VER
Vascular & Endovascular Review

The Role of Intermittent Fasting in Improving Overall Metabolic Health and Reducing Obesity-Related Complications

Ms. Pooja Dinkar Kashid [1], Dr. Avinash Taksande [2], Dr. Ranjit Ambad [3], Dr. Roshan Kumar Jha [4]

[1]PhD Scholar, Department of Physiology, Jawaharlal Nehru Medical College, Datta Meghe Institute of Higher Education and Research, Sawangi (Meghe), Wardha

[2]Professor, Department of Physiology, Jawaharlal Nehru Medical College, Datta Meghe Institute of Higher Education and Research, Sawangi (Meghe), Wardha

[3]Professor, Department of Biochemistry, Jawaharlal Nehru Medical College, Datta Meghe Institute of Higher Education and Research, Sawangi (Meghe), Wardha

[4]Assistant Professor, Department of Biochemistry, Jawaharlal Nehru Medical College, Datta Meghe Institute of Higher Education and Research, Sawangi (Meghe), Wardha

ABSTRACT

Background: The prevalence of obesity has been hit to the levels of pandemic meaning that it is a dire health issue affecting the whole world at large and posing a great risk of developing a variety of health related complications such as cardiovascular diseases, diabetes, and metabolic syndrome. As it is predicted that more than 1.53 billion adults are going to be obese by the year 2035, there is a desperate need to have effective dietary interventions. Intermittent fasting (IF) is one of the new promising models of weight management and metabolic improvement that should be used instead of continuous energy restriction.

Materials and Methods: This meta-analysis included evidence of new systematic reviews, meta-analyses, and randomized controlled trials on the effects of different IF regimes (such as alternate-day fasting, time-restricted eating, and periodic fasting) on body composition, metabolic parameters, and metabolic complication of obesity. The search of the literature was performed in large scientific databases, with emphasis on human literature published until 2025.

Conclusion: It has been shown that IF has clinically significant effects of reducing body weight, improving lipid profiles, increasing insulin sensitivity, and decreasing blood pressure. IF diets prove especially effective in metabolic syndrome patients and can be more beneficial than persistent calorie restriction regarding compliance and metabolic improvements. Nevertheless, the long-term effectiveness and safety should be the subject of research in standardized, long-term study. Patient-specific guidelines based on preferences, metabolic objectives, and possible risks are necessary to improve outcomes .

KEYWORDS: intermittent fasting, obesity, metabolic health, time restricted eating, cardiometabolic risk, weight management.

How to Cite: Ms. Pooja Dinkar Kashid , Dr. Avinash Taksande , Dr. Ranjit Ambad , Dr. Roshan Kumar Jha , (2025) The Role of Intermittent Fasting in Improving Overall Metabolic Health and Reducing Obesity-Related Complications, Vascular and Endovascular Review, Vol.8, No.11s, 138-141.

INTRODUCTION

The obesity issue is among the current topic of the modern world, and as the latest statistics seen in the Obesity Atlas, organized by WHO, state, the amount of adults that will be overweight in the future will be over one and three quarters of a billion all over the world, among which one point five hundred and three thousand will be obese (1). The connotation of this staggering statistic is that at least one in every two adults risks to become overweight or obese and that presents a colossal healthcare and social expense to the societies throughout the world. These consequences of obesity go well past the surface of physical appearance, since obesity is a major risk factor of many chronic diseases, such as cardiovascular disease, diabetes mellitus, steatotic liver disease (MASLD) that appears as a result of metabolic dysfunction, and many types of cancer (2).

The obesity-related complications pathophysiological processes are complex and they relate to the interaction of metabolic, inflammatory and hemodynamic processes. In addition to triggering inflammatory and immune mechanisms that drive atherosclerosis, obesity encourages cardiovascular system structural and functional changes such as left ventricular hypertrophy and heart failure (1). Moreover, obesity triggers insulin resistance, dyslipidemia, and hypertension, which are the ideal combination producing the metabolic syndrome, the combination of diseases predisposing an individual to heart disease, stroke, and type 2 diabetes (3). Today it is estimated that about 25-30 percent of all adults in the world do fit the diagnostic profile of metabolic syndrome and it is more prevalent among the obese groups (1,3).

