RSSDI Indian Diabetes & Metabolic

EDUCATOR JOURNAL

Theme of the Month

Metabolic Health for Everyone

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

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

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FOREWORD

Each issue reflects RSSDI's evolving role in advancing diabetes care, education, and research in India. Built on a strong legacy, RSSDI upholds scientific excellence, academic integrity, and collaborative learning. Through national programs, active state chapters, and public awareness initiatives, it continues to expand its impact and promote holistic metabolic health. Its dedicated task forces drive focused progress in clinical practice, education, and public health. Ongoing and upcoming initiatives emphasize capacity building, digital learning, and research advancement. With strong leadership and a growing research repository, RSSDI remains committed to generating meaningful evidence, developing consensus-led practical guidance, and improving outcomes, while shaping a future rooted in innovation, inclusivity, and excellence. RSSDI is happy to collaborate with USV to support their endeavour to make India the 'Diabetes care capital of the world'.

The Indian Diabetes and Metabolic Educators Journal (IDMEJ), formerly known as the Indian Diabetes Educator Journal (IDEJ), is India's first journal of its kind and the longest-running monthly publication dedicated to diabetes education since April 2015. It remains committed to advancing awareness, disseminating evidence-based knowledge, and supporting healthcare teams in managing diabetes alongside the broader domain of metabolic health. Under the aegis of RSSDI, the Indian Diabetes and Metabolic Educators Journal will continue to strengthen Diabetes Self-Management Education and Support (DSME/S), while expanding its scope across the continuum of metabolic disorders, with a digital reach of over 53,000 doctors and 29,000 diabetes educators.

The April edition of the Indian Diabetes and Metabolic Educators Journal focuses on the theme "Metabolic Health for Everyone," aligning with the spirit of World Health Day on 7th April, which emphasizes the importance of health and well-being for all. Metabolic health extends beyond diabetes and includes balanced nutrition, physical activity, weight management, and healthy lifestyle behaviors that influence long-term metabolic health outcomes. This issue provides diabetes educators with practical, evidence-based insights to support early risk identification and lifestyle interventions. Emphasis is placed on preventive strategies, personalized care, and sustained behavior change to address the rising burden of obesity, insulin resistance, type 2 diabetes, and cardiovascular disease, reinforcing the vital role of diabetes educators in promoting healthier communities.

Our sincere appreciation to all contributors for enriching this issue. We dedicate this journal to the relentless efforts of healthcare professionals committed to advancing India as the "Diabetes care capital of the world."

Sincere Regards,

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MD, DM, FICP, FICN,
FRCP (Eng, Ed., Glasg.), FACE, FACP
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*DSME: Diabetes Self-Management Education, DSMS: Diabetes Self-Management Support

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Article: The Global Epidemic of Metabolic Diseases

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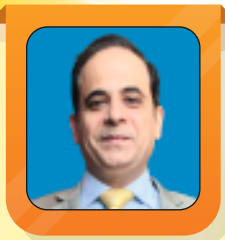
Consultant Cardiologist and Interventional Cardiologist, Health First Advanced Cardiac and Pediatric Clinic, Mumbai

Article: Understanding Cardiovascular-kidney-metabolic (CKM) Syndrome



Dr. Mohammed Taufiq Baksh

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Article: Diabetes as a Driver of Metabolic Dysfunction

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Article: Endocrine Disruptors and Their Role in the Development of Metabolic Syndrome

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Article: Interview of the Month with Dr. Shubhashree Patil

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Article: Drug Spotlight: Metformin

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Article: Skin as a Window to Metabolic Health

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Article: Diabetes Educator's Toolkit: Skill of the Month: Non-verbal Communication

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Article: Frequently Asked Questions on Metabolic Health for Everyone

To get featured in the Indian Diabetes and Metabolic Educator Journal you can connect with us on the below mail ID for further communication: info@nurturehealthsolutions.com

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Cover Story: The Global Epidemic of Metabolic Diseases

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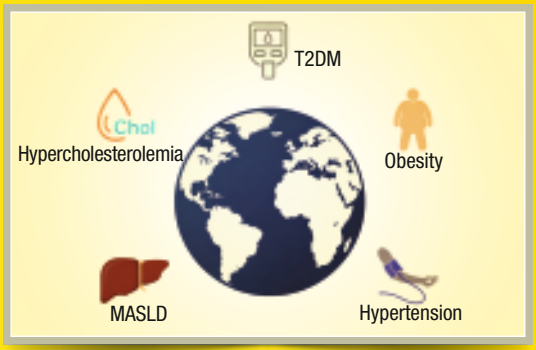
Metabolic disorders are complex abnormalities that involve impaired glucose and lipid metabolism, linked to complications such as kidney disease, cardiovascular disease, foot ulcers, retinopathy, and neuropathy. Individuals with metabolic syndrome are at a markedly increased risk of developing type 2 diabetes mellitus (T2DM) and cardiovascular diseases.

Global burden of metabolic disease

According to the Global Burden of Disease (GBD) study, metabolic diseases have risen sharply over the past three decades, with significant regional and demographic variations. In 2021, hypertension alone accounted for more disability-adjusted life years (DALYs) than any other metabolic condition, while T2DM and obesity have shown accelerating increases in prevalence.

Metabolic dysfunction-associated steatotic liver disease (MASLD) affects over 1.2 billion people worldwide. There has been a substantial increase in the total number of metabolic syndrome cases between 2000 and 2023.



