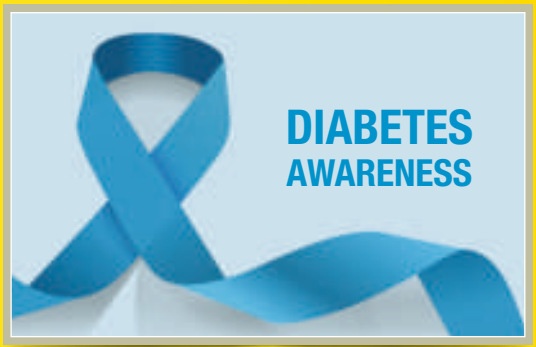
India is home to the second-largest number of adults with diabetes worldwide, which presents an array of socioeconomic and economic challenges. The International Diabetes Federation (IDF) estimates that 77 million Indians between the ages of 20 and 79 are living with diabetes. These huge numbers place India as one of the countries with the highest socioeconomic diabetes burden in the entire world. Management of diabetes and its complications in India is a huge challenge owing to several problems. A few of them are discussed below.

Poor awareness



People's lack of knowledge about diabetes can hinder their potential to manage it. Many studies have looked at the levels of awareness of diabetes among both patients and healthcare providers. According to the Indian Council of Medical Research-India Diabetes (ICMR-INDIAB) (Phase I) study, only 43.2% of the population were aware of diabetes, and the level of awareness was significantly low among rural residents compared to urban ones. Additionally, poor socioeconomic status (SEP), measured by one's degree of education, occupation, and income, raises the risk of diabetes, particularly type 2 diabetes (T2D). Therefore, there is an urgent need to raise diabetes awareness among the general public as well as people with diabetes (PwD) in India. This is crucial since improving diabetes control is closely tied to increased self-management skills.

Lack of diagnosis of diabetes and access to quality care

More than 50% of diabetes cases in India are thought to be undiagnosed in rural areas and roughly 30% in urban ones. This may be linked to the burden of treatment expenditures, logistical challenges for patients living in remote settings, inadequate public healthcare infrastructure, and unavailability of antidiabetic drugs. Poor diabetes treatment outcomes are partly a result of the lack of price regulation in the private sector.

Another important factor is the availability of and access to diabetes medications. According to an estimate based on sales of antidiabetic pharmaceuticals, only 10-12% of Indians with diabetes received modern pharmaceutical care on average. Although insulin therapy is considered one of the most reliable and effective treatment options, the IMPROVE Control India study (2008) found barriers to its adoption. In the majority of patients, insulin was not administered until it was absolutely necessary or until the HbA1c (glycated hemoglobin) levels had gone up to about 9%. This study also identified a number of additional issues with the management of diabetes, including inconsistent monitoring of diabetes status and a lack of uniformity in laboratory procedures.

Poor medication adherence

One of the well-documented challenges in patients with diabetes is inadequate medication compliance. Poor adherence affects clinical results in PwD and raises expenses, complications, hospitalizations, and mortality rates in addition to compromising clinical outcomes. Medication costs, regimen complexity, lack of transportation, lengthy pharmacy wait times, patient emotional well-being, and patient beliefs and fears (due to the patient's fear of insulin and dependence on medications or insulin, side effects, etc.) were specifically identified as key contributors to poor medication adherence.

Time limits and inadequate knowledge among physicians

As per a study of clinical diabetologists, the main obstacles to the use of evidence-based diabetes therapy are low physician awareness, the inapplicability of Western guidelines to Indian patients, and the high cost of treatment. The effectiveness of patient care in India is hampered by inadequate referrals to endocrinologists and other specialists, a lack of counseling, and a lack of use of evidence-based medicine. These elements may also cause poor patient compliance, affecting their well-being and the efficacy of their care, and possibly raising morbidity and mortality rates.

Lack of skilled diabetes educators

The shortage of skilled diabetes educators in India is a pressing issue, given the nation's escalating diabetes epidemic. With an increasing number of individuals affected by diabetes, there is a critical need for a larger workforce of trained educators who can provide essential guidance and support. These educators play a pivotal role in empowering people with diabetes to make informed lifestyle choices, adhere to treatment plans, and effectively manage their condition. The scarcity of skilled diabetes educators not only jeopardizes individual health outcomes but also places a substantial burden on the healthcare system due to uncontrolled diabetes-related complications. Prioritizing the training and expansion of skilled diabetes educators throughout the country is the need of the hour.

Focus on diabetes education, active physician involvement, significant research, and a well-planned healthcare system oriented towards diabetes care are the main areas of desired intervention. Thus, a combined effort from healthcare professionals, individuals, and the government can aid in tiding over the situation.

Resources:

1. Das AK, Saboo B, Maheshwari A, *et al.* Health care delivery model in India with relevance to diabetes care. *Heliyon.* 2022;8(10):e10904. Published 2022 Oct 4. doi:10.1016/j.heliyon.2022.e10904
2. Viswanathan V, Rao VN, *et al.* Problems associated with diabetes care in India. *Diabetes Management.* 2013;3. 31-40. 10.2217/dmt.12.62.
3. Deepa M., *et al.* Knowledge and awareness of diabetes in urban and rural India: The Indian council of medical research India diabetes study (phase I): Indian council of medical research India diabetes 4. *Ind. J. Endocrinol. Metabol.* 2014;18(3):379–385.

Screening for Diabetes Complications

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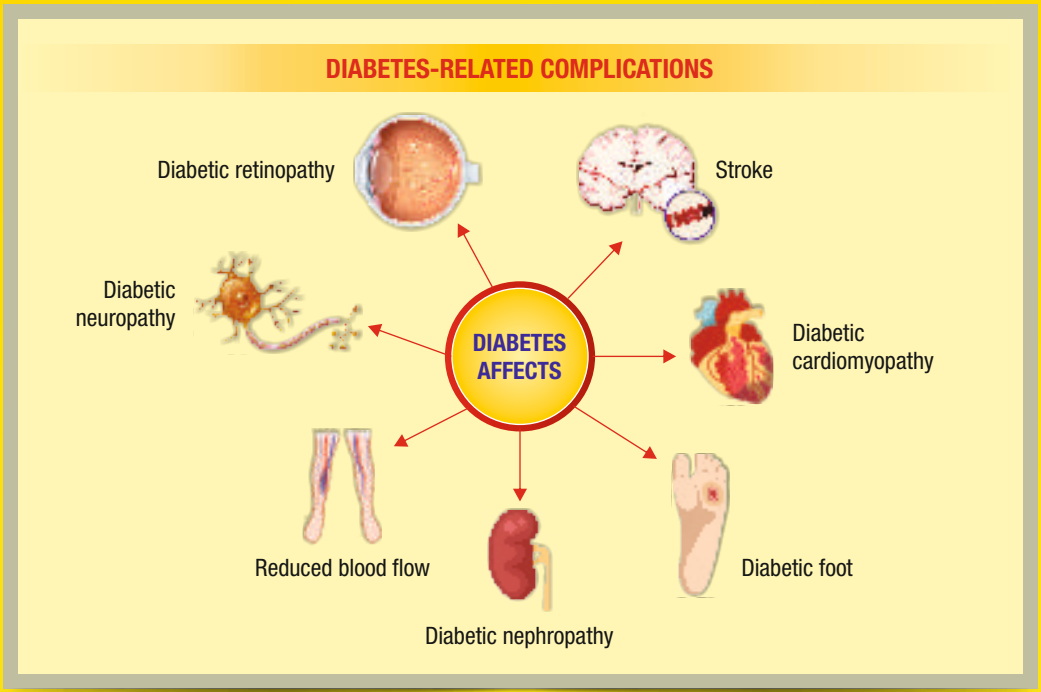
Complications associated with diabetes, such as diabetic retinopathy, nephropathy, neuropathy, and diabetic foot can result from uncontrolled long-term blood glucose levels that damage several organ systems. Clinically, these issues are often "silent" until they are well advanced. Therefore, it is important to screen for the complications regularly to prevent or treat them early.



