

RSSDI Indian Diabetes & Metabolic

EDUCATOR JOURNAL



Theme of the Month

Metabolic Health: Foundation of Well Being

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

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FOREWORD



Every month, RSSDI continues to build momentum through initiatives that promote research, education, and professional development. Supported by its active state chapters, RSSDI is creating opportunities for scientific learning and improved diabetes care across the country. A major highlight is the launch of Save the Feet, Keep Walking 2.0, a nationwide diabetic foot ulcer registry aimed at improving foot care and preventing amputations across India. Alongside this, MAHARSSDI 2026 and the RSSDI Research Retreat highlighted the Society's continued focus on advancing diabetes research and education, while the Walk the Talk series continues to foster knowledge sharing and mentorship among healthcare professionals. RSSDI is pleased to collaborate with USV in the collective vision of establishing India as a global benchmark in diabetes and metabolic care.

The Indian Diabetes and Metabolic Educators Journal (IDMEJ), previously known as the Indian Diabetes Educator Journal (IDEJ), is India's first and longest-running monthly publication dedicated to diabetes education since its establishment in April 2015. The Indian Diabetes and Metabolic Educators Journal has developed over time into a useful scholarly forum for raising awareness, disseminating evidence-based knowledge, and assisting medical professionals in the all-encompassing treatment of diabetes and metabolic health. IDMEJ, which is published under the auspices of RSSDI, keeps advancing Diabetes Self-Management Education and Support (DSME/S) while expanding its scope to encompass a broader range of metabolic illnesses. Over 53,000 physicians and 29,000 diabetes educators in India are actively involved with the journal, which has a robust and expanding online presence.

The August edition of the IDMEJ focuses on the theme "Metabolic Health: Foundation of Well-being". Metabolic health forms the cornerstone of overall well-being and plays a vital role in preventing and managing conditions such as obesity, type 2 diabetes, cardiovascular disease, and metabolic dysfunction-associated steatotic liver disease (MASLD). This issue provides diabetes educators with practical, evidence-based insights into the key pillars of metabolic health, including healthy nutrition, physical activity, weight management, sleep, stress management, and behaviour change strategies. By promoting a holistic, multidisciplinary, and person-centred approach, this edition aims to empower diabetes educators to support sustainable lifestyle changes that improve metabolic health, enhance quality of life, and reduce the risk of long-term complications.

We sincerely acknowledge the invaluable contributions of all the authors and experts who have enriched this issue. This edition is dedicated to the tireless commitment of healthcare professionals whose steadfast pursuit of excellence is helping shape India into a global beacon of leadership in diabetes care.

Sincere Regards,

Dr. (Prof.) Samar Banerjee

MD, FICP, FRSSDI, FISH, FDI

Professor of Medicine and Specialist Diabetes Clinic at Vivekananda Institute of Medical Sciences, Kolkata.

Past National President of RSSDI,

President of Association of Clinical Diabetology,

President of Indian Society of Hypertension

Past President of Diabetes In Pregnancy Study India (DIPSI),

Ex Vice President of API,

Editor in Chief of Journal of Clinical Diabetology,

Ex President of API WB Branch,

Ex Vice President of RSSDI WB Branch

CHIEF EDITOR'S NOTE



As Chief Editor, I am delighted to present this issue of the Indian Diabetes & Metabolic Educators Journal, dedicated to the theme “Metabolic Health: Foundation of well-being.” The increasing recognition of Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD) as an important part of metabolic disease highlights the need to consider liver health as a key component of diabetes and overall cardiometabolic care.

This edition explores key aspects of metabolic health, including the role of the gut microbiome in PCOS, the impact of fructose and uric acid, muscle as a metabolic organ, and the concept of metabolically healthy obesity. It also features practical insights on Paleo diets, gliptins, flaxseeds and case-based discussions to help translate evidence into everyday clinical practice.

Improving metabolic health requires a holistic and patient-centered approach that goes beyond treating a single disease. Healthy eating, regular physical activity, quality sleep, stress management, and timely medical care all play an important role in achieving better health outcomes. This issue provides healthcare professionals, diabetes educators, and dietitians with practical knowledge that can support better patient care and encourage long-term healthy lifestyle changes.

My sincere thanks to all contributors and the RSSDI community for their continued dedication to advancing metabolic health awareness, education, and clinical excellence in India.

Sincere Regards,

Dr. Pratap Jethwani

MD (Medicine), FRCP (Glasgow)
National Treasurer, RSSDI,
Post Graduate Diploma in Diabetes (Cardiff, UK),
Fellow-DiabetesIndia, Fellow-RSSDI
Consultant Diabetes Specialist Physician, Jethwani Hospital, Rajkot

Expert Contributors of the month



Dr. Vinod K. Abichandani

MD, MSc Endocrinology, USW, UK

Consulting Diabetes and Endocrine Physician, Ahmedabad

Article: Metabolic Health: Beyond Glycemia and Weight



Dr. Sudhir Patnaik

MD (Medicine)

Consultant Physician & Diabetologist, Utkal Hospital,
Bhubaneswar

Article: The Gut Microbiome - PCOS - Metabolism Axis



Dr. Gauri Tamhankar

MBBS, MD (Medicine), Fellow in Diabetes

Consultant Diabetologist, Madhumitra Advanced Clinic for
Diabetes, Karad

Article: Fructose, Uric Acid, and Metabolic Health: A Triple Threat



Dr. S. Sridhar

MD (General Medicine),

DM (Endocrinology), FRCP (Glasgow)

Consultant Endocrinologist and Diabetologist, MIOT
International Hospital, Chennai

Article: Muscle Health as the New Metabolic Organ



Dr. J. S. Kumar

MD, GDipDC (Australia), FRCP (Edinburgh)

Associate Dean (PG Academics), Professor and Head of Department
(General Medicine), Diabetology-in-Charge and Consultant
Diabetologist at SRM Medical College (SRMIST), Chennai

Article: Interview of the Month with Dr. J. S. Kumar



Dr. Piyush Lodha

MD (Medicine), DM (Endocrinology)

Consultant Endocrinologist and Diabetologist, Dr Piyush Lodha
Diabetes, Thyroid and Hormone Clinic, Pune

Article: Drug Spotlight: Gliptins

Expert Contributors

of the month



Dr. Arohi Abhinav Jayaswal

MBBS, MD, FDI, FAIG, PG Dip Cardiology (RCP UK), PG Dip Clinical Endocrinology and Diabetes (RCP UK), Certificate in Diabetes Management (ADA)

Consultant Physician, Dr. Arohi Abhinav Clinic, Bhagalpur

Article: Trending Diets: Paleo diet



Dr. Rizwan H. Ali Ahmad

MBBS, M.D. (Medicine)

Consultant Physician, Cardiologist & Diabetologist, Safdarjung Medical College, Delhi

Article: Metabolically Healthy Obesity: Fact, Fiction, or a Distinct Clinical Phenotype?



Dr. Sarthak Gandhi

MBBS, FCCM, D. Diabetes, D. Endocrine (UK)

Consultant Diabetologist and Endocrinologist, Gandhi Diabetic Care clinic, Surat

Article: Diabetes Educator Toolkit: Skill of the Month: Reflect, Reassurance and Empathy



Dr. Brij Teli

MD (Medicine), DM (Endocrinology)

Consultant Diabetologist and Endocrinologist, Granthi- Diabetes Endocrine and Obesity Center, A unit of 'Aumkar Clinic', Rajkot

Article: Frequently Asked Questions on Metabolic Health

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: Metabolic Health: Beyond Glycemia and Weight



Dr. Vinod K. Abichandani

MD, MSc Endocrinology, USW, UK
Consulting Diabetes and Endocrine Physician,
Ahmedabad

Central illustration

Metabolic health is a multidimensional construct, not merely the absence of hyperglycemia or obesity.

Legend: Integrating glycemia, visceral adiposity, blood pressure, lipid profile, liver and muscle health, inflammation, and lifestyle fitness provides a holistic

assessment of cardiometabolic risk. This paradigm supports earlier intervention, precision medicine, and preservation of long-term cardiovascular, renal, hepatic, and metabolic health.

METABOLIC HEALTH BEYOND GLYCEMIA AND WEIGHT

A Holistic Approach to Lifelong
Cardiometabolic Wellness



METABOLIC HEALTH IS MULTIDIMENSIONAL
It is more than blood sugar and body weight.