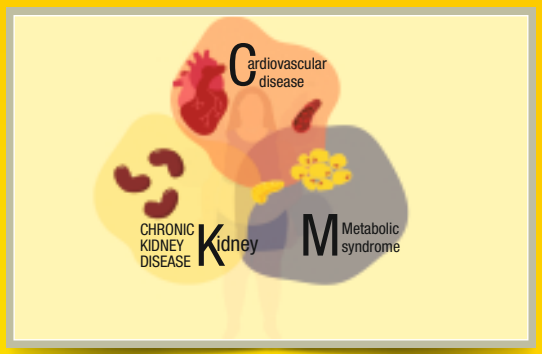
Metabolic health crisis in India

Similarly, India is facing a rapid increase in the burden of metabolic diseases. Data from the nationwide Indian Council of Medical Research-India Diabetes study (ICMR-INDIAB) 2023 study reported that 101 million individuals in India have diabetes, and 136 million have prediabetes, while 35.5% of the population has hypertension. The study also reported a high prevalence of obesity, with about 254 million adults having generalized obesity and around 351 million having abdominal obesity, highlighting the significant metabolic risk in the population.

Factors causing metabolic disease

Sedentary lifestyles, globalization of food systems, and rapid urbanization have significantly changed metabolic health in all societies. Obesity, type 2 diabetes, and cardiovascular diseases have become more common due to increased intake of ultra-processed foods, sugar-sweetened beverages, and energy-dense diets, as well as decreased levels of physical activity. Screen-based jobs, automated transportation, and fewer opportunities for physical activity encourage sedentary behaviors. The prevalence of metabolic diseases has increased dramatically as a result of these lifestyle changes.

At the physiological level, these disorders share common pathways: Chronic low-grade inflammation, oxidative stress, hormonal dysregulation, and impaired energy balance. Genetic predispositions interact with lifestyle factors, notably diet and physical inactivity, catalyzing the progression from early metabolic risk factors to full-blown disease. These disturbances increase the risk of cardiovascular disease, kidney dysfunction, and long-term disability, making metabolic disorders a leading cause of global morbidity and mortality.



The emerging concept of cardiovascular-kidney-metabolic (CKM) syndrome highlights how these conditions function as an interconnected system rather than isolated disorders, emphasizing the need for early, integrated prevention and management strategies.

Beyond lifestyle and genetic factors, environmental influences such as endocrine-disrupting chemicals further contribute to metabolic dysfunction by interfering with hormonal regulation and insulin signaling. Skin conditions such as acanthosis nigricans and psoriasis often reflect underlying insulin resistance and systemic inflammation. Together, these clinical, environmental, and dermatological links illustrate the multifactorial nature of metabolic disease.

Addressing this growing burden of metabolic diseases requires joint efforts from different sectors such as healthcare, government policy, education, food systems, and urban planning. Measures like reducing sugar intake, promoting healthier food choices, encouraging regular physical activity, and limiting exposure to harmful environmental chemicals can help lower metabolic risk.

Each year, World Health Day on 7th April, provides a vital platform to raise awareness of global health priorities and catalyze coordinated action. World Health Day serves as a critical reminder that metabolic health is influenced by social and environmental determinants and not only by individual behavior. Hence, improving metabolic health needs early prevention, better healthcare systems, and healthier living environments. Working together at a global level is important to reduce the growing burden of metabolic diseases and protect long-term health.

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Understanding Cardiovascular-kidney-metabolic (CKM) Syndrome

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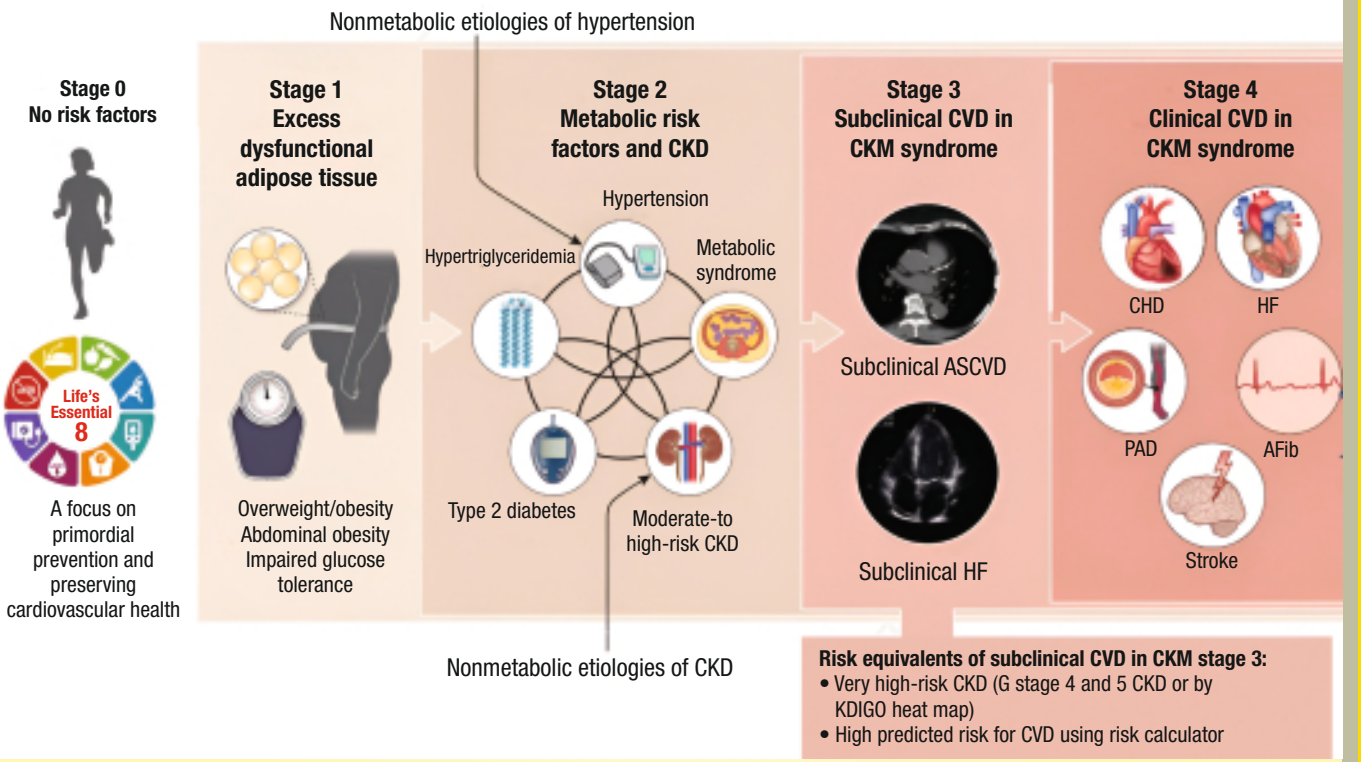
Cardiovascular-kidney-metabolic (CKM) syndrome is an integrative clinical concept that recognizes the overlapping pathophysiology of metabolic disorders such as obesity, type 2 diabetes, chronic kidney disease (CKD), and cardiovascular disease (CVD). The American Heart Association's (AHA) Presidential Advisory formally defined CKM syndrome to reflect this multidirectional interplay, with an emphasis on its profound impact on morbidity, mortality, and population health.