Complications	Screening	When to screen first
Diabetic retinopathy	○ Visual acuity ○ Direct or indirect ophthalmoscopy (dilated pupils) or retinal fundus photography	○ At the time of diagnosis ○ Every two years thereafter, or as per the ophthalmologist's recommendation
Diabetic nephropathy	○ Dipstick analysis for proteinuria ○ Serum creatinine ○ Estimated glomerular filtration rate (eGFR) ○ Spot urine albumin to creatinine ratio ○ Spot protein to creatinine ratio	○ Once a year

Complications	Screening	When to screen first
Diabetic neuropathy	○ Tendon reflex ○ Pressure/touch sensation ○ Vibratory sensation and protective sensation ○ Ankle reflex test	○ At diagnosis and annually thereafter
Cardiovascular disease	○ Blood pressure ○ Lipid profile ○ Stress test ○ Electrocardiogram (ECG) ○ 2D echocardiography	○ Checking the lipid profile should be done at diagnosis and then every year after that.

Resources:

1. Diagnosis and management of type 2 diabetes - World Health Organization. Available at: https://iris.who.int/bitstream/handle/10665/331710/WHO-UCN-NCD-20.1-eng.pdf?sequence=1
2. ICMR guidelines for Management of type 2 diabetes 2018. Available at: https://main.icmr.nic.in/sites/default/files/guidelines/ICMR_Guidelines Type2diabetes2018_0.pdf
3. ADA. Health Checks for People with Diabetes. Available at: https://diabetes.org/diabetes/newly-diagnosed/health-checks-people-with-diabetes
4. American Heart Association. Heart-Health Screenings. 2014. Available at: http://www.heart.org/HEARTORG/Condition/Heart-Health-Screenings _ UCM_ 428687_Article.jsp

Diabetes Management Challenges, Complications, and Solutions from an Indian Perspective

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Concern over the prevalence of diabetes has been highlighted by epidemiological studies from India and international organizations. Asia accounts for more than 60% of the world's population with diabetes, with China and India taking up the majority of this region. The prevalence of diabetes is currently 11.4% in India, while the prevalence of pre-diabetes is 15.3%, which will increase the burden of diabetes in the future. Type 2 diabetes (T2D) strikes Indians at a young age, and according to the recent Indian Council of Medical Research-India Diabetes (ICMR-INDIAB) study, only 7.7% of people with diabetes in India achieve their treatment goals, which are required to prevent complications.

Due to a variety of issues, including a lack of general public understanding of diabetes and its consequences, a shortage of medical professionals, monitoring technology, and even medications, particularly in remote locations, managing diabetes and its complications in India is a very difficult task. The burden of diabetes is already rather heavy, and all of these problems greatly contribute to delayed presentation and missed diagnosis.

Table 1: Barriers and Solutions to Diabetes Management in India

	Barriers in management	Suggested solutions
Efficacy and safety	○ Concern with hypoglycemia with insulin ○ A fear of gaining weight with insulin ○ Insulin's capacity for mitogenesis ○ Current insulin therapy' variability results in problems ○ Patients find it challenging to use a blood glucose self-monitoring device	○ Insulin: Improves glycemic control by mimicking the physiological action of endogenous insulin. Basal insulin: A single daily dose helps prevent the need for several ones and reduces the risk of hypoglycemia due to a flat profile and little intra-patient variability. ○ For the use of insulin therapy to be effective and to reduce hypoglycemic episodes, the therapy should be associated with regular blood glucose monitoring. ○ Increasing education about the need and the right technique of monitoring is essential. ○ Spread the word about the outcome reduction with an initial glargine intervention (ORIGIN) trial findings that insulin is not significantly mitogenic.

Table 1: Barriers and Solutions to Diabetes Management in India (Table contd...)

	Barriers in management	Suggested solutions
Convenience and lifestyle	○ Inconvenient oral antidiabetic drug (OAD)/insulin regimes ○ Lack of compliance and clinical inertia ○ Traveling and hectic schedules ○ Concerns about lifestyle modifications ○ Religious sensitivity and obligations, such as fasting	○ Thorough monitoring of patient compliance with therapy ○ Therapeutic approaches that consider sociocultural aspects ○ Diabetes care that is patient-centered and attentive to a patient's needs ○ Development of diabetes-friendly and cost-effective guidelines ○ A team-based approach to managing the various facets of managing diabetes ○ Improved physician training and motivating strategies
Education	○ Insufficient knowledge and awareness about diabetes and its complications ○ False information spread across communities, especially regarding the side effects of medical therapy ○ Use of alternative therapies ○ A low rate of endocrinologist referrals ○ A shortage of skilled diabetes educators and qualified diabetes doctors ○ Substantial variations in state support	○ Use of various communication channels to raise awareness ○ The employment of well-known people and local authorities in awareness campaigns ○ Educating the media on the need to spread truthful information ○ Content consistency at all levels of care ○ Enhancement in the number and skills of diabetes educators and doctors ○ Referral to Endocrinologists at the earliest rather than referring after the occurrence of complications ○ Public-private partnerships for awareness-raising initiatives

To address the issues associated with diabetes care in India, the government, other stakeholders, and policymakers must develop strong and effective measures that address all of these issues and make sure that they are successfully implemented and followed up. Additionally, healthcare professionals have a significant role to play in this regard. They must constantly update their knowledge necessary for the diagnosis and treatment of diabetes. In addition, they must emphasize the importance of effective diabetes education for both patients and the general public.

Resources:

1. Wangnoo SK, Maji D, Das AK, *et al.* Barriers and solutions to diabetes management: An Indian perspective. *Indian J Endocrinol Metab.* 2013;17(4):594-601. doi:10.4103/2230-8210.113749
2. Viswanathan V, Rao VN. Problems associated with diabetes care in India. *Diabetes Management.* 2013;3(1):31-40.
3. Anjana RM, Unnikrishnan R, Deepa M, *et al.* Metabolic non-communicable disease health report of India: The ICMR-INDIAB national cross-sectional study (ICMR-INDIAB-17). *Lancet Diabetes Endocrinol.* 2023;11(7):474-489. doi:10.1016/S2213-8587(23)00119-5

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Abridged Prescribing Information