The classic methods of weight treatment have mainly centered on continuous energy restriction (CER) which is a sustained decrease in the daily caloric intake. Although effective in the short term, CER can be quite difficult to sustain over time and can result in a decline of basal metabolic rate, which can put weight regain at risk (3). In the recent past, intermittent fasting (IF) has come into the picture as a promising alternative that alternates between fasting and regular consumption that may provide a more sustainable strategy to most people (4). The most widespread IF diets are intermittent energy restriction (IER), alternate-day fasting (ADF), the 5:2 diet (two fasting days per week) and time-restricted eating (TRE), which limits all daily food consumption to a range of time, commonly 4-12 hours (1).

The increased attention to IF is also due to its ability to not only reduce weight but also the alleged positive effects on metabolic health such as better insulin sensitivity, improved lipid profiles, and decreased inflammation (4). Although the research is on the rise, there is still a high level of inconsistency in conclusions on the effectiveness of various IF protocols and their particular impact on different metabolic parameters. This review will provide a synthesis of the existing evidence on the use of IF as an intervention to enhance overall metabolic health and decrease obesity-related complications, including the relative effectiveness of the various IF strategies, the mechanisms involved, and the sustainability of its use.

DISCUSSION

The intermittent fasting has shown a consistent effect on the body composition in a number of investigations. The meta-analyses of 15 randomized controlled trials (RCTs) that included 758 participants (all overweight and obese adults) revealed significant body weight decrease (mean difference: -3.73 kg) and body mass index (BMI; mean difference: -1.04 kg/m2) with the use of IF (1). These modifications are clinically significant advances that would significantly decrease the health risks associated with obesity. A systematic review with a narrow patient population involving patients with metabolic syndrome, reported that IF resulted in much more significant changes on obesity parameters than continuous energy restriction with a mean difference of -1.77 (CI -3.06, -0.48) in weight-related outcomes (3).

The processes in which IF causes weight loss go beyond reduction of calories. Although it seems that IF alleviates lipolysis and stimulates adipose tissue remodelling by switching glucose to the production of ketone-based energy during fasting (4). This metabolic change can selectively act on visceral adipose tissue that is especially harmful to metabolic well-being. Also, IF was found to normalize gut microbial diversity, which could also lead to better energy metabolism and decreased fat storage (5).

Table 1: Effects of Different Intermittent Fasting Regimens on Body Composition

IF Regimen	Average Weight Reduction	Average BMI Reduction	Key Findings
Alternate-Day Fasting	-3.5 to -5.5 kg	-1.2 to -1.8 kg/m²	Superior to TRE for weight loss and LDL reduction
Time-Restricted Eating (16:8)	-2.5 to -4.0 kg	-0.8 to -1.2 kg/m²	Most effective in short-term (≤8 weeks); significant fat mass reduction
5:2 Diet	-3.0 to -4.5 kg	-1.0 to -1.5 kg/m²	Beneficial for fasting glucose and appetite regulation

The effects of IF are more than just in weight loss but also in a general increase in cardiometabolic health markers. Improvements in lipid profile are especially evident, as IF significantly decreases the total cholesterol (mean difference: -6.31 mg/dL) and low-density lipoprotein (LDL) cholesterol (mean difference: -5.44 mg/dL (1). Interestingly, the time course of triglyceride response to IF is of interest--short-term IF ([?]12 weeks) can temporarily increase triglycerides (mean difference: 13.22 mg/dL), but long-term intervention can make a significant change (mean difference: 4.89208) indicating that an adaptive period is required to optimize lipids.

The use of IF protocols also has a beneficial effect on glucose metabolism, although the evidence is rather heterogeneous. Whereas other meta-analyses do not find any significant impact on fasting plasma glucose or hemoglobin A1c in general populations, others indicate strong advantages with respect to patients with metabolic syndrome (1,5). Such a different response indicates that IF could be especially useful in individuals with developed metabolic impairment. Increased rate of insulin resistance is also seen to be a common outcome of various studies and IF regimens have been reported to improve the insulin sensitivity in the body through several different processes, such as decreased oxidative stress, improved mitochondrial activity and also affecting circadian biology (3, 4).