DETECT EARLY, PROTECT EARLY
Early detection of metabolic dysfunction prevents cardiometabolic-kidney-liver disease.



BODY COMPOSITION MATTERS
Muscle health and reduction of visceral fat are central to metabolic wellness.



LIFESTYLE IS FOUNDATION THERAPY
Nutrition, physical activity, sleep and stress management drive metabolic resilience.



A HOLISTIC, ORGAN-PROTECTIVE APPROACH
An integrated CKM (cardiometabolic-kidney) framework delivers lifelong benefits beyond glucose lowering.

“Metabolic health is the presence of resilience—where every organ, pathway and habit works in harmony to promote vitality and protection.”

THE METABOLIC HEALTH WHEEL



PROTECTS MULTIPLE ORGANS, REDUCES LIFELONG RISK



HEART



KIDNEY



BRAIN



BLOOD VESSELS

**EIGHT INTERCONNECTED PILLARS.
ONE GOAL: LIFELONG HEALTH.**

BEYOND HbA1c AND BMI WHAT EVERY CLINICIAN SHOULD MEASURE

PILLAR	KEY MARKERS / TOOLS	WHY IT MATTERS
GLYCEMIC REGULATION	Fasting glucose, HbA1c, CGM metrics, OGTT	Detects dysglycemia early; prevents microvascular & macrovascular disease.
BLOOD PRESSURE	Office BP; Home BP; 24-hour Ambulatory BP	Strongest modifiable risk factor for CVD, CKD and stroke.
LIPID PROTEIN HEALTH	Lipid profile, ApoB, Non-HDL-C, Lp(a)	Atherogenic lipoproteins drive ASCVD risk beyond LDL-C alone.
ADIPOSITY / VISCERAL FAT	Waist circumference, Waist-to-height ratio, Imaging (USG / MRI)	Visceral fat is metabolically active and predicts diabetes & CVD.
MUSCLE HEALTH	Lean mass (BIA / DEXA), Handgrip strength, Physical performance	Muscle is the largest glucose-disposal organ; protects against frailty & diabetes.
LIVER HEALTH	ALT, AST, GGT, FIB-4, CAP (FibroScan), Ultrasound	MAFLD increases risk of CVD, T2D, HCC and liver-related outcomes.
INFLAMMATION	hs-CRP, Ferritin, IL-6 (as indicated)	Chronic low-grade inflammation drives insulin resistance & atherosclerosis.
LIFESTYLE FITNESS	Physical activity, VO ₂ max estimate, Sleep quality, Diet pattern, Stress score	Lifestyle behaviours determine metabolic resilience across the lifespan.



**MEASURE WHAT MATTERS.
MANAGE WHAT COUNTS.**

Emerging paradigms in diabetes and cardiometabolic disease management

Diabetes management has traditionally focused on two key metrics: Glycated hemoglobin (HbA1c) and body mass index (BMI). Although both remain fundamental therapeutic targets, they capture only part of an individual's cardiometabolic risk. People with a normal BMI may harbor significant metabolic dysfunction, whereas some individuals with obesity remain metabolically healthy. Likewise, patients achieving HbA1c targets may continue to accumulate cardiovascular, renal, or hepatic risks due to unrecognized metabolic abnormalities.

The focus has therefore shifted from isolated risk-factor control to the preservation of comprehensive metabolic health—a dynamic state encompassing coordinated regulation of glucose homeostasis, adipose tissue function, skeletal muscle, lipid metabolism, vascular integrity, and inflammation. This broader perspective enables earlier identification of metabolic dysfunction and more effective prevention of diabetes, cardiovascular disease, chronic kidney disease, and metabolic dysfunction-associated steatotic liver disease (MASLD).

Metabolic health extends beyond blood glucose regulation

Metabolic health is the body's ability to efficiently produce, store, and utilize energy while maintaining normal physiological function. It reflects the integrated performance of multiple organ systems, including the pancreas, liver, skeletal muscle, adipose tissue, gastrointestinal tract, kidneys, heart, and brain.

Rather than being defined solely by normal glucose concentrations or body weight, metabolic health is characterized by preserved insulin sensitivity, healthy body composition, and the absence or effective control of visceral adiposity, dyslipidemia, hypertension, chronic inflammation, and ectopic fat accumulation.

Importantly, insulin resistance often develops years before hyperglycemia becomes apparent, allowing cardiovascular injury to progress during an otherwise clinically silent phase.

Expanding metabolic assessment beyond HbA1c and BMI

Comprehensive metabolic assessment should extend beyond conventional glycemic indices.

Waist circumference is a simple surrogate for visceral adiposity and is particularly informative in South Asians, who develop central obesity and cardiometabolic risk at lower BMI values.

Blood pressure remains a powerful predictor of cardiovascular and renal disease, with even modest elevations substantially increasing long-term risk.

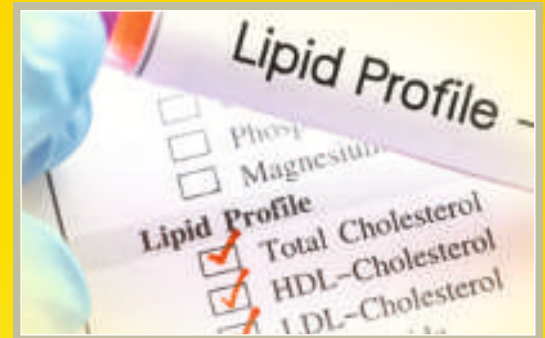


Lipid profiling— The assessment of triglycerides, high-density lipoprotein (HDL) cholesterol, apolipoprotein B, and lipoprotein A provides valuable insight into insulin resistance and atherosclerotic risk prior to the onset of overt diabetes.

Although direct measurement of insulin resistance is largely confined to research, surrogate measures such as fasting insulin, homeostatic model assessment for insulin resistance (HOMA-IR), triglyceride-to-HDL ratio, and clinical markers including acanthosis nigricans can identify high-risk individuals.

Assessment of liver health is equally important. MASLD affects nearly one-third of adults worldwide and commonly coexists with obesity and type 2 diabetes. Liver enzymes, fibrosis scores, and imaging facilitate earlier detection of irreversible liver injury.

Finally, **inflammatory biomarkers** such as high-sensitivity C-reactive protein reflect the chronic low-grade inflammation underlying insulin resistance and atherosclerosis. Together, these measures provide a far more comprehensive evaluation of metabolic health than HbA1c or BMI alone.



The importance of body composition over body weight

Body weight alone provides limited information about metabolic health.

Individuals with identical BMI may differ markedly in skeletal muscle mass and visceral fat, resulting in substantially different cardiometabolic risk profiles.

Visceral adipose tissue is now recognized as an active endocrine organ that secretes inflammatory cytokines, adipokines, and free fatty acids, promoting insulin resistance, endothelial dysfunction, dyslipidemia, hypertension, and hepatic steatosis. Conversely, skeletal muscle is the principal site of insulin-mediated glucose disposal. Loss of muscle mass and quality (sarcopenia) impairs glucose utilization, reduces metabolic flexibility, and accelerates diabetes and frailty.

Whenever feasible, body composition assessment using bioimpedance analysis or dual-energy X-ray absorptiometry offers greater clinical value than body weight alone.

Optimizing metabolic health through lifestyle interventions



Note: The given image is AI generated and is used for illustrative purpose only

Lifestyle intervention remains the cornerstone of metabolic medicine.

A dietary pattern rich in vegetables, fruits, legumes, whole grains, nuts, healthy fats, and high-quality protein improves insulin sensitivity while reducing visceral fat. Limiting refined carbohydrates, ultra-processed foods, and sugar-sweetened beverages further enhances metabolic resilience.

Regular physical activity should combine aerobic and resistance exercise. Aerobic training improves cardiovascular fitness and insulin sensitivity, whereas resistance training preserves skeletal muscle, enhances glucose disposal, and supports healthy aging.

Adequate sleep, stress reduction, smoking cessation, and moderation of alcohol intake further promote metabolic homeostasis. Even modest weight loss reduces liver fat, improves insulin sensitivity, and lowers cardiovascular risk.

Lifestyle therapy should therefore target body composition, physical fitness, and metabolic function—not weight reduction alone.