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Adverse Reactions: Most common adverse reactions reported are: Dapagliflozin- Female genital mycotic infections, nasopharyngitis, and urinary tract infections. Sitagliptin- Upper respiratory tract infection, nasopharyngitis and headache. Metformin- Diarrhea, nausea/vomiting, flatulence, asthenia, indigestion, abdominal discomfort, and headache.
Warnings and Precautions: Dapagliflozin: Volume depletion; Ketoacidosis in Patients with Diabetes Mellitus; Urosepsis and Pyelonephritis; Hypoglycaemia; Genital Mycotic infections
Sitagliptin: General- Sitagliptin should not be used in patients with type 1 diabetes or for the treatment of diabetic ketoacidosis. Acute pancreatitis: Hypoglycaemia when used in combination with other anti-hyperglycaemic medicinal product; Renal impairment; Hypersensitivity reactions including anaphylaxis, angioedema, and exfoliative skin conditions- Stevens-Johnson syndrome; Bullous pemphigoid. Metformin Hydrochloride: Lactic acidosis; In case of dehydration (severe diarrhoea or vomiting, fever or reduced fluid intake), metformin should be temporarily discontinued and contact with a healthcare professional is recommended.
Contraindications: Hypersensitivity to the active substance of Dapagliflozin, Sitagliptin & Metformin or to any of the excipients listed. Any type of acute metabolic acidosis (such as lactic acidosis, diabetic ketoacidosis). Diabetic pre-coma; Severe renal failure (eGFR<30mL/min); Acute conditions with the potential to alter renal function such as: Dehydration, Severe infection, Shock; Acute or chronic disease which may cause tissue hypoxia such as: Cardiac or respiratory failure, Recent myocardial infarction, Shock, Hepatic Impairment, Acute Alcohol intoxication, alcoholism
Use in a special population: Pregnant Women: Due to lack of human data, drug should not be used during pregnancy. Lactating Women: It should not be used during breastfeeding. Paediatric Patients: The safety and efficacy of drug has not yet been established. No data are available. Geriatric Patients: In Patients > 65 years, it should be used with caution as age increases.

Additional information is available on request.
Last updated: January 01, 2023

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Personalized Counselling for Preventing Hypoglycemia: A Doctor's Experience on the MyCare Patient Support Program

Dr. A.J. Asirvatham

MD (Gen Med)., D.Diab., FRCP (Glasgow)

Professor of Diabetology, Madurai Medical College, Diabetologist, Govt. Rajaji Hospital, Madurai (Retired)

A 15-year-old boy diagnosed with type 1 diabetes mellitus 2 years ago is being managed by Dr. A.J. Asirvatham.

Here's what Dr. A.J. Asirvatham has to say:

The patient came with complaints of nocturnal hypoglycemia, night sweats, nightmares, and generalized weakness. His insulin dose: Premix 30/70 14 units (breakfast) and 12 units (dinner), was increased by a local doctor to 25 units before breakfast and dinner as his sugars were deranged.

I suggested he put on a continuous glucose monitor (CGM), to assess his glucose trends, identify the reason for glucose fluctuations, and to see if the Somogyi/Dawn phenomena is a problem. His CGM showed his fasting glucose to be 225-260 mg/dL, HbA1c (glycated hemoglobin) was 8.0% and 3 am readings were 70-90 mg/dL this proved the Somogyi effect.

I adjusted his insulin dosage and stopped premixed insulin and put him on basal (glargine 15 units) and bolus (12-10-8 rapid-acting insulin) regime. Although he said he was regular with his diet and exercise, he was disappointed with the lack of improvement.

Here is where I assigned Syed Kader, the MyCare diabetes educator (MDE) to assist him with the same. Post-session it was understood that the patient had developed a fear of nocturnal hypoglycemia and was skipping his insulin at times. Syed then took it upon himself to help the 15-year-old by teaching him the role of insulin and the importance of injecting pre-meals. The MDE taught him about carbohydrate counting. He took a detailed recall of his diet and curated a meal plan, keeping in mind the patient's insulin dosage. He was advised a bedtime snack to prevent hypoglycemia at night.

The MDE helped him overcome his fear of nocturnal hypoglycemia during the follow-ups. Regular check-ups, timely education from the MDE, and my medical intervention collectively helped to get excellent results in this boy's glucose control.

Mr. Syed Kader

NDEP and T1DE Certified Diabetes Educator

Here's what MDE Syed Kader had to say:

Dr. A.J. Asirvatham's medical intervention and my education helped in the disappearance of nocturnal hypoglycemia and the discomfort caused by it. With the ultimate goal of enhancing self-management, it has been a real pleasure for me to advise and educate people with diabetes.

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*PWD: People with Diabetes

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1. Glimepiride use is associated with reduced cardiovascular mortality in patients with type 2 diabetes and chronic heart failure, a prospective cohort study | European Journal of Preventive Cardiology | Oxford Academic (oup.com) 2. Ther Adv Endocrinol Metab 2020. Vol 11:1-12 DOI: 10. 1177/2042018820926000. # Data on file * As compared to non-glimepiride group
EET: Epoxyeicosatrienoic acid; sEH: soluble Epoxide Hydrolase; AHAs: antihyperglycemic agents; T2DM: Type 2 Diabetes Mellitus