CKM syndrome comprises a spectrum of risk from early metabolic dysfunction to advanced stages marked by pre-existing cardiovascular or renal diseases. Metabolic risk factors and CKD together accelerate vascular damage, inflammation, and neurohormonal dysregulation, which contribute to the structural and functional decline across organ systems. Screening and preventive measures, informed by a staging framework, are recommended across the lifetime to recognize at-risk individuals with early interventions. Four stages of CKM syndrome are described below, with stage 0 referring to the absence of all risk factors and stage 4 referring to established CVD.



Abbreviations: CKD: Chronic kidney disease; CVD: Cardiovascular disease; CKM: Cardiovascular-kidney-metabolic; ASCVD: Atherosclerotic cardiovascular disease; HF: Heart failure; CHD: Coronary heart disease; PAD: Peripheral artery disease; AFib: Atrial fibrillation

The present literature underscores the need to integrate social determinants of health involving socioeconomic disadvantage, restricted access to care, and environmental barriers into both clinical assessment and treatment planning. These factors disproportionately drive CKM syndrome prevalence and outcomes. Moreover, the literature advocates for a multidisciplinary care network involving cardiologists, nephrologists, endocrinologists, and primary care providers to breakdown historically fragmented care systems in disease management and encourage holistic patient-centered care. A multifaceted change in healthcare practice and policy is important to address these problems. This involves extending interdisciplinary care models, strengthening clinical education, improving screening protocols, and prioritizing equal access to guideline-based therapies.

CKM syndrome signals a shift towards integrated system-based chronic disease management instead of organ-specific care. Improving long term cardiovascular and renal outcomes demand early detection, coordinated and equitable access to evidence-based therapies. Collectively, CKM syndrome reframes cardiometabolic risk as a unified, progressive disorder requiring coordinated prevention strategies, structured implementation pathways, and sustained system-level commitment to improve long-term health trajectories.

Resources:

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Diabetes as a Driver of Metabolic Dysfunction

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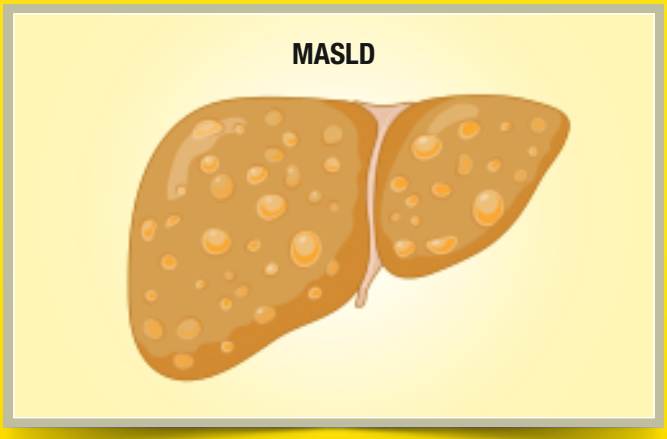
Type 2 diabetes is a metabolic disorder characterized by insulin resistance and pancreatic β-cell dysfunction leading to hyperglycemia. As the disease progresses, diabetes drives systemic metabolic dysfunction affecting the liver, skeletal muscle, adipose tissue, cardiovascular system, and even oncogenic pathways. Reduced insulin signaling increases hepatic gluconeogenesis and decreases peripheral glucose uptake. In skeletal muscle, impaired insulin action reduces glucose uptake, further aggravating insulin resistance. Obesity-associated adipose dysfunction exacerbates insulin resistance through enhanced lipolysis. This elevates circulating free fatty acids and promotes ectopic lipid deposition in the liver, muscle, and pancreas (lipotoxicity), triggering mitochondrial dysfunction, oxidative stress, and chronic inflammation. Thereby, collectively accelerating systemic metabolic injury.

Insulin resistance: The core mechanism

Insulin resistance is the core determinant of systemic metabolic injury and a key pathophysiological driver of type 2 diabetes. Under normal physiological conditions, insulin facilitates the uptake of glucose in skeletal muscle and adipose tissue and suppresses hepatic gluconeogenesis. It inhibits lipolysis and supports anabolism. But in insulin-resistant states, this regulation fails, leading to compensatory hyperinsulinemia and persistent hyperglycemia. Over time, this metabolic overload damages cellular signaling pathways and exacerbates systemic dysfunction. This results in the organ-specific effects, bringing about structural and functional impairments:

- **Metabolic-associated steatotic liver disease (MASLD):** The influx of free fatty acids and hepatic gluconeogenesis promotes triglyceride accumulation within hepatocytes, causing hepatic steatosis, the hallmark of MASLD. Research indicates that dysglycemia may exert a stronger association with hepatic steatosis than dyslipidemia.



