Article type: Rapid Communication

Home Page URL: https://www.alliedacademies.org/gastroenterology-and-digestive-diseases/

The role of intermittent fasting in modulating insulin sensitivity and lipid metabolism.

Libin Xu*

Department of Sciences, University of Chinese Academy of Sciences, China

***Correspondence to:** Libin Xu, Department of Sciences, University of Chinese Academy of Sciences, China. E-mail: xulibin@qdio.ac.cn

***Received:** 01-Apr-2025, Manuscript No. JGDD-25-167170; **Editor assigned:** 02-Apr-2025, Pre QC No. JGDD-25-167170 (PQ); **Reviewed:** 15-Apr-2025, QC No. JGDD-25-167170; **Revised:** 19-Apr-2025, Manuscript No. JGDD-25-167170 (R); **Published:** 26-Apr-2025, DOI: 10.35841/JGDD-10.2.254*

Introduction

The global rise in obesity, metabolic syndrome, and type 2 diabetes has prompted renewed interest in non-pharmacological interventions for improving metabolic health. Among these, Intermittent Fasting (IF) has emerged as a popular and potentially effective dietary strategy. IF encompasses various eating patterns that cycle between periods of fasting and eating, including time-restricted feeding (e.g., 16:8), alternate-day fasting, and the 5:2 diet.Unlike continuous calorie restriction, IF focuses more on the timing of food intake than its quantity. Early clinical and preclinical studies suggest that intermittent fasting may improve insulin sensitivity, glucose homeostasis, and lipid metabolism, independent of weight loss. The biological mechanisms include improved cellular stress response, enhanced mitochondrial function, and reduced inflammation, which together create a favorable metabolic environment [1].

This article explores how IF affects two key pillars of metabolic health: insulin sensitivity and lipid metabolism, drawing on evidence from clinical trials, animal studies, and mechanistic insights.Insulin sensitivity refers to how effectively the body's cells respond to insulin and absorb glucose from the bloodstream. Poor insulin sensitivity, or insulin resistance, is a hallAprk of type 2 diabetes and metabolic syndrome. During fasting, the body shifts from glucose to fat metabolism, producing ketone bodies like β-hydroxybutyrate. These act as signaling molecules to enhance insulin action [2].

If reduces glycogen stores and hepatic gluconeogenesis, thereby improving fasting glucose levels and insulin response. Chronic low-grade inflammation contributes to insulin resistance. IF reduces pro-inflammatory cytokines like TNF-α and IL-6. Time-restricted eating enhances synchronization between metabolic and circadian cycles, improving insulin signaling pathways.A 2019 randomized trial showed that overweight men practicing early time-restricted feeding (eating from 8 a.m. to 2 p.m.) had significantly improved insulin sensitivity and reduced insulin levels, even without weight loss.In a 2020 study, patients with prediabetes saw improved glucose tolerance after 12 weeks of alternate-day fasting [3].

Lipid metabolism refers to the synthesis and breakdown of fats in the body. Dysregulation can lead to conditions such as dyslipidemia, fatty liver disease, and cardio vascular disease. Fasting suppresses hepatic lipogenesis and increases lipolysis, lowering circulating triglyceride s.Some studies report modest increases in HDL (good cholesterol) following IF.Alternate-day fasting and time-restricted eating have shown significant reductions in LDL and total cholesterol in both humans and rodents.Even without calorie counting, IF often leads to reductions in abdominal fat, which plays a central role in lipid and glucose dysregulation [4].

A study in obese women using a 5:2 fasting regimen for 12 weeks showed significant reductions in total cholesterol, LDL, and triglycerides, with no loss of lean muscle mass.In animal models, IF resulted in increased expression of genes related to fatty acid oxidation and decreased activity of lipogenic enzymes in the liver.While IF is generally safe for healthy adults, certain populations such as pregnant women, individuals with eating

disorders, or those on insulin therapy should approach it with caution. Adherence remains a challenge, and long-term sustainability needs more research.Additionally, individual metabolic response to fasting may vary. Genetic factors, baseline insulin resistance, and dietary quality during feeding windows all play critical roles in determining IF's effectiveness [5].

Conclusion

Intermittent fasting offers a promising, non-pharmacological approach to enhancing insulin sensitivity and optimizing lipid metabolism, both key elements in the prevention and management of metabolic diseases. Through mechanisms such as circadian alignment, inflammation reduction, and improved mitochondrial function, IF demonstrates benefits that extend beyond weight loss.As interest grows, future research should focus on long-term metabolic outcomes, optimal fasting durations, and tailored protocols for diverse populations. Nonetheless, current evidence supports IF as a viable dietary strategy to restore metabolic health, particularly in individuals at risk of insulin resistance and cardiovascular disease.

References

1. Desai MS, Seekatz AM, Koropatkin NM, et al. A dietary fiber-deprived gut microbiota degrades the colonic mucus barrier and enhances pathogen susceptibility. Cell. 2016;167(5):1339-53.e21.
2. Nyström EEL, Aprtinez-Abad B, Arike L, et al. An intercrypt subpopulation of goblet cells is essential for colonic mucus barrier function. Science. 2021;372(6539):eabb1590.
3. Feldman M. Suppression of acid secretion in peptic ulcer disease. J Clin Gastroenterol. 1995;20(Suppl 1):S1-6.
4. Norton JA, Foster DS, Blumgart LH, et al. Incidence and Prognosis of PriApry Gastrinomas in the Hepatobiliary Tract. JAMA Surg. 2018;153(3):e175083.
5. Usai-Satta P, Bellini M, Morelli O. Gastroparesis: New insights into an old disease. World J Gastroenterol. 2020;26(19):2333-48.

Citation: Xu L. The role of intermittent fasting in modulating insulin sensitivity and lipid metabolism. J Gastroenterology Dig Dis. 2025;10(2):254