Prescribing Information

Information: Metformin hydrochloride (as prolonged release) and glimepiride tablets. Glycomet-GP 0.5/Glycomet-GP 0.5 Forte/ Glycomet-GP 1/ Glycomet-GP 1/850/ Glycomet-GP 2/ Glycomet-GP 2/850/ Glycomet-GP 3/ Glycomet-GP 3/850/ Glycomet-GP 4/ Glycomet-GP 4/850/ Glycomet-GP 1 Forte/ Glycomet-GP 2 Forte/ Glycomet-GP 3 Forte/ Glycomet-GP 4 Forte Abridged Prescribing Information **Composition:** Glycomet GP 0.5mg: Each uncoated tablet contains metformin hydrochloride IP (as prolonged release form) 500mg and glimepiride IP 0.5mg • Glycomet GP 0.5 Forte: Each uncoated tablet contains metformin hydrochloride IP (as prolonged release form) 1000mg and glimepiride IP 0.5mg • Glycomet GP 1: Each uncoated tablet contains metformin hydrochloride IP (as prolonged release form) 500 mg and glimepiride IP 1 mg. • Glycomet GP 1/850: Each uncoated tablet contains metformin hydrochloride IP (as prolonged release form) 850 mg and glimepiride IP 1 mg. • Glycomet GP 2: Each uncoated tablet contains metformin hydrochloride IP (as prolonged release form) 500 mg and glimepiride IP 2 mg. • Glycomet GP 2/850: Each uncoated tablet contains metformin hydrochloride IP (as prolonged release form) 850 mg and glimepiride IP 2 mg • Glycomet GP 3: Each uncoated tablet contains metformin hydrochloride IP (as prolonged release form) 500 mg and glimepiride IP 3 mg. • Glycomet GP 3/850: Each uncoated tablet contains metformin hydrochloride IP (as prolonged release form) 850 mg and glimepiride IP 3 mg. • Glycomet GP 4: Each uncoated tablet contains metformin hydrochloride IP (as prolonged release form) 500 mg and glimepiride IP 4 mg. • Glycomet GP 4/850: Each uncoated tablet contains metformin hydrochloride IP (as prolonged release form) 850 mg and glimepiride IP 4 mg. • Glycomet GP 1 Forte: Each uncoated tablet contains metformin hydrochloride IP (as prolonged release form) 1000mg and glimepiride IP 1mg. • Glycomet GP 2 Forte: Each uncoated tablet contains metformin hydrochloride IP (as prolonged release form) 1000mg and glimepiride IP 2mg. • Glycomet GP 3 Forte: Each uncoated tablet contains metformin hydrochloride IP (as prolonged release form) 1000mg and glimepiride IP 3mg. • Glycomet GP 4 Forte: Each uncoated tablet contains metformin hydrochloride IP (as prolonged release form) 1000mg and glimepiride IP mg. **Indication:** For the management of patients with type 2 diabetes mellitus when diet, exercise and single agent (glimepiride or metformin alone) do not result in adequate glycaemic control. **Dosage and Administration:** The recommended dose is one tablet daily during breakfast or the first main meal. Each tablet contains a fixed dose of glimepiride and Metformin Hydrochloride. The highest recommended dose per day should be 8 mg of glimepiride and 2000mg of metformin. Due to prolonged release formulation, the tablet must be swallowed whole and not crushed or chewed. **Adverse Reactions:** For Glimepiride: hypoglycaemia may occur, which may sometimes be prolonged. Occasionally, gastrointestinal (GI) symptoms such as nausea, vomiting, sensations of pressure or fullness in the epigastrium, abdominal pain and diarrhea may occur. Hepatitis, elevation of liver enzymes, cholestasis and jaundice may occur; allergic reactions or pseudo allergic reactions may occur occasionally. For Metformin: GI symptoms such as nausea, vomiting, diarrhea, abdominal pain, and loss of appetite are common during initiation of therapy and may resolve spontaneously in most cases. Metallic taste, mild erythema, decrease in Vit B12 absorption, very rarely lactic acidosis, Hemolytic anemia, Reduction of thyrotropin level in patients with hypothyroidism, Hypomagnesemia in the context of diarrhea. Encephalopathy, Photosensitivity, hepatobiliary disorders. **Warnings and Precautions:** For Glimepiride: Patient should be advised to report promptly exceptional stress situations (e.g., trauma, surgery, febrile infections), blood glucose regulation may deteriorate, and a temporary change to insulin may be necessary to maintain good metabolic control. Metformin Hydrochloride may lead to Lactic acidosis; in such cases metformin should be temporarily discontinued and contact with a healthcare professional is recommended. Sulfonylureas have an increased risk of hypoglycaemia. Long-term treatment with metformin may lead to peripheral neuropathy because of decrease in vitamin B12 serum levels. Monitoring of the vitamin B12 level is recommended. Overweight patients should continue their energy-restricted diet, usual laboratory tests for diabetes monitoring should be performed regularly. **Contraindications:** Hypersensitivity to the active substance of glimepiride & Metformin or to any of the excipients listed. Any type of acute metabolic acidosis (such as lactic acidosis, diabetic ketoacidosis, diabetic pre-coma). Severe renal failure (GFR≤30ml/min). In pregnant women. In lactating women Acute conditions with the potential to alter renal function (dehydration, severe infection, shock, intravascular administration of iodinated contrast agents); acute or chronic disease which may cause tissue hypoxia (cardiac or respiratory failure, recent myocardial infarction, shock); hepatic insufficiency; acute alcohol intoxication, alcoholism. **Use in a special population:** Pregnant Women: Due to a lack of human data, drugs should not be used during pregnancy. Lactating Women: It should not be used during breastfeeding. Pediatric Patients: The safety and efficacy of drugs has not yet been established. Renal impairment: A GFR should be assessed before initiation of treatment with metformin containing products and at least annually thereafter. In patients at increased risk of further progression of renal impairment and in the elderly, renal function should be assessed more frequently, e.g. every 3-6 months.

Additional information is available on request.

Last updated: March 13, 2023

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Tips for Preventing Eye Complications

Dr. Chandrashekhar Patil

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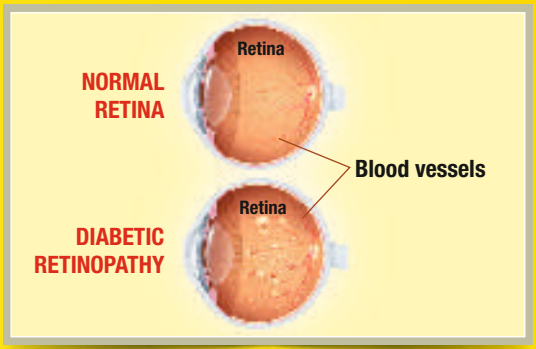
Diabetes commonly affects the retina, the area at the back of the eye. Small blood vessels in the retina are progressively and irreversibly damaged. About a third of all people with diabetes have signs of retinopathy affecting their quality of life. Blood vessels become leaky or blocked. Abnormal blood vessels may develop which can bleed.

Risk factors for retinopathy

- Duration of diabetes is the primary risk factor
- Uncontrolled blood sugar [1% decrease in HbA1c (glycated hemoglobin) reduces the risk of retinopathy by 40%]
- Hypertension
- Age (more common in the older onset group)
- Pregnancy
- Renal disease and anemia
- Smoking and hyperlipidemia



Types of retinopathy

- Non-proliferative→Mild, moderate, and severe (early retinal damage without new blood vessel growth)
- Proliferative or proliferative diabetic retinopathy (PDR) (involves abnormal blood vessel growth in the retina)

In type 2 diabetes, macular edema (area near the center of the eye) can occur.

Clinical symptoms

- Blurred, distorted, or fluctuating vision
- Diplopia
- Night vision problems
- Seeing floaters and flashes

Tests to be done

- Examination of the fundus of the eye after dilation of both eyes with 0.5 tropicamide
- visual acuity
- Slit-lamp examination
- Color fundus photography
- Optical coherence tomography (measures retinal thickness)

Prevention

Screening of every person with diabetes should be done to reduce the risk of vision impairment and blindness, especially those who may have no complaints at the beginning.

- Optimize glucose control
- Blood pressure and lipid control
- Eating a healthy balanced diet, including vegetables, colorful fruits, etc. Strictly avoid processed meats, deep-fried snacks, and carbonated drinks.
- Regular visits to the ophthalmologist (every year if the fundus is normal and every six months if signs of retinopathy)
- Sufficient water intake
- Regular exercise, quit smoking

Nutrients essential for eye health

An optimal combination of vitamins B_1, B_2, B_6, L Methyl folate, methylcobalamin (B_{12}), vitamin C, D, E, lutein, zeaxanthin, α-lipioic acid, and N-acetylcysteine is known to protect the retina.

Treatment

Panretinal photocoagulation is the treatment for high-risk retinopathy. Vitrectomy can restore useful vision in vitreous hemorrhage and tractional retinal detachment. Treatment does not cure retinopathy but is effective in preventing further vision loss.