A comprehensive approach to cardiometabolic disease prevention

Modern diabetes care increasingly embraces a whole-person approach by addressing multiple cardiometabolic risk factors simultaneously.

Routine evaluation should include waist circumference, blood pressure, lipid profile, liver and kidney function, physical activity, sleep quality, nutritional status, psychological well-being, and HbA1c.

The waist-to-height ratio (WtHR) has emerged as a practical indicator of visceral adiposity. Unlike BMI, it accounts for stature and more accurately identifies metabolically unhealthy individuals with normal body weight. A WtHR ≥ 0.5 represents a simple, inexpensive, and universally applicable marker of increased cardiometabolic risk.

This comprehensive assessment enables earlier risk stratification and individualized intervention. It also aligns with the evolving concept of cardiometabolic-kidney health, which recognizes the interdependence of the heart, kidneys, liver, adipose tissue, and endocrine system. Optimizing metabolic health, therefore, confers benefits that extend beyond glycemic control, including fewer cardiovascular events, slower progression of chronic kidney disease, reduced MASLD, and lower premature mortality.

Summary and implications

Metabolic health extends far beyond HbA1c and BMI. It reflects the integrated regulation of insulin sensitivity, body composition, visceral adiposity, blood pressure, lipid metabolism, liver function, inflammation, and physical fitness.

Healthcare professionals should move beyond a glucose-centric model toward a comprehensive metabolic assessment that facilitates earlier detection of dysfunction, personalized intervention, preservation of muscle mass, reduction of visceral fat, and protection of multiple organ systems.

The ultimate goal is not simply to normalize blood glucose or body weight, but to restore metabolic resilience and promote lifelong cardiometabolic health.

Resources:

1. Khan AR, Salama AH, Aleem Z, *et al.* The Promising Frontier of Cardiometabolic Syndrome: A New Paradigm in Cardiology. *Cureus*. 2023;15(9):e45542. Published 2023 Sep 19. doi:10.7759/cureus.45542.
2. Zinn, Caryn. Metabolic health: A new frontier. *Journal of Metabolic Health*. 2023. 6. 10.4102/jmh.v6i1.92
3. Khan SS, Bhawe N, Blumenthal RS, *et al.* Use of Predicted Risk and Expected Benefit to Guide Decision-Making in Cardiovascular-Kidney-Metabolic Syndrome for the Primary Prevention of Cardiovascular Disease: A Scientific Statement From the American Heart Association and American College of Cardiology. *Circulation*. Published online June 9, 2026. doi:10.1161/CIR.0000000000001447
4. Caturano A, Morciano C, Zielińska K, *et al.* Rethinking the Diabetes-Cardiovascular Disease Continuum: Toward Integrated Care. *J Clin Med*. 2025;14(18):6678. Published 2025 Sep 22. doi:10.3390/jcm14186678.

The Gut Microbiome - PCOS - Metabolism Axis



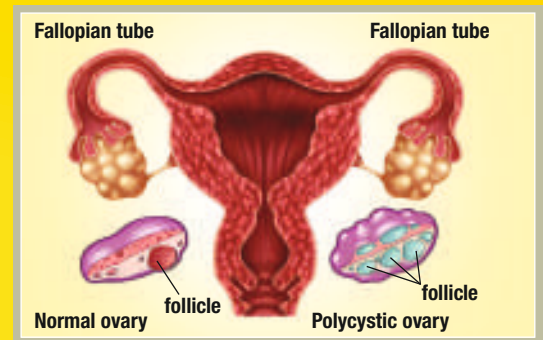
Dr. Sudhir Patnaik

MD (Medicine)

Consultant Physician & Diabetologist, Utkal Hospital, Bhubaneswar

Polycystic ovary syndrome (PCOS) is one of the most prevalent endocrine disorders affecting women of the reproductive age. It is increasingly recognized as a metabolic condition rather than solely a reproductive disorder, extending far beyond hyperandrogenism, ovulatory dysfunction, and polycystic ovarian morphology.

A significant number of women with PCOS experience insulin resistance, obesity, dyslipidemia, chronic low-grade inflammation, and an elevated risk of type 2 diabetes and cardiovascular disease. In the recent years, growing evidence has highlighted the gut microbiome as an important contributor to these metabolic disturbances, giving rise to the concept of the gut microbiome - PCOS - metabolism axis.



The gut microbiome and metabolic homeostasis

The gut microbiome comprises trillions of microorganisms that regulate several physiological processes, including nutrient metabolism, immune function, intestinal barrier integrity, and hormone homeostasis. A healthy and diverse microbial flora produces metabolites such as short-chain fatty acids (SCFAs), which help maintain gut barrier function, regulate glucose and lipid metabolism, and improve insulin sensitivity.

Alterations in the gut microbial diversity and composition which is commonly referred to as gut dysbiosis has been observed in women with PCOS and is believed to actively contribute to the metabolic abnormalities associated with the condition.

Linking gut dysbiosis with PCOS and metabolic dysfunction

Emerging research suggests that gut dysbiosis influences PCOS through multiple interconnected pathways.

- **Increased gut permeability:** Reduced production of SCFAs and impaired bile acid metabolism compromise the intestinal lining leading to increased permeability.
- **Chronic inflammation:** Translocation of the bacterial toxins in the blood stream can trigger chronic low-grade inflammation.

This inflammation worsens insulin resistance resulting in hyperinsulinemia, which in turn, stimulates the ovarian androgen production while suppressing the sex hormone binding globulin synthesis, thereby exacerbating hyperandrogenism and ovulatory dysfunction. Simultaneously, excess androgens may further alter gut microbial composition, creating a bidirectional relationship in which metabolic dysfunction and hormonal imbalance perpetuate one another. This complex interplay highlights the gut microbiome as a key mediator linking metabolic and reproductive abnormalities in PCOS.

Targeting the gut microbiome: Lifestyle and therapeutic strategies

Lifestyle factors play a significant role in shaping the gut microbiome and, consequently, metabolic health. Dietary patterns rich in fiber, whole grains, legumes, fresh fruits and vegetables, can help promote microbial diversity and increase SCFA production. In addition, microbiome-directed interventions such as including probiotics, prebiotics, and synbiotics also play a key role in gut health. Ultimately, building a resilient gut microbiome requires a holistic approach to lifestyle modification that extends well beyond dietary choices alone. Engaging in regular physical activity, prioritizing restorative sleep, and implementing practical stress-reduction techniques all serve as foundational pillars that foster microbial diversity.



There must also be an emphasis on the value of simple, daily habits, such as maintaining optimal hydration status and practicing mindful eating. Empowering individuals to consistently integrate these sustainable behavioral changes into their daily routines, can help them establish the physiological stability necessary for long-term good health.

Understanding the gut microbiome–PCOS–metabolism axis provides a valuable insight into the close relationship between metabolic and reproductive health. Incorporating strategies that support gut health alongside established lifestyle interventions may strengthen metabolic outcomes and contribute to a more holistic, person-centered approach to the long-term management of women living with PCOS.

Resources:

1. Zhao M, Chen D, Hu X, *et al.* Gut-ovary axis in polycystic ovary syndrome: mechanistic insights and gut microbiota-targeted therapeutic strategies. *Front Endocrinol (Lausanne)*. 2025;16:1684492. Published 2025 Nov 5. doi:10.3389/fendo.2025.1684492
2. Sun Y, Gao S, Ye C, *et al.* Gut microbiota dysbiosis in polycystic ovary syndrome: Mechanisms of progression and clinical applications. *Front Cell Infect Microbiol*. 2023;13:1142041. Published 2023 Feb 24. doi:10.3389/fcimb.2023.1142041
3. Liu S, Cheng L, Li S. Characteristics of Gut Microbiota in Patients with Polycystic Ovary Syndrome and Its Association with Metabolic Abnormalities: A Review. *Int J Womens Health*. 2025;17:2165-2174. Published 2025 Jul 18. doi:10.2147/IJWH.S522708
4. Gautam R, Maan P, Jyoti A, *et al.* The Role of Lifestyle Interventions in PCOS Management: A Systematic Review. *Nutrients*. 2025;17(2):310. Published 2025 Jan 16. doi:10.3390/nu17020310

Fructose, Uric Acid, and Metabolic Health: A Triple Threat



Dr. Gauri Tamhankar

MBBS, MD (Medicine), Fellow in Diabetes

Consultant Diabetologist, Madhumitra
Advanced Clinic for Diabetes, Karad

The increasing consumption of added sugars, particularly fructose, has become a major public health concern due to its association with obesity, diabetes, and fatty liver disease. Unlike glucose, fructose is metabolized exclusively in the liver, where it rapidly depletes adenosine triphosphate (ATP) and triggers the production of uric acid, initiating a series of metabolic changes that

contribute to metabolic dysfunction. Hyperuricemia (HU) has also emerged as a significant global public health concern, with its prevalence steadily increasing worldwide over the past 40 years, particularly in Asian countries, including India (~25.8%). It is characterized by elevated serum uric acid levels resulting from increased production and/or reduced renal excretion. Increased uric acid production is associated with a purine-rich diet, high fructose intake, inherited disorders of purine metabolism, and conditions causing increased cell turnover. Reduced renal excretion, the most common cause of HU occurs in chronic kidney disease, dehydration, certain endocrine disorders, and with the use of medications such as diuretics, low-dose aspirin, etc.