- **Cardiovascular metabolic dysfunction:** Diabetes contributes to diabetic cardiomyopathy (DCM), defined as myocardial dysfunction in the absence of coronary artery disease or hypertension. DCM arises directly from diabetes-induced metabolic disturbances, particularly in type 2 diabetes mellitus, where insulin resistance, dyslipidemia, and obesity drive lipid accumulation and toxicity (lipotoxicity) in the heart. These metabolic shifts disrupt the myocardial energy metabolism, initiating a cascade of structural and functional changes that progress from subclinical diastolic dysfunction to overt systolic failure.

- **Diabetes and cancer risk:** Diabetes is not only a comorbidity of cancer but also a potent modulator of tumor biology through a complex web of metabolic, hormonal, and immune interactions. Insulin resistance, chronic hyperglycemia, and dyslipidemia can reshape cellular metabolism in ways that favor tumor initiation and progression.

Conclusion

The above aspects suggest that diabetes is not merely elevated blood glucose levels but a systemic metabolic disorder that drives organ dysfunction and cancer risk. This recognition helps shift the clinical focus towards comprehensive metabolic restoration instead of isolated glycemic management. Emphasis should thus be made in reframing both prevention and therapeutic strategies towards cardiometabolic care.

Resources:

1. Hameed I, Masoodi SR, Mir SA, Nabi M, Ghazanfar K, Ganai BA. Type 2 diabetes mellitus: From a metabolic disorder to an inflammatory condition. *World Journal of Diabetes.* 2015;6(4):598.
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Endocrine Disruptors and Their Role in the Development of Metabolic Syndrome

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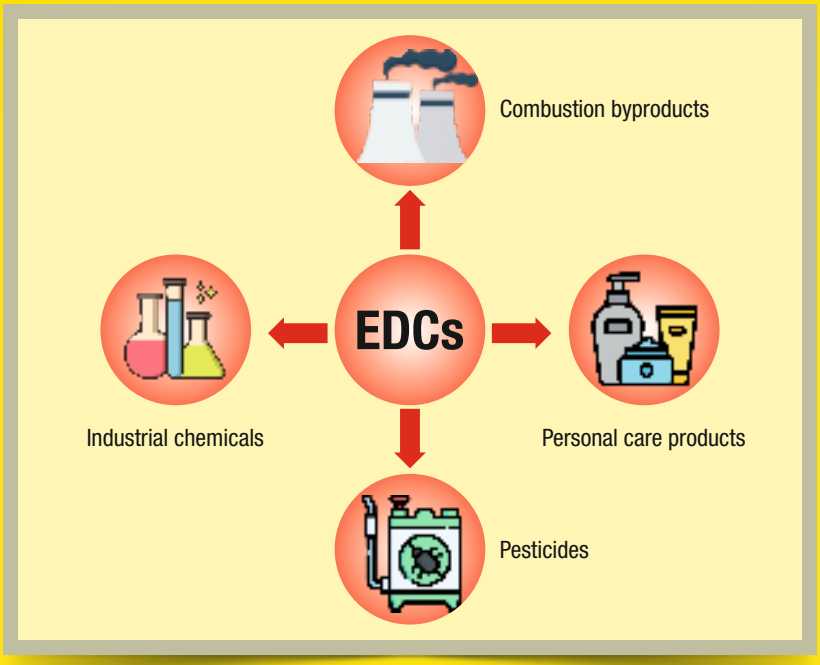
Introduction

Endocrine-disrupting chemicals (EDCs) are substances that interfere with the normal functioning of the hormonal system and affect metabolic regulation. EDCs are commonly present in plastics, pesticides, cosmetics, and food packaging. Metabolic syndrome (MetS) consists of obesity, insulin resistance, dyslipidemia, and hypertension, which increase the risk of type 2 diabetes and cardiovascular diseases. Environmental exposure to EDCs contributes significantly to the development of MetS.

Routes of exposure: Humans are exposed to EDCs through ingestion, inhalation, and dermal contact.



EDC and metabolic dysfunction

EDCs interfere with hormone synthesis, transport, binding, and elimination, thereby disturbing endocrine homeostasis. These chemicals affect insulin, thyroid hormones, estrogen, and appetite-regulating hormones. Altered hormonal signaling leads to impaired glucose control, abnormal lipid metabolism, and energy imbalance. Many EDCs act as “obesogens” that promote fat cell accumulation. They also disturb gut bacteria and increase intestinal permeability.

Daily exposure to EDC

Bisphenol A (BPA), dioxins, perchlorate, per- and polyfluoroalkyl substances (PFAS), and phthalates are common endocrine-disrupting chemicals widely found in daily-use products and industrial materials. These chemicals can migrate into food, water, and air, leading to continuous human exposure.

- BPA is used in plastics and food packaging, while dioxins are released during industrial processes and waste burning.
- Perchlorate is present in explosives and fireworks, and can contaminate groundwater.
- PFAS are used in nonstick cookware and protective coatings.
- Phthalates are added to plastic products such as toys and medical tubing, and as fragrance in sanitizers and cosmetics such as nail polish, hair spray, aftershave lotion, cleanser, and shampoo.
- Parabens are used as preservatives in cosmetics and personal care products that can mimic estrogen.

Conclusion

Endocrine disruptors play a significant role in the development of metabolic syndrome by altering hormonal balance, promoting obesity, and impairing glucose and lipid metabolism. Individual efforts such as choosing safer food containers, limiting processed and packaged foods, and using chemical-free personal care products can help reduce exposure. Strong public health policies, improved environmental monitoring, and greater awareness are essential for long-term prevention.