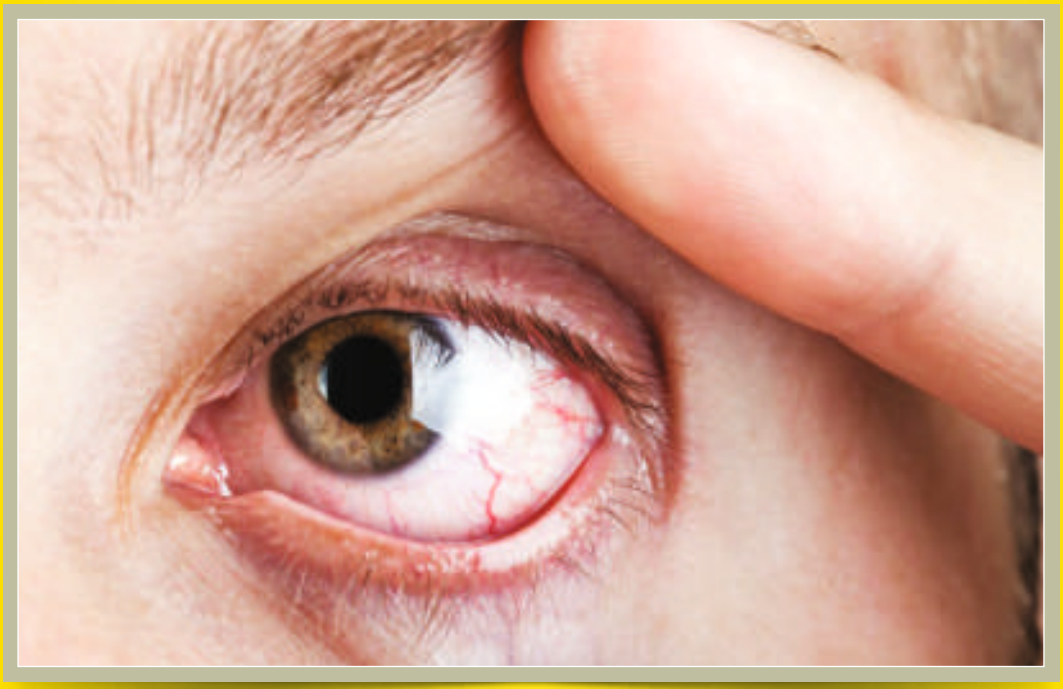
Other eye problems in diabetes

- Cataract
- Glaucoma
- Dry eyes
- Diabetic third cranial nerve palsy
- Rhinocerebral mucormycosis

Relevant information about diabetes and its impact on eye health and about the eye status should be shared regularly with the person with diabetes and their family members.

Resources:

1. Tan, Gavin S, Wong, Tien Yin. International Textbook of Diabetes Mellitus. Diabetic retinopathy and other ocular complications. 2015. https://doi.org/10.1002/9781118387658.ch61
2. Dr Nihal Thomas. A practical guide to Diabetes mellitus. 8th Ed . 2018. Jaypee Brothers Medical Publishers (P) Ltd.



Nutrition Requirements for Diabetes Remission

Dr. Jyoti Pankaj

MD (Medicine)

Assistant Professor, Dept. of General Medicine, Dr. Ram Manohar Lohia Institute of Medical Sciences, Lucknow

For decades, the management of diabetes has been majorly focused on the control of hyperglycemia and delaying the progression to the stage of complications. Recently, there has been a paradigm shift towards trying to achieve diabetes remission and live a diabetes-free life. Diabetes remission broadly is defined as achieving normoglycemia either spontaneously or following an intervention that persists for at least three months in the absence of glucose-lowering pharmacotherapy. New evidence suggests that, it is possible to achieve remission of type 2 diabetes mellitus (T2DM) but, long-term data on sustainability are lacking. Remission can be achieved through bariatric surgery or by drastic dietary and lifestyle changes to achieve profound weight loss resulting in a significant body fat reduction (particularly hepatic fat), thereby improving insulin sensitivity. Low-calorie diets (LCDs) and low carbohydrate diets (LCBDs) are dietary interventions found to be associated with diabetes remission.

LCDs usually provide 1000-1500 kcal/day while very low-calorie diets (VLCDs) provide <800 kcal/day. A VLCD regime typically involves replacing all food with a liquid diet formulation providing nearly 400-800 kcal/day for a period of 12-16 weeks, followed by a structured food reintroduction phase for maintenance. These formulas comprise approximately 50-60% of energy coming from carbohydrates in order to prevent ketosis, essential fatty acids to meet the daily requirements, and high-biological-value proteins such as 1.2-1.5 g/kg body weight (BW) to preserve loss of lean body mass. They contain very little fiber, are sweetened with artificial sweeteners, and are fortified with vitamins and minerals to meet nutritional requirements. As per the available evidence, VLCD is seen to help achieve 15 kg or greater weight loss. However, maintenance of weight loss is seen to be the main driver and predictor of remission.

LCBDs are either classified as low-carbohydrate (<26%) carbohydrates or <130 g carbohydrates/day and very low-carbohydrate (<10%) carbohydrates or 20-50 g carbohydrates/day. If LCBD is sustained, remission of T2DM is seen to be maintained in the absence of weight loss. Relapse is likely to occur if carbohydrate restriction ceases. LCBD has shown a reduction in fat mass and diabetes remission for up to 6 months. Long-term studies are warranted as the efficacy of LCBD on weight loss and metabolic benefits beyond 6 months is found to be unsatisfactory.

Recent evidence from the Indian Council of Medical Research-India Diabetes (ICMR-INDIAB) study, recommends a reduction in carbohydrate intake and an increment in protein intake to achieve diabetes and pre-diabetes remission to reduce the diabetes burden in India. The macronutrient recommendations are described in the below table.

	Carbs (%)	Protein (%)	Fat (%)
Diabetes remission in newly diagnosed diabetes	49-54%	19-20%	21-26%
Pre-diabetes remission to normal glucose tolerance	50-56%	18-20%	21-27%

Identifying the candidates likely to achieve remission is important such as individuals with less than 6 years and ideally within 2 years of diagnosis of T2DM, preferably males, those with better glycemic control, who are on fewer antidiabetic drugs, those with good beta-cell function and insulin secretion, those with less visceral fat, and lastly with good mental health. Accordingly, the possibility of and the need for achieving remission should be discussed with individuals with diabetes. It must also be emphasized that diabetes remission can occur only in individuals with pre-diabetes and T2DM. It is important that one must follow any intervention under the strict supervision of a healthcare professional.

Resources:

1. Salis S, Anjana RM, Unnikrishnan R, Syed S, Mohan V. Remission of Type 2 Diabetes: How, When, and for Whom?. *J Assoc Physicians India.* 2022;70(8):11-12. doi:10.5005/japi-11001-0078.
2. Anjana RM, Srinivasan S, Sudha V, *et al.* Macronutrient Recommendations for Remission and Prevention of Diabetes in Asian Indians Based on a Data-Driven Optimization Model: The ICMR-INDIAB National Study. *Diabetes Care.* 2022;dc220627. doi:10.2337/dc22-0627

DIABETES REMISSION

Frequently Asked Questions

Dr. Shakera Mubeen

MBBS, F Diab., PG Dip Endocrinology & Diabetes (RCP UK), CCGDM, CCEBDM

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1. I am a 27-year-old male, I have no medical complications. However, my father and grandfather both have type 2 diabetes mellitus (T2DM). I wanted to know, am I at risk of developing diabetes?

Ans. T2DM is a complex disorder. According to studies, genetics does play a prominent role in the development of the same. In your case, as both your father and grandfather have diabetes, it increases your risk of T2DM. However, it is not only genetics but genetics along with environmental factors that can lead to diabetes. Even if you have a family history, you can take preventive measures like keeping your weight and waist circumference in the ideal range. Ensure your diet is healthy, wholesome, and well-balanced, and physical activity is a part of your daily routine. Refrain from smoking and alcohol consumption. Ensure adequate sleep and stress management techniques. Make sure you screen for impaired blood glucose levels annually since early diagnosis of impaired glucose tolerance can prevent it from progressing to diabetes.

2. I am a 29-year-old pregnant lady, I am nearing the end of my second trimester. I recently underwent a glucose tolerance test and was diagnosed with gestational diabetes mellitus (GDM). Someone told me that this is harmful to the child. I wanted to know if the fetus is at any risk of complication during the rest of my pregnancy as well as post-delivery.