HU is a major risk factor for gout, a very painful type of arthritis that occurs when too much uric acid builds up in the body. The excess uric acid forms tiny crystals in the joints, leading to sudden attacks of severe pain, swelling, and redness. It most commonly affects the big toe. Beyond gout, elevated uric acid also plays a key role in metabolic health. HU is associated with obesity, diabetes, hypertension, and liver-related disorders. In particular, obesity and HU are linked. Visceral adipose tissue provides free fatty acids to the liver, inducing uric acid production. Another proposed mechanism is dysregulation of adipocytes causing decreased uric acid and sodium excretion by the renal tubules.

Diabetes: During fructose metabolism, rapid ATP depletion leads to increased uric acid production. Elevated uric acid promotes oxidative stress, inflammation, and insulin resistance, impairing glucose uptake and increasing the risk of type 2 diabetes.

Hypertension: HU is an independent risk factor for hypertension, even after accounting for obesity and diabetes. Studies have shown that serum uric acid levels, even within the upper normal range, are associated with an increased risk of hypertension. Elevated uric acid promotes hypertension through several mechanisms, including activation of the renin-angiotensin system, increased oxidative stress and endothelial inflammation, enhanced endothelin-1 activity, and reduced nitric oxide availability, resulting in endothelial dysfunction and increased vascular resistance.

Metabolic dysfunction-associated steatotic liver disease (MASLD): Excess fructose intake may contribute to MASLD by increasing uric acid production, which promotes oxidative stress and liver fat (triglyceride) synthesis. Fructose also increases gut permeability and inflammation, accelerating fat accumulation and liver damage. As the prevalence of metabolic disorders continues to rise, identifying modifiable dietary factors has become increasingly important. Understanding the relationship between fructose intake, uric acid, and metabolic health reinforces the value of balanced nutrition and healthy lifestyle choices in reducing the risk of chronic metabolic diseases and improving long-term health.

Resources:

1. Patel H, Shah D. Hyperuricemia prevalence in Indian subjects with underlying comorbidities of hypertension and/or type 2 diabetes: a retrospective study from subjects attending hyperuricemia screening camps. *Int J Res Med Sci.* 2020;8(3):794
2. Leslie SW, Minter DA. Hyperuricemia. In: StatPearls. StatPearls Publishing; 2026. Updated October 14, 2023. Accessed July 3, 2026. <https://www.ncbi.nlm.nih.gov/books/NBK459218/>

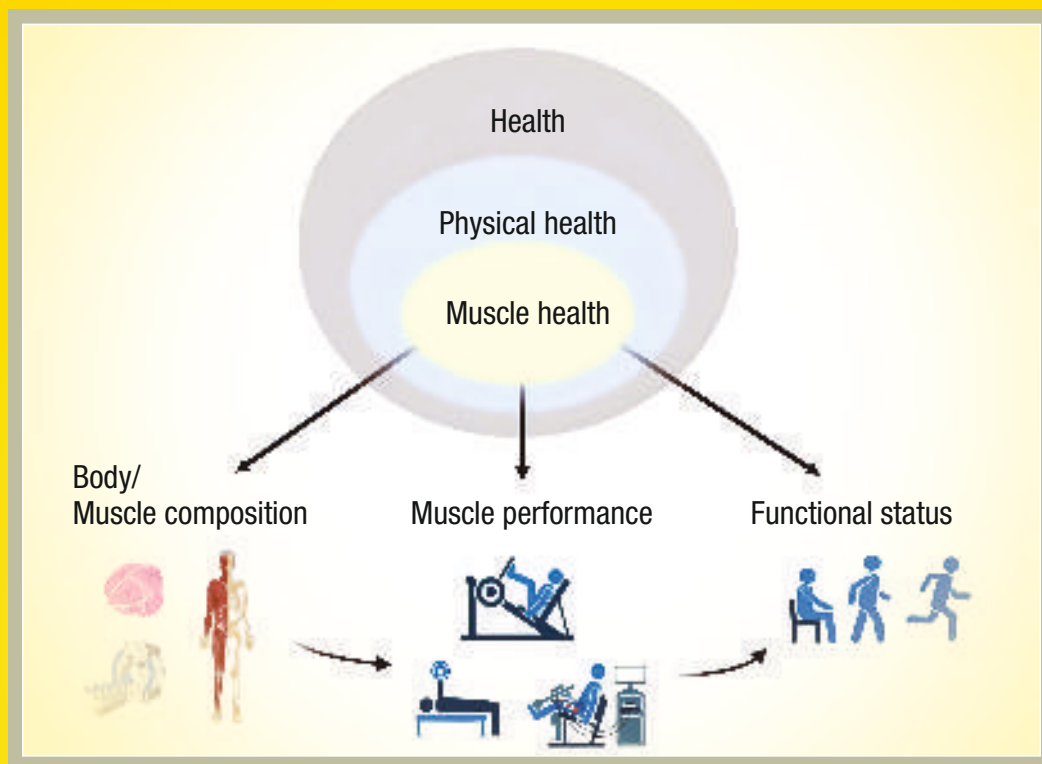
Muscle Health as the New Metabolic Organ



Dr. S. Sridhar

**MD (General Medicine),
DM (Endocrinology), FRCP (Glasgow)**
Consultant Endocrinologist and Diabetologist,
MIOT International Hospital, Chennai

Skeletal muscle is a dynamic metabolic organ rather than just a structure that facilitates movement. By controlling insulin mediated glucose absorption, energy expenditure and inter organ communication it plays a vital part in conserving metabolic homeostasis. A healthy skeletal muscle secretes myokines a physiologically active chemical which has a major impact on metabolic health beyond movement.



Muscle-metabolism relationship

Skeletal muscle is the main location for insulin stimulated glucose elimination. Sarcopenia or the loss of muscle mass and strength lowers glucose absorption, increases insulin resistance and exacerbates metabolic dysfunction. Reduced muscle mass also makes it harder to regulate metabolism by increasing the build-up of lipids in muscle and liver tissues. During exercise when muscles contract myokines like irisin and interleukin-6 which promote healthy glucose metabolism, increase lipid oxidation and improve insulin sensitivity are released. On the other hand, a vicious loop of metabolic impairment is created by physical inactivity which lowers myokine synthesis, increases muscle loss and encourages chronic low-grade inflammation.

Clinical significance for people with diabetes

For people with diabetes maintaining skeletal muscle mass must be a crucial part of metabolic therapy. Strategies that support muscular health are:

- Resistance exercises
- Consuming enough protein in the diet.
- Vitamin D sufficiency
- Physically active lifestyle

Conclusion

Skeletal muscle being an endocrine and metabolic organ actively controls systemic inflammation, lipid metabolism and blood glucose levels. In addition to traditional diabetes therapy, maintaining muscle function has a significant chance to enhance metabolic results.

Key takeaways

- Skeletal muscle tissue is a strong metabolic organ that promotes insulin sensitivity and blood glucose control.
- Maintaining muscle mass with diet and exercise is a crucial approach for enhancing metabolic health.
- Muscle health should be one of the main principles of all-inclusive diabetes care.