Resources:

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In T2DM with Comorbidities,

Tri Simplified CaRe

With

UDAPA-Trio

Dapagliflozin 10 mg + Sitagliptin 100 mg + Metformin 500 mg XR

UDAPA-Trio Forte

Dapagliflozin 10 mg + Sitagliptin 100 mg + Metformin 1000 mg XR

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Abridged Prescribing Information

Indication: It is indicated as an adjunct to diet and exercise to improve glycaemic control in adults with type 2 diabetes mellitus.
Dosage and Administration: The recommended dose is one tablet daily. Each tablet contains a fixed dose of dapagliflozin, Sitagliptin and Metformin Hydrochloride.
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: March 2026

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Corvette Team

Interview of the Month with Dr. Shubhashree Patil

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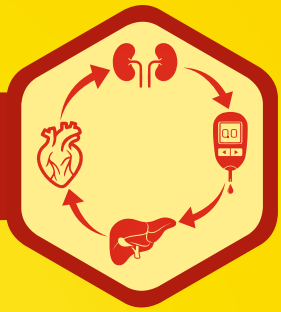
Consultant Diabetologist and Physician, Diabetes & Wellness Clinic, Mumbai

Dr. Shubhashree Patil is a dedicated Consultant Diabetologist and Physician consulting at Diabetes & Wellness Clinic in Mumbai, with a strong focus on comprehensive diabetes and lifestyle disease management. She has extensive clinical expertise in managing diabetes, hypertension, thyroid disorders, and other metabolic conditions. Dr. Patil is committed to providing patient-centered care that combines medical treatment with practical lifestyle guidance. She believes in empowering patients through education, preventive care, and sustainable health practices. Her approach emphasizes early detection, personalized treatment plans, and long-term wellness to help patients lead healthier and more balanced lives.

Metabolic Health for Everyone



1. How do you define metabolic health, and why is it important for everyone, not just people with diabetes?

Metabolic health refers to the optimal state where the body efficiently regulates energy balance, glucose, lipids, and blood pressure without insulin resistance or abdominal obesity. It matters for everyone because it underpins cardiovascular protection, immune function, cognitive health, and longevity, reducing risks of chronic diseases even in those without diabetes.

2. What early markers should clinicians and diabetes educators look for to identify poor metabolic health?

Clinicians and educators should monitor fasting glucose, insulin levels, homeostatic model assessment of insulin resistance (HOMA-IR) for insulin resistance, triglycerides, low high-density lipoprotein (HDL) cholesterol, uric acid, high-sensitive C-reactive protein (hs-CRP) for inflammation, and oxidative stress markers like malondialdehyde (MDA). These precede full metabolic syndrome, with lipid changes often appearing first in young adults, enabling early intervention.

3. What key lifestyle interventions have the greatest impact on improving metabolic health?

Supervised programs combining calorie-controlled diets rich in vegetables, moderate aerobic exercise like brisk walking (150 min/week), strength training, and behavioral coaching yield the biggest gains, resolving metabolic syndrome in up to 4 times more participants. Sustained habits targeting steps, stress reduction, and sleep improve waist size, glucose, lipids, and pressure over 24 months.

4. How can diabetes educators support individuals in sustaining long-term behavior change for better metabolic health?

Diabetes educators drive adherence via personalized assessment, goal-setting, action plans, and follow-up using models like transtheoretical stages, achieving HbA1c drops of 1%+, weight loss, and better self-care. Group sessions and culturally tailored coaching in programs like lifestyle balance foster habits for lasting metabolic gains.

5. What role do diabetes educators play in promoting metabolic health and preventing metabolic diseases at the community level?

Educators spearhead group-based diabetes prevention programs in communities, delivering workshops on diet, activity, and screening to cut metabolic risks and diabetes incidence. By partnering with local health centers for scalable, remote-friendly interventions, they promote population-wide shifts, lowering costs and disease burden.

(Disclaimer: These is an AI-generated images and used for illustrative purposes only.)

Drug Spotlight: Metformin

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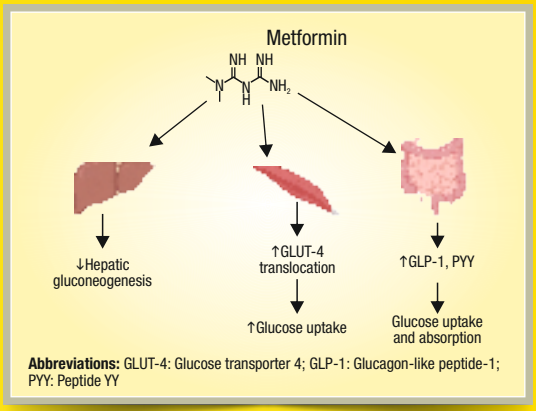
Metformin belongs to the class of drugs known as biguanides and is currently the only biguanide widely used in clinical practice for diabetes management. It is recommended as first-line therapy for individuals who are unable to achieve glycemic targets despite diet and lifestyle interventions.

Mechanism of action

Metformin helps manage blood glucose levels by:

- Suppressing hepatic gluconeogenesis
- Delaying the intestinal glucose absorption
- Enhancing insulin sensitivity

It is recognized as weight-neutral, with the potential to induce modest weight loss, and is unlikely to cause hypoglycemia and may have potential cardio-protective effects, further adding to its value in diabetes treatment.



Abbreviations: GLUT-4: Glucose transporter 4; GLP-1: Glucagon-like peptide-1; PYY: Peptide YY

Several formulations of metformin are available to enhance adherence and tolerability:

- Immediate release (IR) – multiple doses a day, facilitates adaptable dosage titration.
- Extended release (ER/XR) – once daily, linked to better gastrointestinal tolerance.