Ans. GDM is a condition in which your blood glucose levels become high during pregnancy. With proper management of the same, you can minimize the risks to both you and your baby. You will be advised dietary modifications and lifestyle changes to keep your blood glucose levels in control. Medication/insulin may be started if the sugars remain high even after these dietary changes. Keeping blood glucose within target levels minimizes any risk to you and the fetus. However, GDM may affect your unborn child if sugars are uncontrolled. When you have GDM, your pancreas works extra hard to make excess insulin. While glucose and other nutrients do pass the placenta, insulin does not. So, the placenta absorbs excess blood glucose, which causes the baby's blood glucose levels to be elevated. In order to reduce the blood glucose, the baby's pancreas produces more insulin as a result of this, the baby may develop to be 'large', which can increase the risk of complications during delivery. Newborns may have very low blood glucose levels at delivery because of the additional insulin produced by the baby's pancreas, and they also have a higher chance of having respiratory issues. The baby's risk of developing T2DM in the future increases. However, with proper management, dietary changes, and the inclusion of physical activity these risks are reduced, and you and your baby can lead a healthy normal life.

3. My uncle is 65 years old and has had diabetes for the past 15 years. He is not very careful about his medications and diet. Recently his left leg had a small wound near the toes. He ignored it and now there is swelling and severe pain in that area. Please advise.

Ans. Considering the swelling, severe pain, and wound on your uncle's left leg, it's essential to seek immediate medical attention. This could be due to diabetes-related complications, such as an infection or even a diabetic foot ulcer. Foot problems arise due to nerve damage and damage to the blood vessels leading to poor circulation to the foot. As a result, wounds on the foot may take a longer time to heal. Neglecting any wound on the foot can result in infections, which in turn can lead to the loss of a limb if proper care is not taken, so you need to take your uncle to the doctor immediately to get his foot examined and to start the required treatment soon. Take an appointment with a diabetes educator to help him understand the importance of diet and medication in keeping blood glucose controlled to prevent long-term complications. Accompany him to the doctor and subsequent follow-ups to ensure proper and timely medical care.

Diabetes Educator Tip of the Month

Contributed by
Name: Ms. Zeal Doshi

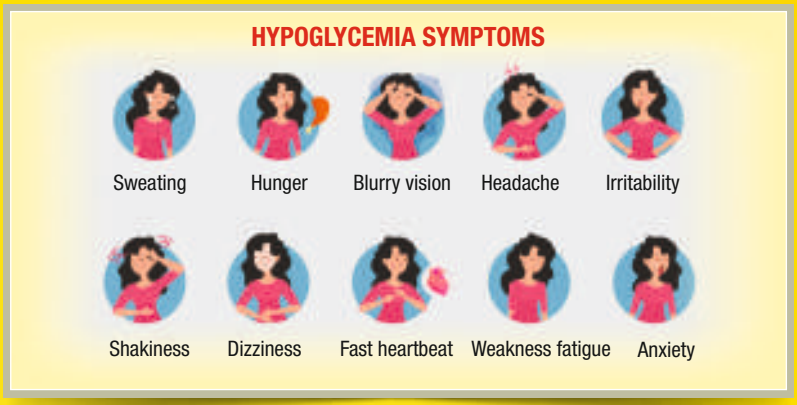
MSc. Clinical Nutrition and Dietetics,
Certified Diabetes Educator

Response to hypoglycemia

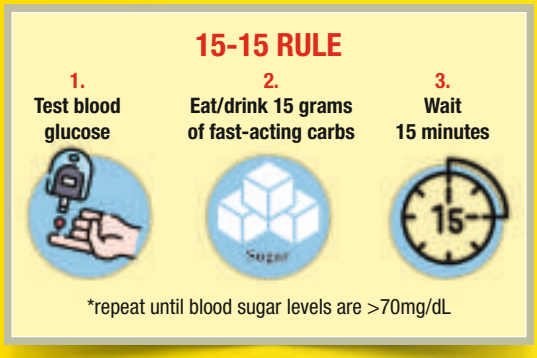
A low blood glucose level (<70 mg/dL) is known as hypoglycemia (where hypo means low, and glycemia means glucose in the blood). It needs immediate attention and needs to be corrected. Insulin and other oral antidiabetic drugs like sulphonylureas can cause hypoglycemia.

Causes for hypoglycemia

- Eating too little or skipping meals without reducing insulin or medication dose
- Taking more insulin/medication dose than required
- More physical activity than usual
- Drinking alcohol empty stomach



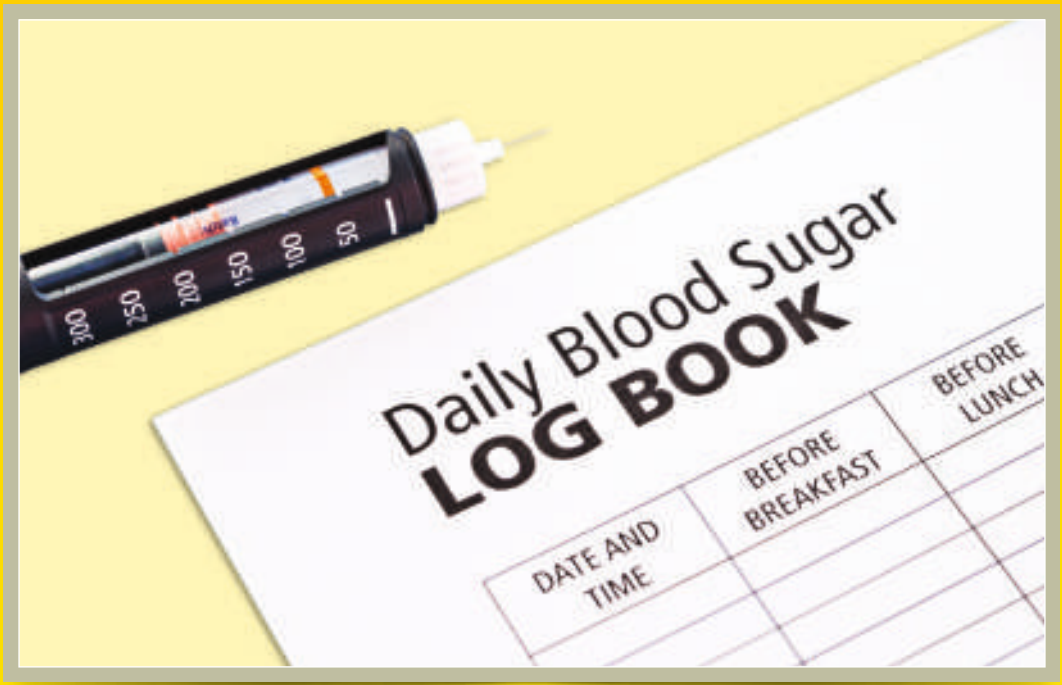
Treatment – The "15-15 rule"



When blood glucose drops below 70 mg/dL, consume 15 g of fast-acting carbohydrates like 3 teaspoons of sugar/glucose powder wait for 15 minutes, and then check blood glucose level again. If after 15 minutes, the blood glucose level is still <70 mg/dL, repeat the same treatment. Once the blood glucose level is above 70 mg/dL, consume a snack/meal which has carbohydrates and proteins, to avoid the reoccurrence of hypoglycemia.

The choice of carbohydrate source is crucial for treating hypoglycemia. Complex carbohydrates and foods containing both fat and carbohydrates, such as chocolate, sweets, biscuits, and ice cream, can impede the absorption of glucose and should not be used to treat low glucose levels.

A log should be maintained to document any hypoglycemic episode, and it should be discussed with the healthcare team to find out the cause and prevent the same in the future.



