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Short communication

Nutritional support in insulin resistanc

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Introduction

Insulin resistance (IR) is a metabolic condition characterized by decreased sensitivity of peripheral tissues to insulin action, resulting in compensatory hyperinsulinemia and impaired glucose metabolism. Over time, insulin resistance may contribute to the development of type 2 diabetes mellitus, obesity, cardiovascular diseases, metabolic syndrome, and endocrine disorders such as polycystic ovary syndrome (PCOS) (American Diabetes Association, 2025; Melmed et al., 2020). Insulin plays a crucial role in facilitating glucose uptake into cells for energy production. In insulin resistance, cells respond inadequately to insulin, leading to elevated circulating glucose and insulin levels. Common symptoms include fatigue after meals, increased appetite, cravings for sweets, difficulty losing weight, abdominal obesity, impaired concentration, and fluctuations in energy levels. Physical findings may include acanthosis nigricans, increased waist circumference, and elevated blood pressure (Melmed et al., 2020). The prevalence of insulin resistance is increasing globally due to sedentary lifestyle, obesity, poor dietary habits, stress, and insufficient sleep (World Health Organization, 2025). In addition, several comorbidities are associated with insulin resistance, including type 2 diabetes mellitus, obesity, PCOS, dyslipidaemia, metabolic syndrome, non-alcoholic fatty liver disease, obstructive sleep apnea, and cardiovascular diseases (International Diabetes Federation, 2025; Melmed et al., 2020). Chronic inflammation and oxidative stress are frequently present in affected individuals. Therefore, early recognition and appropriate nutritional intervention are essential as insulin resistance can often be reversed through dietary and lifestyle modifications (Evert et al., 2019).

Materials and methods

This review paper is based on current scientific literature, evidence-based clinical guidelines, and consensus recommendations related to insulin resistance and metabolic disorders. Relevant information was obtained from publications and recommendations issued by the American Diabetes Association (ADA), World Health Organization (WHO), International Diabetes Federation (IDF), European Association for the Study of Diabetes (EASD), and National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK).

The review also included data from endocrinology and clinical nutrition textbooks, including *Krause's Food & the Nutrition Care Process* (Mahan and Raymond, 2020) and *Williams Textbook of Endocrinology* (Melmed et al., 2020). The analysed literature focused on pathophysiology, diagnosis, nutrition therapy, Mediterranean dietary

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patterns, and lifestyle management in insulin resistance.

Results and discussion

Diagnosis of insulin resistance commonly includes fasting plasma glucose, fasting insulin levels, glycated haemoglobin (HbA1c), oral glucose tolerance test (OGTT), and HOMA-IR (homeostatic model assessment for insulin resistance) index calculation (American Diabetes Association, 2025).

HOMA-IR = [fasting glucose (mmol/L) × fasting insulin (μU/mL)] / 22.5, where 22.5 is a mathematical normalizing constant representing normal fasting glucose and insulin concentrations in healthy individuals (Melmed et al., 2020).

Low glycaemic index carbohydrates are recommended. Beneficial foods include whole grains, oats, legumes, vegetables, and low glycaemic index fruits such as apples and berries. Refined carbohydrates, white bread, sweets, sugar-sweetened beverages, and processed foods should be limited (Evert et al., 2019; Mahan and Raymond, 2020).

Dietary fibre slows glucose absorption, increases satiety, and supports weight management. Important sources include vegetables, oats, legumes, chia seeds, and flaxseed (Mahan and Raymond, 2020).

Adequate protein intake from fish, poultry, eggs, yogurt, and legumes contributes to stable glucose levels, appetite regulation, and muscle maintenance. Healthy fats, especially olive oil, nuts, avocado, and omega-3-rich fish, may reduce inflammation and improve cardiometabolic health (Mahan and Raymond, 2020).

The Mediterranean dietary pattern is considered an effective nutritional approach for insulin resistance because it emphasizes vegetables, whole grains, healthy fats, and minimally processed foods. Clinical studies demonstrate improvements in insulin sensitivity, inflammatory markers, weight control, and reduced risk of type 2 diabetes progression (Evert et al., 2019; International Diabetes Federation, 2025).

Regular physical activity improves insulin sensitivity. Exercise lasting 30–45 minutes daily, including walking and resistance training, improves glycaemic control and body composition. Even modest weight reduction of 5–10% improves metabolic parameters (American Diabetes Association, 2025; World Health Organization, 2025).

Healthcare professionals have an important role in insulin resistance management. Dietitians provide individualized meal planning and nutrition education, while pharmacists contribute through counselling, supplementation guidance, and patient education. Nutritional supplements such as magnesium, vitamin D, omega-3 fatty acids, and myo-inositol may provide benefits in selected individuals; however, supplementation should be individualized (Mahan and Raymond, 2020; Melmed et al., 2020).

Conclusion

Insulin resistance is a significant metabolic disorder associated with increased risk of chronic diseases. Early recognition and individualized medical nutrition therapy, regular physical activity, and lifestyle modification are essential for improving metabolic outcomes and preventing progression to type 2 diabetes mellitus (American Diabetes Association, 2025; Evert et al., 2019). Multidisciplinary collaboration among physicians, dietitians, and pharmacists supports effective patient education, adherence, and disease prevention.

References

American Diabetes Association Professional Practice Committee, 2025. Introduction and methodology: Standards of Care in Diabetes—2025. Diabetes Care 48, S1–S5. https://doi.org/10.2337/dc25-SINT

Evert, A.B. et al., 2019. Nutrition therapy for adults with diabetes or prediabetes: a consensus report. Diabetes Care 42, 731–754. https://doi.org/10.2337/dci19-0014

International Diabetes Federation, 2025. IDF Diabetes Atlas, 11th ed. International Diabetes Federation, Brussels. https://diabetesatlas.org/resources/idf-diabetes-atlas-2025/

Mahan, L.K., Raymond, J.L., 2020. Krause's Food & the Nutrition Care Process, 15th ed. Elsevier, St. Louis.

Melmed, S., Auchus, R.J., Goldfine, A.B., Koenig, R.J., Rosen, C.J. (Eds.), 2020. *Williams Textbook of Endocrinology*, 14th ed. Elsevier, Philadelphia. World Health Organization, 2025. Diabetes. World Health Organization, Geneva. https://www.who.int/health-topics/diabetes