Resources

Kim G, Kim JH. Impact of Skeletal Muscle Mass on Metabolic Health. *Endocrinol Metab (Seoul)*. 2020;35(1):1-6. doi:10.3803/EnM.2020.35.1.1

In T2DM with Comorbidities,

Tri Simplified **CaRe**

With

UDAPA-Trío

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

UDAPA-Trío Forte

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



1: Akodewas Mar-Jan 2026

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; Urinary 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 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 diseases 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.
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*In case of any adverse events, kindly contact: pr@usv.in

For the use of registered medical practitioner, hospital or laboratory.*



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Corvette Team

Interview of the Month with Dr. J. S. Kumar



Dr. J. S. Kumar

MD, GDipDC (Australia), FRCP (Edinburgh)

Associate Dean (PG Academics), Professor and
Head of Department (General Medicine),
Diabetology-in-charge and Consultant
Diabetologist at SRM Medical College (SRMIST),
Chennai

Dr. J. S. Kumar is the Associate Dean (PG Academics), Professor and Head of the Department of General Medicine, Diabetology-in-charge, and Consultant Diabetologist at SRM Medical College Hospital and Research Centre, SRM Institute of Science and Technology (SRMIST), Chennai. A Fellow of the Royal College of Physicians (Edinburgh), he also holds a Graduate Diploma in Diabetes Care from the University of Newcastle, Australia. With over two decades of experience in internal medicine and diabetology, Dr. Kumar has made significant contributions to patient care, clinical research, and postgraduate medical education. He has authored numerous peer-reviewed publications, mentored postgraduate students and PhD scholars, and continues to advance evidence-based diabetes care through clinical practice, research, teaching, and innovative approaches to the prevention and management of diabetes and its complications.

Metabolic Health: Foundation of Well Being



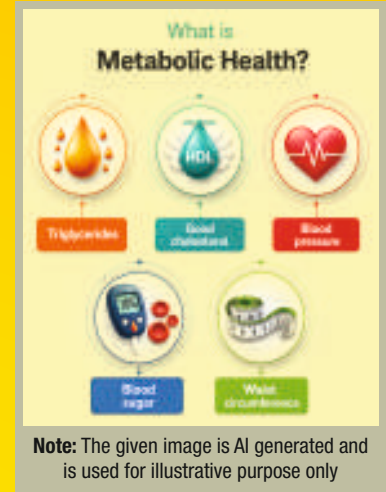
1. What does metabolic health mean, and why is it considered the foundation of overall well-being?

As we know, metabolic health is about how well your body handles energy, how it takes the food you eat and turns it into fuel without leaving damage behind. When that machinery is running cleanly, your blood glucose, your fats, your blood pressure, your waistline, and your background level of inflammation all sit comfortably in range, and they do it without your body having to strain. I often describe metabolism to my residents as the engine room of a ship: you never actually see it, but every deck above depends on it running smoothly. That's exactly why it's foundational. Almost every major chronic illness of our time - type 2 diabetes, heart disease, fatty liver, several cancers, even cognitive decline, can be traced back upstream to metabolism that quietly went off-course years earlier. Get the engine room right, and you are not treating one disease at a time; you are protecting the whole ship (body).



2. What are the key indicators of good metabolic health beyond blood glucose levels?

Glucose is just one dial on a much bigger dashboard, and honestly, it's often the last dial to move. Long before glucose rises, I want to know a person's waist-to-height ratio, a simple tape measure telling you to keep your waist under half your height does more predictive work than most people expect. Then blood pressure, triglycerides and HDL, and increasingly body composition rather than plain weight. This matters enormously in our population: a South Asian can look slim on the scale yet carry dangerous visceral fat around the organs, thin on the outside, fat on the inside. So I look at muscle mass versus visceral fat, fasting insulin, liver enzymes like alanine aminotransferase (ALT), aspartate aminotransferase (AST) and platelet count to calculate fibrosis-4 score.



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

Movement, first and above everything and I mean movement in the broadest sense, not just the hour at the gym but breaking up the long hours of sitting. Muscle is a metabolic/endocrine organ; every time it contracts, it pulls glucose out of the blood and sharpens insulin sensitivity. As a runner myself, I've watched this play out in my own body and my patients' for years. After movement I would put sleep, which is shockingly underrated, a few bad nights will wreck glucose control and stir up appetite hormones the next day. Then the quality of food over the endless obsession with quantity: real food, enough protein and fiber, and cutting back the ultra-processed packets. If I had to rank it: consistent daily movement, protein and fiber on the plate, quality sleep, not smoking, and moderating alcohol. The real secret is not intensity, it is consistency, the unglamorous thirty-minute daily walk beats the occasional heroic weekend workout every single time. Also, I would suggest trying exercise snacking during office hours. About 5-10 minutes break and one could do a few squats, lunges, jumping jacks, pogo jumps all in same place.



4. How can diabetes educators help individuals prevent metabolic dysfunction at an early stage?

By catching it upstream, before there is a diagnosis to hand over. By the time glucose finally climbs, insulin resistance has usually been building silently for the better part of a decade — so the educator’s real power lies in that quiet window. Simple tools go a long way: a waist tape, family history, look out for acanthosis nigricans sometimes a fasting insulin, and a conversation that begins before any label is attached. I would encourage educators to reframe their role from treating disease to building health — to sit alongside the person rather than across from them, and to offer small, sustainable changes instead of an overwhelming life-overhaul that collapses by week two. And personalize the risk: A South Asian at a “normal” BMI of 23 may already need attention, and telling them so early, kindly, is one of the most valuable things an educator can do.

5. How can families work together to build lifelong metabolic health?

Metabolic health, for better or worse, tends to be a family affair — meals, activity, sleep patterns, and habits are all shared under one roof, so it makes little sense to fix one person in isolation. The most powerful shift I see is when a family stops singling out the “diabetic” member and instead makes health the default culture of the home: cooking together, eating together at a table rather than in front of separate screens, an evening walk that becomes non-negotiable, sensible bedtimes for everyone. Children absorb what they see, not what they are told — a parent who exercises and who practices mindful eating is teaching far more effectively than any lecture. What is in the fridge, how screen time is handled, whether weekends involve movement — these quiet defaults shape a child’s metabolism for life. I have watched one person’s diagnosis become the turning point for an entire household, and that, to me, is the most hopeful version of this story.

Drug Spotlight: Gliptins



Dr. Piyush Lodha

MD (Medicine), DM (Endocrinology)
Consultant Endocrinologist and Diabetologist,
Dr Piyush Lodha Diabetes, Thyroid and
Hormone Clinic, Pune

Gliptins are a well-known family of oral anti-diabetic medications used to treat type 2 diabetes. Their glucose dependent method provides a good safety profile, especially for people with diabetes who need low risk hypoglycemia and weight neutral treatments.

Name and class of the drug

Gliptins are members of the class of dipeptidyl peptidase-4 (DPP-4) inhibitors and include Sitagliptin, Vildagliptin, Linagliptin, Tenzeligliptin and Alogliptin.

Mechanism of action

It supports glucose control by blocking the enzyme DPP-4, which breaks down incretin hormones - glucose-dependent insulinotropic polypeptide and glucagon-like peptide-1 leading to:

- Increased glucose dependent insulin secretion
- Mildly suppresses the release of glucagon

Compared to insulin secretagogues, these medications pose a lower risk of hypoglycemia.

Available formulations

Gliptins are used as monotherapy, in fixed-dose combinations and in some formulations, combination with SGLT2 inhibitors.