Resources:

1. Glycemic targets: Standards of medical care in diabetes-2022. *Diabetes Care*. 2021;45(Supplement_1).
2. Hypoglycemia (low blood glucose). Hypoglycemia (Low Blood Glucose). *ADA*.

Dia-Games

True or false

1. For people with diabetes and cardiovascular disease, the lipid profile should be done upon diagnosis and every alternate year.

2. Diagnostic criteria for diabetes with respect to HbA1c (glycated hemoglobin) is ≥6.5%.

3. Obesity increases the risk of developing type 2 diabetes, regardless of genetic predisposition to the disease.

4. Tendon reflex and ankle reflex are screening tests for diabetes nephropathy.

5. Mental disorders can be a result of uncontrolled blood glucose levels.

6. Non-alcoholic fatty liver disease (NAFLD) and its advanced form, non-alcoholic steatohepatitis (NASH), pose significant concerns for individuals with diabetes.

7. Type 2 diabetes accounts for more than 90% of all diabetes.

8. Chocolates can be given to raise blood glucose levels in case of hypoglycemia.

Answer: 1. False 2. True 3. True 4. False 5. True 6. True 7. True 8. False

Beat Diabetes
Win Life

For screening people with High & Moderate Risk of Diabetes

Indian Diabetes Risk Score

Share this simple test with your family & Friends

Users can share it with their family & friends

Video on Suggestive Lifestyle Interventions to minimise risks - for each category

12 Languages

An awareness initiative by USV

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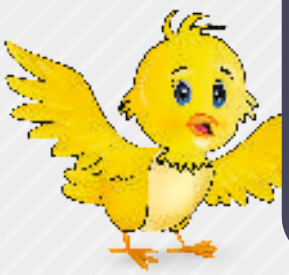

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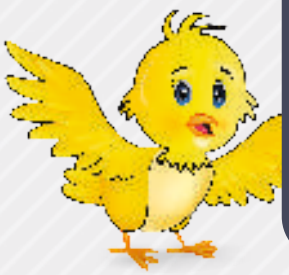

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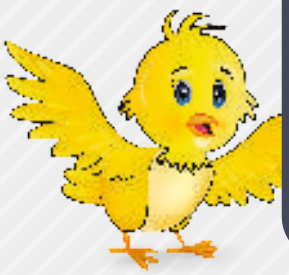

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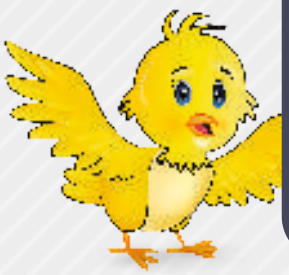

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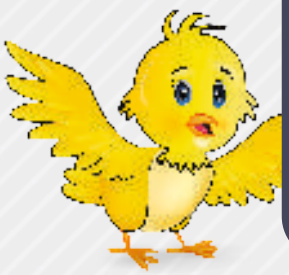

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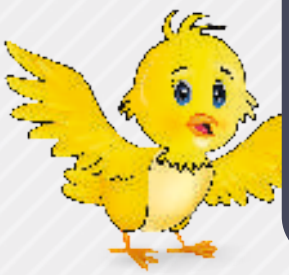

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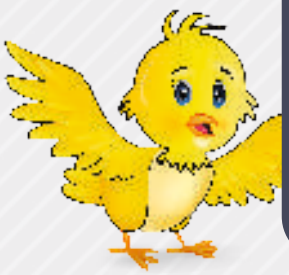

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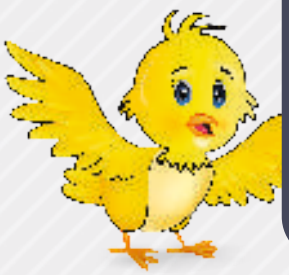

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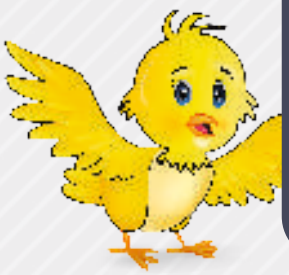

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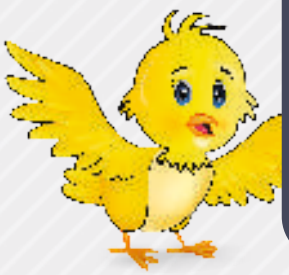

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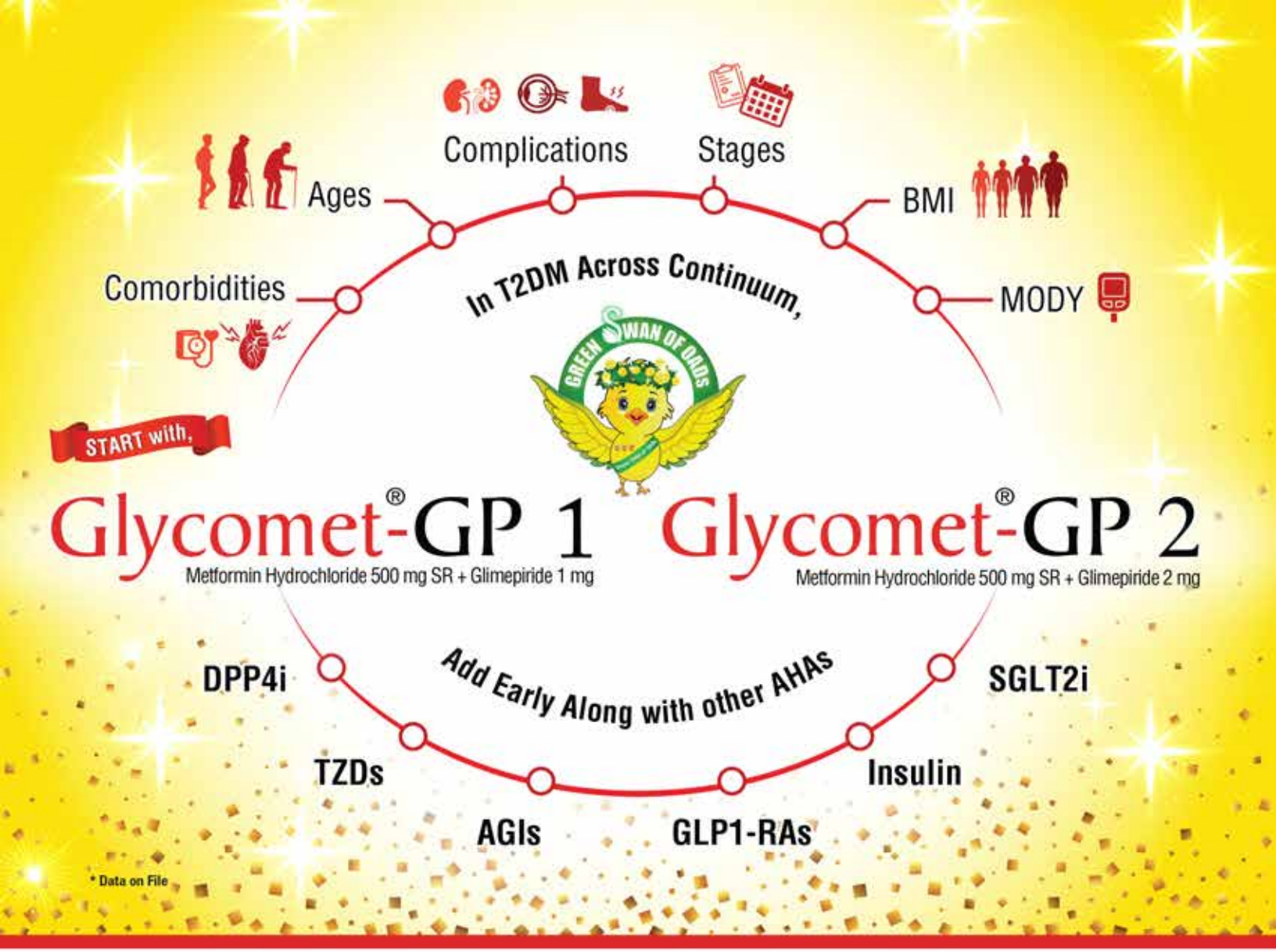