Clinical considerations

- Gastrointestinal side effects like nausea, diarrhea, or pain in the abdomen, especially at the beginning, may occur.
- Long-term usage can cause vitamin B12 deficiency, hence monitoring and supplementation as required is important.

Resources:

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2. Davies MJ, Aroda VR, Collins BS, *et al.* Management of Hyperglycemia in Type 2 Diabetes, 2022. A Consensus Report by the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). *Diabetes Care.* 2022;45(11):2753–2786. doi:10.2337/dci22-0034
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Trending Diets: Indian Adapted Mediterranean Diet (IAMD)

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The Mediterranean diet (MD) is one of the most evidence-based dietary patterns for preventing and managing cardiometabolic diseases, including type 2 diabetes and cardiovascular disease. It emphasizes high intake of fruits, vegetables, whole grains, legumes, nuts, olive oil, and fish, with limited consumption of red meat and processed foods. This dietary pattern has been consistently associated with improved glycemic control, reduced inflammation, and lower cardiovascular risk.

However, direct adoption of the Mediterranean diet in India can be challenging due to differences in food culture, availability, and affordability. To address this gap, a multidisciplinary team of cardiologists, biochemists, nutritionists, and food scientists aimed to co-create a culturally suited, customized Indian-adapted Mediterranean diet (IAMD) using the nutritional equivalents of conventional Mediterranean diet components.

What is IAMD: It emphasizes a predominantly plant-based eating pattern, including:

- Seasonal vegetables, fruits, legumes, whole grains and millets, nuts, and seeds.
- Healthy fats such as olive oil or other unsaturated vegetable oils (mustard oil, groundnut oil) are encouraged while limiting saturated fats like ghee and butter.
- Lentils, pulses (chickpeas, rajma, etc), and soyfoods serve as key plant protein sources, while fish such as sardines (*tarli*), mackerel (*bangda*), and Indian salmon (*raavas*), poultry, eggs, and lean meat can be included for non-vegetarians.
- Red and processed meats and ultra-processed foods should be minimized.

A unique advantage of this approach is the use of traditional Indian spices such as turmeric, ginger, garlic, cumin, and cinnamon, which possess antioxidant and anti-inflammatory properties. The Dietary Inflammatory Index (DII) score of IAMD was found to be much lower and significantly more anti-inflammatory than the diets currently consumed in India. Therefore, IAMD holds abundant scope for improving individual diets to be metabolically protective and reduce the probability of future cardiac events. A randomized controlled trial (RCT) is needed to generate evidence to inform dietary recommendations for the Indian-adapted Mediterranean diet.

Resources:

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Skin as a Window to Metabolic Health

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Metabolic syndrome (MetS), also referred to as Syndrome X or the "insulin resistance syndrome," is a cluster of interrelated clinical conditions that include central (abdominal) obesity, hypertension, insulin resistance (IR), and dyslipidemia. It is now recognized as a global epidemic that increases healthcare costs while significantly compromising overall health and quality of life. MetS is also associated with conditions like metabolic dysfunction-associated steatotic liver disease (MASLD), polycystic ovarian syndrome (PCOS), obstructive sleep apnea (OSA), gout, certain cancers, etc.

The skin–metabolism connection

Research suggests that MetS has important dermatological associations in addition to being a metabolic disorder. The relationship between the skin and MetS is bidirectional, as systemic metabolic disturbances can manifest as cutaneous disease. Conversely, some skin diseases may contribute to IR and MetS, both of which are chronic inflammatory conditions. Inflammatory skin disorders like atopic dermatitis and psoriasis release mediators into the bloodstream, causing inflammation and related health complications. The following are some of the dermatological conditions that have been strongly linked to MetS:

Psoriasis

Psoriasis is a complex, multisystem inflammatory disease that demonstrates a strong association with MetS. Studies indicate that MetS prevalence is high among individuals with psoriasis, with risk increasing as the number of metabolic abnormalities rises. The incidence was found to be higher among women aged 40 years and above. Psoriasis and MetS share a common immunopathogenesis driven by chronic systemic inflammation. Among the components of MetS, obesity and diabetes are most commonly observed in individuals with psoriasis, highlighting the need for regular metabolic health monitoring.

Acanthosis nigricans

Acanthosis nigricans is a common and easily identifiable marker of underlying MetS. It is characterized by hyperpigmented, leathery patches most commonly over the nape of the neck, axillae, and groin. During insulin-resistant states, compensatory hyperinsulinemia stimulates epidermal keratinocyte and dermal fibroblast proliferation through insulin-like growth factor (IGF-1) pathways, leading to the characteristic skin changes. Obesity is implicated as a common linking factor between acanthosis nigricans and MetS. Acanthosis nigricans often appears early in metabolic dysfunction and reflects the effects of elevated insulin levels, even when blood glucose is normal or mildly elevated. Therefore, it can serve as an early clue to impaired glycemic control.

Acne

Acne severity has been shown to correlate with the incidence of MetS positively. Acne is associated with IR, hypertension, and dyslipidemia. Studies have reported that individuals with acne have higher rates of IR and MetS. Additionally, increased waist circumference has been observed in individuals with acne, further strengthening the link between metabolic dysfunction and acne.

Androgenetic alopecia (AGA)

AGA is a common patterned hair loss in men and women influenced by genetic and androgenic factors, typically presenting as gradual thinning with age. Hyperinsulinemia may accelerate hair loss by impairing follicular circulation and increasing dihydrotestosterone (DHT) activity, leading to accelerated follicular miniaturization. Research shows that individuals with this type of hair loss are more likely to have elevated triglycerides and hypertension. Hormonal dysregulation may explain this coexistence, and early-onset or rapidly progressive androgenetic alopecia may indicate increased cardiometabolic risk. Therefore, early-onset or rapidly progressive androgenetic alopecia may serve as a subtle clinical indicator of cardiometabolic risk.