Advantages	Things to reconsider
Weight neutrality	Moderately effective in lowering HbA1c
Low risk of hypoglycemia	Caution for people with history of pancreatitis
Minimal gastrointestinal effects	Renal dosage modification is required (except for linagliptin).
Suitable for elderly people or people with comorbidities	
Renal safety, cost effective	

Drug snapshot

Drug group	Specific drug	Effects	Contra indications	Special considerations	Adverse effects
DPP-4 inhibitors	Sitagliptin, Vildagliptin, Linagliptin, Tenoeligliptin Alogliptin etc.	Prevents break down of GIP and GLP-1, supports glucose control, weight, neutral minimal gastrointestinal effects	History of pancreatitis	Renal dosage modification is required, except for linagliptin	Itching, skin rashes (rare)

Resources:

1. Deacon CF. Dipeptidyl peptidase 4 inhibitors in the treatment of type 2 diabetes mellitus. *Nat Rev Endocrinol*. 2020;16(11):642-653. doi:10.1038/s41574-020-0399-8
2. Gallwitz B. Clinical Use of DPP-4 Inhibitors. *Front Endocrinol (Lausanne)*. 2019;10:389. Published 2019 Jun 19. doi:10.3389/fendo.2019.00389
3. Ganesan K, Rana MBM, Sultan S. Oral Hypoglycemic Medications. [Updated 2023 May 1]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2026 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK482386/>
4. Scheen AJ. Cardiovascular effects of dipeptidyl peptidase-4 inhibitors: from risk factors to clinical outcomes. *Postgrad Med*. 2013;125(3):7-20. doi:10.3810/pgm.2013.05.2659
5. Scirica BM. The Safety of Dipeptidyl Peptidase 4 Inhibitors and the Risk for Heart Failure. *JAMA Cardiol*. 2016;1(2):123–125. doi:10.1001/jamacardio.2016.0184

Trending Diets: Paleo Diet



Dr. Arohi Abhinav Jayaswal

MBBS, MD, FDI, FAIG, PG Dip Cardiology (RCP UK), PG Dip Clinical Endocrinology and Diabetes (RCP UK), Certificate in Diabetes Management (ADA)

Consultant Physician, Dr. Arohi Abhinav Clinic, Bhagalpur

Paleo diet is a dietary pattern placing a strong emphasis on foods said to have been eaten during the palaeolithic era. It excludes grains, legumes, dairy products, refined sugars, ultra-processed foods and majority of the packaged foods while

promoting lean meats, fish, eggs, fruits, vegetables, nuts and seeds. This diet is a popular nutritional approach for enhancing metabolic health since it is high in protein, fiber, unsaturated fats, vitamins, and minerals. Research on its long-term benefits in managing diabetes is still in progress.

Possible advantages

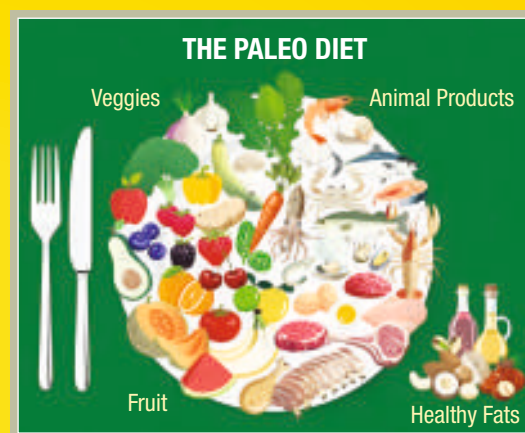
The paleo diet may offer several metabolic advantages especially when paired with healthy lifestyle choice. These include:

- Better blood glucose control and improved insulin sensitivity
- Decrease in body weight and waist circumference as a result of eating less ultra-processed meals
- A reduction in blood pressure, lipids, and some cardiometabolic risk factors.
- Increased intake of nutrient dense foods that are high in dietary fiber and antioxidants.

Restrictions and concerns

Compared to the possible advantages paleo diet has significant drawbacks. Possible disadvantages include:

- If whole grains, legumes and dairy are restricted calcium, vitamin D and several B vitamins may be consumed less frequently.
- A heavy dependence on animal-based protein might not be suitable for everyone especially for people at risk or having cardiovascular or renal conditions.
- Long-term adherence may be difficult due to financial constraints and dietary limitations.
- Available data have not demonstrated that this approach is more effective than other evidence-based healthy eating patterns for long-term glycemic control.



Conclusion

For some people with diabetes paleo diet may be helpful as a short-term dietary solution under the guidance of a healthcare provider. Before recommending this dietary strategy consider important factors like individualised meal planning, nutritional sufficiency, cardiovascular health, sustainability and long-term adherence.

Resources:

1. Sohoulí MH, Fatahi S, Lari A, *et al.* The effect of paleolithic diet on glucose metabolism and lipid profile among patients with metabolic disorders: a systematic review and meta-analysis of randomized controlled trials. *Crit Rev Food Sci Nutr.* 2022;62(17):4551-4562. doi:10.1080/10408398.2021.1876625
2. Jamka M, Kulczyński B, Juruć A, *et al.* The Effect of the Paleolithic Diet vs. Healthy Diets on Glucose and Insulin Homeostasis: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. *J Clin Med.* 2020;9(2):296. Published 2020 Jan 21. doi:10.3390/jcm9020296
3. Szczerba E, Barbaresko J, Schieman T, *et al.* Diet in the management of type 2 diabetes: umbrella review of systematic reviews with meta-analyses of randomised controlled trials. *BMJ Med.* 2023;2(1):e000664. Published 2023 Nov 9. doi:10.1136/bmjmed-2023-000664

Metabolically Healthy Obesity: Fact, Fiction, or a Distinct Clinical Phenotype?



Dr. Rizwan H. Ali Ahmad

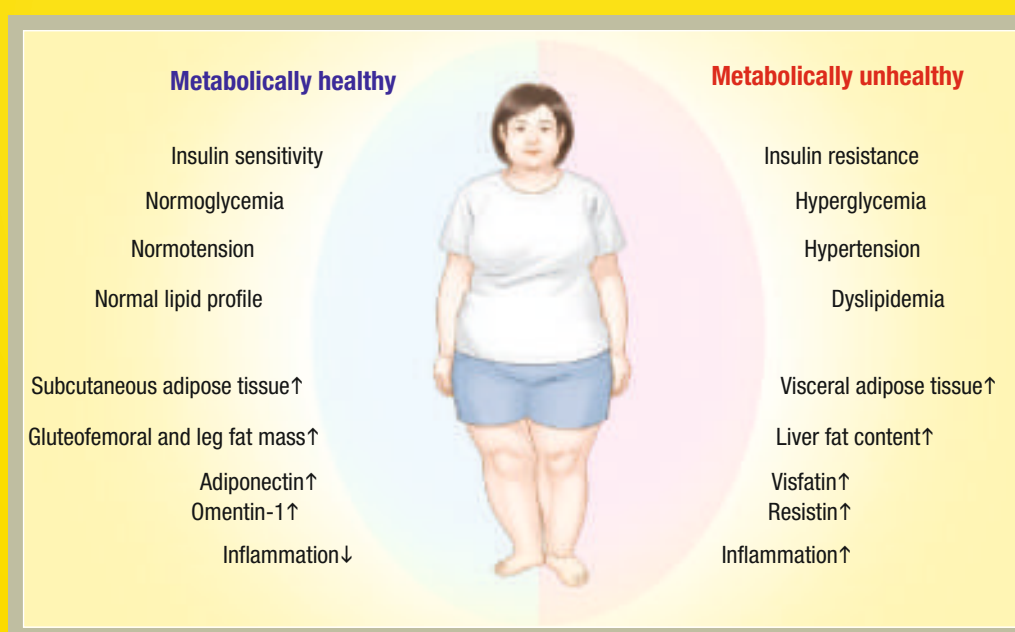
MBBS, M.D. (Medicine)

Consultant Physician, Cardiologist & Diabetologist, Safdarjung Medical College, Delhi

Obesity is commonly associated with a range of metabolic abnormalities, including insulin resistance, prediabetes, atherogenic dyslipidemia characterized by elevated plasma triglycerides (TG) and reduced high-density lipoprotein cholesterol (HDL-C), metabolic dysfunction associated steatotic liver disease (MASLD), and metabolic

syndrome. Together, these conditions significantly increase the risk of developing type 2 diabetes (T2DM) and cardiovascular diseases (CVDs). However, not all individuals with obesity develop these metabolic complications, raising the question of whether metabolically healthy obesity (MHO) represents a distinct clinical phenotype or merely a transitional stage toward metabolically unhealthy obesity (MUHO). To better characterize the relationship between body weight and metabolic health, individuals are commonly classified according to both body mass index (BMI) and metabolic status. Based on BMI and metabolic health, individuals can be classified into six phenotypes: metabolically healthy normal weight (MHNW), metabolically unhealthy normal weight (MUHNW), metabolically healthy overweight (MHOW), metabolically unhealthy overweight (MUHOW), MHO, and MUHO.

MHO may be defined as having ≤ 2 metabolic syndrome components. The lack of a standardized definition has made comparison across studies challenging. Several mechanisms have been proposed to explain MHO, including lower visceral fat accumulation, preserved insulin sensitivity, favorable adipose tissue function, lower levels of chronic inflammation, and healthier lifestyle behaviors. Collectively, these features may support the maintenance of metabolic health despite excess adiposity. The reported prevalence of MHO varies considerably across studies due to the lack of a universally accepted definition.