1. Asian Journal of Diabetology, Vol. 23, No. 2, April-June 2022: YALAMANCHI SADASIVA RAO etal, 2. Asian Journal of Diabetology, Vol. 23, No. 2, April-June 2022; SAUMITRA RAY etal, 3. Cureus 2020; 12(9): e10.7759/cureus.1070 4. CMARC Data 5. Healthplix Data 6. Lim L-L, Lau ESH, Cheung JTK, et al. Real-world usage of sulphonylureas in Asian patients with type 2 diabetes using the Joint Asia Diabetes Evaluation (JADE) register. Diabetes Obes Metab. 2022;1-14. Doi:10. 1111/dom.14865;

Prescribing Information

Information: Metformin hydrochloride (as prolonged release) and glimepiride tablets. Glycomet-GP 0.5/Glycomet-GP 0.5 Forte/ Glycomet-GP 1/ Glycomet-GP 1/850/ Glycomet-GP 2/ Glycomet-GP 2/850/ Glycomet-GP 3/ Glycomet-GP 3/850/ Glycomet-GP 4/ Glycomet-GP 4/850/ Glycomet-GP 1 Forte/ Glycomet-GP 2 Forte/ Glycomet-GP 3 Forte/ Glycomet-GP 4 Forte Abridged Prescribing Information **Composition:** Glycomet GP 0.5mg: Each uncoated tablet contains metformin hydrochloride IP (as prolonged release form) 500mg and glimepiride IP 0.5mg.• Glycomet GP 0.5 Forte: Each uncoated tablet contains metformin hydrochloride IP (as prolonged release form) 1000mg and glimepiride IP 0.5mg.• Glycomet GP 1: Each uncoated tablet contains metformin hydrochloride IP (as prolonged release form) 500 mg and glimepiride IP 1 mg. • Glycomet GP 1/850: Each uncoated tablet contains metformin hydrochloride IP (as prolonged release form) 850 mg and glimepiride IP 1 mg. • Glycomet GP 2: Each uncoated tablet contains metformin hydrochloride IP (as prolonged release form) 500 mg and glimepiride IP 2 mg. • Glycomet GP 2/850: Each uncoated tablet contains metformin hydrochloride IP (as prolonged release form) 850 mg and glimepiride IP 2 mg.• Glycomet GP 3: Each uncoated tablet contains metformin hydrochloride IP (as prolonged release form) 500 mg and glimepiride IP 3 mg. • Glycomet GP 3/850: Each uncoated tablet contains metformin hydrochloride IP (as prolonged release form) 850 mg and glimepiride IP 3 mg. • Glycomet GP 4: Each uncoated tablet contains metformin hydrochloride IP (as prolonged release form) 500 mg and glimepiride IP 4 mg. • Glycomet GP 4/850: Each uncoated tablet contains metformin hydrochloride IP (as prolonged release form) 850 mg and glimepiride IP 4 mg. • Glycomet GP 1 Forte: Each uncoated tablet contains metformin hydrochloride IP (as prolonged release form) 1000mg and glimepiride IP 1mg. • Glycomet GP 2 Forte: Each uncoated tablet contains metformin hydrochloride IP (as prolonged release form) 1000mg and glimepiride IP 2mg. • Glycomet GP 3 Forte: Each uncoated tablet contains metformin hydrochloride IP (as prolonged release form) 1000mg and glimepiride IP 3mg. • Glycomet GP 4 Forte: Each uncoated tablet contains metformin hydrochloride IP (as prolonged release form) 1000mg and glimepiride IP mg. **Indication:** For the management of patients with type 2 diabetes mellitus when diet, exercise and single agent (glimepiride or metformin alone) do not result in adequate glycaemic control. **Dosage and Administration:** The recommended dose is one tablet daily during breakfast or the first main meal. Each tablet contains a fixed dose of glimepiride and Metformin Hydrochloride. The highest recommended dose per day should be 8 mg of glimepiride and 2000mg of metformin. Due to prolonged release formulation, the tablet must be swallowed whole and not crushed or chewed. **Adverse Reactions:** For Glimepiride: hypoglycaemia may occur, which may sometimes be prolonged. Occasionally, gastrointestinal (GI) symptoms such as nausea, vomiting, sensations of pressure or fullness in the epigastrium, abdominal pain and diarrhea may occur. Hepatitis, elevation of liver enzymes, cholestasis and jaundice may occur; allergic reactions or pseudo allergic reactions may occur occasionally. For Metformin: GI symptoms such as nausea, vomiting, diarrhea, abdominal pain, and loss of appetite are common during initiation of therapy and may resolve spontaneously in most cases. Metallic taste, mild erythema, decrease in Vit B12 absorption, very rarely lactic acidosis, Hemolytic anemia, Reduction of thyrotropin level in patients with hypothyroidism, Hypomagnesemia in the context of diarrhea, Encephalopathy, Photosensitivity, hepatobiliary disorders. **Warnings and Precautions:**: For Glimepiride: Patient should be advised to report promptly exceptional stress situations (e.g., trauma, surgery, febrile infections), blood glucose regulation may deteriorate, and a temporary change to insulin may be necessary to maintain good metabolic control. Metformin Hydrochloride may lead to Lactic acidosis; in such cases metformin should be temporarily discontinued and contact with a healthcare professional is recommended. Sulfonylureas have an increased risk of hypoglycaemia. Long-term treatment with metformin may lead to peripheral neuropathy because of decrease in vitamin B12 serum levels. Monitoring of the vitamin B12 level is recommended. Overweight patients should continue their energy-restricted diet, usual laboratory tests for diabetes monitoring should be performed regularly. **Contraindications:** Hypersensitivity to the active substance of glimepiride & Metformin or to any of the excipients listed. Any type of acute metabolic acidosis (such as lactic acidosis, diabetic ketoacidosis, diabetic pre-coma). Severe renal failure (GFR≤30ml/min). In pregnant women. In lactating women.Acute conditions with the potential to alter renal function (dehydration, severe infection, shock, intravascular administration of iodinated contrast agents); acute or chronic disease which may cause tissue hypoxia (cardiac or respiratory failure, recent myocardial infarction, shock); hepatic insufficiency; acute alcohol intoxication; alcoholism. **Use in a special population:** Pregnant Women: Due to a lack of human data, drugs should not be used during pregnancy. Lactating Women: It should not be used during breastfeeding. Pediatric Patients: The safety and efficacy of drugs has not yet been established. Renal impairment: A GFR should be assessed before initiation of treatment with metformin containing products and at least annually thereafter. In patients at increased risk of further progression of renal impairment and in the elderly, renal function should be assessed more frequently, e.g. every 3-6 months.

Additional information is available on request.

Last updated: March 13, 2023

In case of any adverse events, kindly contact: pv@usv.in For the use of registered medical practitioner, hospital or laboratory.

USV Private Limited Corvette Team

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