Clinical implications and early intervention

Evidence strongly supports an association between MetS and various dermatological conditions, suggesting that some skin diseases may reflect underlying systemic metabolic dysfunction. Although the exact mechanisms are still under investigation, IR, altered insulin signaling, hyperandrogenism, and chronic low-grade inflammation appear central to this link.

Recognizing these dermatological clues provides clinicians with an opportunity for early identification, risk stratification, and timely intervention in individuals with MetS. In this context, the skin truly serves as a visible window to metabolic health, offering insights that extend far beyond cosmetic concerns.

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Diabetes Educator's Toolkit:
Skill of the Month: Non-verbal Communication

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Effective diabetes education requires a combination of critical skills, including motivational interviewing, cultural competence,problem-solving, non-verbal communication, etc. These skills help educators build trust, improve patient adherence, and provide personalized guidance for self-management. This article discusses non-verbal communication as a skill for diabetes educators (DE) to help them enhance patient interactions. It includes:

- **Body language of the DE:** Crossed legs, folded arms, or lack of a smile may make the DE appear unapproachable or disinterested, making the patient feel unwelcome.
- **Facial expressions:** Empathetic expressions are important, especially when patients share their concerns or anxieties. The DE's expressions should convey understanding and support.
- **Attending:** Maintaining eye contact, offering a warm smile, sitting upright with an open posture, and leaning slightly forward can create a welcoming environment and help patients feel comfortable during counseling.
- **Observing the person with diabetes:** The DE should pay attention to the patient's posture, gestures, facial expressions, and tone, as these non-verbal cues may indicate distress or discomfort.
- **Active listening:** Nodding, leaning slightly forward, and using encouraging cues such as "Go on" help build an interactive and supportive conversation.
- **Privacy and minimal interruptions:** Ensuring a quiet setting, minimizing interruptions, and keeping devices silent helps patients feel respected and more willing to share their concerns.

Resource:

American Diabetes Association. Mental health and diabetes: A workbook for healthcare professionals, Chapter 1. American Diabetes Association; 2020. https://professional.diabetes.org/sites/default/files/media/ada_mental_health_workbook_chapter_1.pdf.

Frequently Asked Questions on Metabolic Health for Everyone

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1. A 38-year-old man with a normal body-mass index (BMI) of 22.6 kg/m² presents for a routine check-up but is found to have elevated triglycerides (220 mg/dL), low high-density lipoprotein (HDL) (36 mg/dL), blood pressure (BP) of 138/88 mmHg, impaired fasting glucose (108 mg/dL), and hyperinsulinemia, along with mild fatty liver on ultrasound. He was found to have a waist circumference of 96 cm. He is concerned about how he could have metabolic abnormalities despite having a "normal BMI" and wants to understand his risk of developing diabetes and heart disease.

Answer: It is possible to have metabolic abnormalities even when BMI is normal, a condition known as metabolically obese normal weight (MONW). This is particularly relevant in Asian Indians, who exhibit the Asian Indian phenotype, characterized by higher visceral fat and greater insulin resistance at lower BMI levels. Therefore, waist circumference and metabolic parameters are better indicators of metabolic health than BMI alone. To improve your metabolic health and future risk of disease, the following steps are recommended:

- Regular physical activity to improve insulin sensitivity and to reduce abdominal fat (waist circumference <90 cm).
- Adopt a balanced, nutrient-dense diet that limits refined carbohydrates, excess sugars, and unhealthy fats, including fried food and packaged food.
- Monitoring metabolic markers regularly, including blood glucose, lipid profile, blood pressure, and liver parameters.
- Managing stress, improving sleep quality, and avoiding smoking or alcohol, as these also influence metabolic health.

2. A 12-year-old obese boy presents with weight gain and acanthosis nigricans. He leads a sedentary lifestyle with a high intake of sugary beverages and has a family history of diabetes and hypertension. Laboratory tests reveal impaired fasting glucose, hyperinsulinemia, and elevated triglycerides. His mother is concerned about how he can reduce his risk of developing diabetes and improve his overall health.

Answer: The findings in your child suggest early features of metabolic syndrome and insulin resistance, which are increasingly being seen in children and adolescents. Acanthosis nigricans (dark, thickened skin around the neck or underarms) is often a visible sign that the body is producing higher levels of insulin to control blood glucose levels. Lifestyle changes can significantly improve metabolic health and even reverse many of these early changes. The focus should be on building healthy habits as a family. To help reduce his risk of developing other metabolic diseases:

- Encourage daily physical activity such as outdoor play, sports, cycling, or brisk walking for at least 60 minutes a day.
- Include balanced, nutritious meal especially rich in antioxidants, protein, and fiber, like oats, barley, whole wheat flour, eggs, lean chicken, fish, legumes, and green leafy vegetables, as it helps manage elevated glucose and triglyceride levels.
- Limit sugary drinks and replace them with low-calorie beverages like plain water, lemon water, buttermilk, veg soup, etc.
- Reduce screen time and sedentary habits, which are strongly linked with childhood obesity, and ensure adequate sleep, as poor sleep can worsen insulin resistance.
- Regular medical follow-up is important to monitor weight, blood glucose, and overall metabolic health.

3. A 28-year-old sedentary woman (height: 158 cm; weight: 78 kg; BMI: 31.2 kg/m²) presents with irregular menses and a waist circumference of 92 cm. She has been facing difficulty conceiving for the past 1 year. Investigations show an HbA1c of 6.0%, elevated fasting insulin levels, and triglycerides of 220 mg/dL.

Answer: The symptoms and test results suggest features of metabolic syndrome and insulin resistance, which can affect both metabolic and reproductive health. Insulin resistance can contribute to irregular menstrual cycles, difficulty with ovulation, and challenges with conception. Improving metabolic health will also improve fertility outcomes.