Recent evidence from the nationally representative ICMR-INDIAB study indicates that MHO is relatively uncommon in India, with a prevalence of only 1.8% among adults. The prevalence was slightly higher in urban populations and among men and declined with increasing age. These findings suggest that most Indian adults with obesity already exhibit metabolic dysfunction. Longitudinal studies further suggest that MHO is often not a permanent state. Up to 60% of individuals with MHO eventually transition to MUO, emphasizing the need for regular metabolic monitoring even in individuals who initially appear metabolically healthy. High BMI, older age, hepatic steatosis, a greater number of metabolic abnormalities, metabolic values closer to the upper limit of normal, and unhealthy lifestyle behaviors (poor diet, physical inactivity, and smoking) all increase the risk of progression from MHO to MUO.

All cause morbidity and mortality

Compared with MUO, MHO is associated with a lower risk of T2DM, chronic kidney disease, CVD, and all-cause mortality. However, these risks remain higher than in metabolically healthy lean individuals and increase with worsening metabolic abnormalities or transition to a metabolically unhealthy phenotype. Maintaining metabolic health over time and achieving weight loss can substantially reduce these risks.

Although MHO is recognized as a distinct clinical phenotype, accumulating evidence indicates that it is often a transient rather than permanent state. Regular metabolic screening and sustained lifestyle interventions are therefore essential to preserve metabolic health and delay or prevent progression to metabolically unhealthy obesity.

Resources:

1. Smith GI, Mittendorfer B, Klein S. Metabolically healthy obesity: facts and fantasies. *J Clin Invest*. 2019;129(10):3978-3989. doi:10.1172/JCI129186
2. Blüher M. Metabolically healthy obesity. *Endocr Rev*. 2020;41(3):bnaa004. doi:10.1210/endrev/bnaa004
3. Mohan D, Pradeepa R, Venkatesan U, *et al*. High prevalence of metabolic obesity in India: The ICMR-INDIAB national study (ICMR-INDIAB-23). *Indian J Med Res*. 2025;161(5):461-472. doi:10.25259/IJMR_328_2025
4. Cho YK, Jung CH. Metabolically healthy obesity: it is time to consider its dynamic changes. *Cardiovasc Prev Pharmacother*. 2022;4(4):123-131. doi:10.36011/cpp.2022.4.e19
5. Cho YK, Lee YL, Jung CH. Pathogenesis, Murine Models, and Clinical Implications of Metabolically Healthy Obesity. *International Journal of Molecular Sciences*. 2022; 23(17):9614. <https://doi.org/10.3390/ijms23179614>

Diabetes Educator Toolkit:

Skill of the Month: Reflection, Reassurance, and Empathy



Dr. Sarthak Gandhi

MBBS, FCCM, D. Diabetes, D. Endocrine (UK)
Consultant Diabetologist and Endocrinologist,
Gandhi Diabetic Care clinic, Surat

Effective diabetes counseling extends beyond providing medical advice. It involves understanding the individual's experiences and building a partnership that supports long-term self-management. Reflection, reassurance, and empathy are key communication skills that foster trust, enhance engagement, and promote positive health behaviors.

Reflection

Reflection is an active listening technique in which the healthcare professional carefully listens to the individual's concerns and reflects back their thoughts and emotions to demonstrate understanding and encourage collaborative problem-solving.

Example

Person with diabetes: *"I try to avoid sweets, but I can't resist during family gatherings."*

Diabetes educator (DE): *"Family occasions make it much harder for you to stick to your eating plan"*



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Empathy

Empathy is the ability to recognize, understand, and respond appropriately to another person's emotions without judgment. An empathic response helps reduce feelings of isolation and encourages honest communication about difficulties that may affect diabetes management.

DE: *"I can understand why that's difficult. Food is often an important part of family celebrations, and it can be hard to say no."*

This approach validates the concern while encouraging problem-solving and reinforcing the individual's ongoing efforts.

Reassurance

Reassurance involves providing realistic and supportive encouragement based on the individual's strengths and previous successes. It helps reduce anxiety, promotes self-efficacy, and encourages problem-solving while maintaining honesty.

DE: *"You're not alone, many people find special occasions challenging. The good news is that you can still enjoy celebrations by planning ahead and practising portion control. One meal won't undo all your efforts."*

This response acknowledges the emotional experience, normalizes the concern without dismissing it, and opens the door for collaborative problem-solving.

When used together, these skills encourage open communication, strengthen self-confidence, and help individuals manage both the emotional and practical challenges of living with diabetes.

Resources:

1. Howe CJ, Walker D, Watts J. Use of Recommended Communication Techniques by Diabetes Educators. *Health Lit Res Pract.* 2017;1(4):e145-e152. Published 2017 Oct 10. doi:10.3928/24748307-20170810-01
2. Paiva D, Abreu L, Azevedo A, Silva S. Patient-centered communication in type 2 diabetes: The facilitating and constraining factors in clinical encounters. *Health Serv Res.* 2019;54(3):623-635. doi:10.1111/1475-6773.13126
3. Yao M, Zhou XY, Xu ZJ, *et al.* The impact of training healthcare professionals' communication skills on the clinical care of diabetes and hypertension: a systematic review and meta-analysis. *BMC Fam Pract.* 2021;22(1):152. Published 2021 Jul 15. doi:10.1186/s12875-021-01504-x
4. Alkhaibari RA, Smith-Merry J, Forsyth R. "I am not just a place for implementation. I should be a partner": a qualitative study of patient-centered care from the perspective of diabetic patients in Saudi Arabia. *BMC Health Serv Res.* 2023;23(1):1412. Published 2023 Dec 14. doi:10.1186/s12913-023-10391-0
5. Alsubahi N, Groot W, Alzahrani AA, *et al.* Patient-centered care and satisfaction of patients with diabetes: insights from a survey among patients at primary healthcare centers in Saudi Arabia. *BMC Prim Care.* 2025;26(1):140. Published 2025 May 1. doi:10.1186/s12875-025-02778-1

Frequently Asked Questions on Metabolic Health



Dr. Brij Teli

MD (Medicine), DM (Endocrinology)

Consultant Diabetologist and Endocrinologist,
Granthi- Diabetes Endocrine and Obesity
Center, A unit of 'Aumkar Clinic', Rajkot

1. I am 35 years old and work in a corporate job. My body mass index (BMI) is normal, but my doctor says I have increased waist circumference, fatty liver, high triglycerides, and early changes in my blood sugar. I work long hours, often skip meals, and hardly exercise. How can I have these metabolic problems when I'm not overweight?

Answer: A normal BMI does not always mean that a person is metabolically healthy. Fat stored around the abdomen and organs such as the liver can increase the risk of metabolic disorders, even if overall body weight appears normal. Some of the factors that may contribute include:

- **A larger waist circumference** suggests increased abdominal fat, which is associated with a higher risk of insulin resistance and metabolic disorders.
- **Skipping meals and prolonged sitting** reduces the body's ability to use glucose efficiently and can worsen insulin resistance.
- **Fatty liver and high triglycerides** are signs that excess fat is being stored inside the body, even when BMI is normal.
- **Low physical activity** further reduces fat burning and affects overall metabolic health.

Instead of focusing only on body weight, the goal should be to improve body composition by reducing abdominal fat. Regular meals, daily physical activity, strength training, and reducing prolonged sitting can significantly improve metabolic health and lower the future risk of diabetes and heart disease.

2. I am a 55-year-old businessman with obesity, high blood pressure, high uric acid, and grade 2 fatty liver. I recently started a glucagon-like peptide -1 (GLP-1) injection for weight loss. Do I still need to follow a healthy diet, or will the medication be enough?

Answer: GLP-1 receptor agonists help by reducing appetite, increasing the feeling of fullness, slowing stomach emptying, and improving blood glucose control, which supports healthy weight loss. However, these medicines are not a substitute for a healthy lifestyle. They work best when combined with the right food choices, regular physical activity, and other healthy daily habits. Along with taking your GLP-1 injection, it is important to:

- **Support liver health:** Reduce ultra-processed foods, added sugars, saturated fats, and alcohol to help improve grade 2 fatty liver.
- **Manage high uric acid:** Limit high-purine foods such as organ meats, avoid foods with high fructose corn syrup, stay well hydrated, and maintain a healthy weight to reduce the risk of gout.



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- **Protect heart health:** Choose a low-sodium, fiber-rich diet with plenty of vegetables, fruits, whole grains, and healthy fats to help manage blood pressure and reduce cardiovascular risk.
- **Preserve muscle mass:** As GLP-1 medicines reduce appetite, ensure adequate protein intake and include resistance exercises to minimize muscle loss during weight loss.

GLP-1 therapy is a part of the treatment plan. When combined with healthy eating and regular exercise, it provides the better long-term benefits for weight management and overall metabolic health.

3. I am 28 years old and was recently diagnosed with PCOS. I have gained weight around my abdomen, have persistent acne, and my periods have become irregular. How does PCOS affect my metabolic health, and what can I do to manage it?

Answer: PCOS is not just a condition that affects the ovaries it also affects the body's metabolism. Many women with PCOS develop insulin resistance, where the body does not respond well to insulin. As a result, the body produces more insulin, which can contribute to weight gain around the abdomen, acne, irregular periods, and increased cravings. Over time, it can also increase the risk of prediabetes, type 2 diabetes, and heart disease. With the right treatment and lifestyle measures, PCOS symptoms can be effectively managed, and your metabolic health can improve.

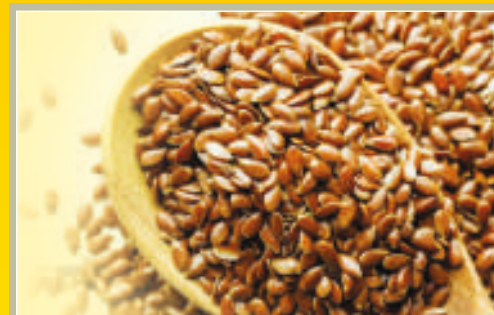
Some simple steps include:

- **Choose balanced meals** with adequate protein, fiber, and healthy fats to keep blood sugar levels stable.
- **Stay physically active** most days of the week, as exercise improves insulin sensitivity and supports hormonal balance.
- **Prioritize good sleep and stress management**, as both play an important role in hormone regulation and appetite control.
- **Aim for gradual weight loss.** Even losing 5-10% of body weight can improve menstrual regularity, reduce acne, and improve insulin resistance.

With early treatment and consistent lifestyle changes, you can successfully manage the symptoms and improve your metabolic health.

Superfood: Flaxseeds

Flaxseeds (or linseeds) (*Linum usitatissimum*), the latin name which means “very useful” is popularly known as Alsī/Jawas/Tishi or Aksebija. In India, it is mainly cultivated in Madhya Pradesh, Maharashtra and Bihar. The table given below provides insights into the various health benefits associated with flaxseeds.



Health benefits	Function
Dyslipidemia, cardiac health	Help reduce serum triglyceride, total cholesterol, and increase HDL cholesterol, and supports heart health due to the presence of α -linolenic acid (ALA), phenolic compounds, lignans, and dietary fiber.
Hypertension	Reduces systolic and diastolic blood pressure. (30 g of ground flaxseed/day showed positive results in one study).
Diabetes	May improve fasting blood glucose levels and insulin sensitivity. (A study reported a beneficial effect with 10g of flaxseed supplementation.)
Digestive health	Provides relief from constipation symptoms, particularly by improving stool consistency.
Cancer	May act as an anti-carcinogenic agent due to secoisolariciresinol diglucoside (SDG), a phytoestrogenic lignin, which slows progression of certain hormone- sensitive cancers.
Menopause symptoms	May help decrease the severity of menopausal symptoms.
Hair problems	Nourishes the scalp, promotes hair growth and improves hair texture.

Recommended dosage

The dosage varies across studies; intakes of 10–30 g/day have demonstrated beneficial effects.

Nutritional value

10 g gives 44 kcal, 1g carb, 1.8g protein, and 3.5g fat.

Nutritional value

Add ground flaxseeds to yoghurt, oatmeal, smoothies, dough, soups, or chutneys, or simply sprinkle them over salads.

Resources:

1. Nowak W, Jeziorek M. The role of flaxseed in improving human health. *Healthcare*. 2023; 11(3):395.
2. Sahu K, Sahu R, Sahu Y, *et al*. A review on flaxseed as a hair smoothening agent. *International Journal of Advanced Multidisciplinary Research and Studies*. 2024; 4:803-806.

Role Play

Scenario: *Mr. Ramesh, a 56-year-old man with an 8-year history of type 2 diabetes (T2DM), has recently been diagnosed with sarcopenia. He visits a diabetes educator (DE) to understand the condition and learn how to manage it.*

Mr. Ramesh: Hello! My doctor told me I have sarcopenia. I've been feeling weak and tired, and even simple tasks like lifting light objects, washing clothes, or hanging them have become difficult. Is this because of sarcopenia?

DE: Hello, Mr. Ramesh. Yes, sarcopenia is a condition in which there is a gradual loss of muscle strength and muscle mass. This makes everyday activities feel more difficult than before.

Mr. Ramesh: Does diabetes have anything to do with it?

DE: Yes. People with T2DM are at a higher risk of developing sarcopenia. Persistently high blood glucose levels, ageing, physical inactivity, and inadequate protein intake can all contribute to muscle loss over time.

Mr. Ramesh: Can anything be done, or is this just part of getting older?

DE: The good news is that sarcopenia can often be improved. The most effective approach combines regular resistance exercises such as strength training with adequate protein intake, good diabetes management, and staying physically active. The earlier we start, the better the outcomes.

Mr. Ramesh: That's reassuring. Where should I begin?

DE: Do you include protein sources like dal, legumes, curd, paneer, egg, chicken, and fish regularly?

Mr. Ramesh: I have a simple meal comprising rice, chapati and vegetables but dal is not there every day. Only at lunch.

Diabetes Educator: Make sure every meal includes a good source of protein. For lunch and dinner, you can include curd, dal or pulses, paneer, or soya. If you eat non-vegetarian foods, include chicken or fish as your protein source two to three times a week. Follow a healthy food order by starting your meal with a salad or soup, followed by a protein-rich food, and then carbohydrates such as rice or chapati. This helps provide nutrients in a balanced way and may slow glucose absorption from the meal. Adequate protein intake, combined with regular strength-training exercises, is essential for improving muscle mass and strength in people with sarcopenia.

Mr. Ramesh: Understood. Which strength-training exercises should I do?

DE: You can begin with light weights, chair squats or exercise using resistance bands under the guidance of a certified fitness trainer two-three times a week.

Mr. Ramesh: Thank you for the detailed information.

DE: Welcome. All the best!

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Choose the Leader

Glycomet®-GP

Metformin Hydrochloride 500/850/1000 mg SR + Glimepiride 0.5/1/2/3/4 mg

Glycomet®-GP 0.5

Metformin Hydrochloride 500 mg SR + Glimepiride 0.5 mg

Glycomet®-GP 1

Metformin Hydrochloride 500 mg SR + Glimepiride 1 mg

Glycomet®-GP 2

Metformin Hydrochloride 500 mg SR + Glimepiride 2 mg

Glycomet®-GP 2/850

Metformin Hydrochloride 850 mg SR + Glimepiride 2 mg

Glycomet®-GP 3/850

Metformin Hydrochloride 850 mg SR + Glimepiride 3 mg

Glycomet®-GP 3 FORTE

Metformin Hydrochloride 1000 mg SR + Glimepiride 3 mg

Glycomet®-GP 4 FORTE

Metformin Hydrochloride 1000 mg SR + Glimepiride 4 mg

Glycomet®-GP 0.5 FORTE

Metformin Hydrochloride 1000 mg SR + Glimepiride 0.5 mg

Glycomet®-GP 1 FORTE

Metformin Hydrochloride 1000 mg SR + Glimepiride 1 mg

Glycomet®-GP 2 FORTE

Metformin Hydrochloride 1000 mg SR + Glimepiride 2 mg



Abridged Prescribing Information

Active Ingredients: Metformin hydrochloride (as sustained release) and glimepiride tablets **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

Arvind Vitthal Gandhi Chowk, B. S. D. Marg, Govandi, Mumbai - 400 088. | Tel.: 91-22-2556 4048 | Fax: 91-22-2558 4025 | www.usvindia.com

Corvette Team

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