- Weight reduction, by 5–10%, can help restore hormonal balance, which in turn can help manage prediabetes and improve ovulation.
- Having a well-balanced diet including complex carbohydrates like whole grain cereals, legumes, eggs, antioxidant-rich colorful fruits and vegetables, and healthy fats from nuts and seeds can help manage prediabetes and support weight loss.
- Regular physical activity, including aerobic and strength training, can improve insulin sensitivity, reduce weight, and waist circumference.
- Ensure adequate sleep and manage stress, as poor sleep and chronic stress can worsen insulin resistance and hormonal imbalance. Practices such as relaxation techniques, meditation, and regular physical activity can be helpful. Regular monitoring of blood pressure, blood glucose, and lipid levels is important to ensure readiness for healthy fertility.
- Regular consultation with a healthcare provider will be helpful for targeted treatment and fertility guidance.

The Metabolic Syndrome Index (MSI)

Introduction: Metabolic syndrome (MetS), a multiple risk factor for atherosclerotic cardiovascular disease, is defined as a clinical condition in which biochemical and metabolic factors coexist. Traditionally, MetS is diagnosed using fixed criteria that classify the condition in a binary manner (present or absent based on cut-offs). But the use of the MSI in MetS evaluation provides a more integrated and sensitive appraisal of metabolic risk by generating a continuous composite score. This helps clinicians to evaluate the severity and progression of risk rather than simply identifying whether a person meets minimum criteria.

Components and structure of MSI: A literature review conducted helped identify the MetS risks, and an item pool was created. The MSI consists of 21 items designed to provide a multidimensional assessment of metabolic risk. The MSI includes age, body mass index (BMI), waist circumference, clinical history, and lifestyle factors such as smoking, alcohol, duration and quality of sleep, stress levels, and water consumption. Each component is weighted to understand its contribution to metabolic risk. A study reported excellent diagnostic accuracy of MSI with 100% sensitivity, supporting its reliability as a screening and risk stratification tool. The cutoff value of MSI $<48 \rightarrow$ indicates a lower likelihood of metabolic syndrome, and MSI $\geq 48 \rightarrow$ indicates risk/prediction of metabolic syndrome.

Clinical applications: MSI facilitates early detection of individuals at elevated metabolic risk. It can assess MetS risk more easily without the need for more than height, weight, and waist circumference. It can be used in clinical and epidemiologic studies and to evaluate the effectiveness of educational programs.

Conclusion: Utilization of MSI incorporates and integrates diverse risk measures into one single composite index that can comprehensively quantify metabolic risk and intervention outcomes. Thereby supporting preventive strategies and providing a more nuanced understanding of metabolic health.

Resource:

Akeren Z, Apaydın E. Metabolic syndrome index measurement tool (MSI): Scale development, reliability and validity study. *BMC Public Health.* 2025; 25(1):51.

Role Play

Case: A 34-year-old man presents with excessive daytime sleepiness, morning headaches, loud snoring, and persistent fatigue despite sleeping 7–8 hours nightly. A polysomnography confirms obstructive sleep apnea. He has gained weight over the past two years, has a sedentary lifestyle, and his body mass index (BMI) is 29 kg/m² with a waist circumference of 102 cm. His blood pressure is 148/92 mmHg, and fasting glucose is 110 mg/dL. He is concerned about his constant tiredness and difficulty concentrating at work. He has visited a diabetes educator (DE) to understand obstructive sleep apnea, manage his elevated blood glucose levels and blood pressure, and seek counseling on lifestyle modifications, including weight management.

Mr. XYZ: Hello! My sleep study results have confirmed obstructive sleep apnea. I've been experiencing daytime sleepiness, fatigue, and finding it difficult to concentrate. Could this be impacting my overall health beyond just sleep?

DE: Yes, certainly! Obstructive sleep apnea (OSA) not only affects sleep quality but also overall health and productivity. In OSA, the airway repeatedly collapses during sleep, causing brief pauses in breathing. This leads to low oxygen levels and poor sleep quality, and can increase the risk of high blood pressure, diabetes, and heart problems.

Mr. XYZ: Alright. So my excess weight, OSA, and the high fasting glucose levels and blood pressure are all interconnected?

DE: Yes, they are closely interconnected. Weight gain, particularly around the abdomen, combined with OSA, increases the inflammatory markers and causes a hormonal imbalance that worsens the regulation of blood glucose levels and blood pressure control. Therefore, weight reduction, especially abdominal fat, can help alleviate the severity of OSA in obesity.

Mr. XYZ: What lifestyle changes can I incorporate to manage OSA along with the accompanying conditions?

DE: Weight reduction can significantly lower the risk of progression to diabetes and also improve blood pressure levels. Consume a balanced diet rich in whole grains like oats, barley, whole wheat flour, millets like pearl millet, barnyard millet, foxtail millet, along with an adequate intake of protein to help with satiety and portion control. Fill half of your plate with non-starchy vegetables, one-quarter with whole grain cereals, and one-quarter with a protein source. Restrict the intake of refined, processed, and foods high in fat and sugar in the daily diet. Limit the sodium intake to manage blood pressure.

Mr. XYZ: Understood. How important is incorporating an exercise routine?

DE: Well, physical activity is equally important for weight reduction, diabetes control, and managing blood pressure. All of which will collectively contribute to reducing OSA. However, prior to beginning an exercise routine, seek medical advice. Start gradually (10–15 minutes) and build up to 30 minutes. Brisk walking 30 minutes, 5 days a week, is generally recommended if there are no cardiac complications.

Mr. XYZ: Thank you for providing such in-depth knowledge.

DE: You're welcome. Address these concerns systematically, and you will be able to improve your quality of life and overall health.

NOTES

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Additional information is available on request.
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