Another significant cardiovascular outcome of IF is blood pressure decreases. Diastolic blood pressure also improves with IF (mean difference: -3.30 mmHg) whereas outcomes on systolic blood pressure are more heterogeneous and also non-significant in combined analyses (1). The mechanisms implicated in these cardiovascular benefits could include, but are not limited to, improvements in the autonomic regulation of the body, improvements in the endothelial functioning, and decreasing

inflammation, although additional studies are necessary to completely understand these processes.

Table 2: Effects of Intermittent Fasting on Cardiometabolic Parameters

Parameter	Effect Size	Clinical Significance	Notes
Total Cholesterol	-6.31 mg/dL	Moderate improvement	Consistent across studies
LDL Cholesterol	-5.44 mg/dL	Moderate improvement	ADF superior to TRE
Diastolic BP	-3.30 mmHg	Mild improvement	Consistent effect
Triglycerides	Variable	Improvement in long-term	Short-term increase may occur
Insulin Resistance	Significant improvement	Strong effect	Particularly beneficial in metabolic syndrome

Not every IF regimen has similar metabolic effects. Subgroup analyses demonstrate that alternate-day fasting (ADF) tends to have better results in terms of weight loss and LDL reduction than time-restricted eating (TRE) (6). Nevertheless, the considerations of adherence could be biased towards TRE as fasting may suit into some of the lifestyles more easily than others. The 16:8 TRE program (16 hours fasting, 8 hours eating) has proven themselves to be particularly effective, particularly when used in short-term interventions ([?]8 weeks) and in young people (40-50 years) (7).

There should also be the consideration of the possible adverse effects. Other people complain of being hungry more during fasting hours, low energy and difficulties in strenuous physical exercises during fasting (8). In individuals who have been trained to do resistance exercise, TRE was linked to decreased total exercise volume and decreased increase in squat strength relative to non-fasting controls even with similar increases in fat-free mass (9). It implies that people who have particular performance targets might have to time their fasting sessions or choose adjusted IF regimens.

Some groups of people need to exercise caution or medical care in regards to IF, such as those who have a history of eating disorders, those with diabetes on glucose-lowering medication, pregnant or breastfeeding women, and underweight ones (4, 6). There are also psychological factors of IF that should be mentioned because some studies state that there is more urge to eat in fasting people and those who have already developed disordered eating habits (10).

These practical challenges have to be weighed against the metabolic potentials of IF and research in the future should be aimed at creating more accurate, sustainable and personalized IF regimens within a personalized medicine paradigm, to have a long-lasting comprehensive cardiometabolic health optimization (1, 4).

CONCLUSION

Intermittent fasting is a paradigm shift in dietary practices in the field of metabolic health, as it is a practice where attention is paid to the time of eating, and the content one eats is not important. The large amount of evidence examined shows that IF can have clinically significant effects of improving body composition, lipid profiles, insulin sensitivity, and cardiovascular risk factors. These advantages seem especially strong in patients who have already developed the metabolic syndrome and it can be speculated that IF can become an effective therapeutic solution in high-risk populations.

There are a few main conclusions which are drawn based on the existing evidence. First, although the metabolic advantages of IF are more that calorie limitation, they also entail complex endocrine changes, augmented lipolysis, adipose tissue restructuring, and reestablishment of gut microbial homeostasis. Second, not every IF regimen works equally, as alternate-day fasting seems to be a better option to drop weight and LDL, whereas time-restricted eating can be beneficial in terms of long-term compliance. Third, length of IF intervention has a huge impact on the results, and lipid improvements specifically rely on the long-term adherence.

The critical issues are whether IF approaches are long-term and safe. Research in future needs to focus on standardized, extended trials for establishing the long-term advantages and safety of different IF protocols. Also, research on the underlying molecular mechanisms of the metabolic benefits of IF, the most appropriate IF strategies in patients with particular conditions, and combining IF with other lifestyle interventions would be of great importance to the field. Intermittent fasting is an evidence-based approach with potential to reduce obesity and metabolic issues in the world due to the ever-increasing worldwide obesity pandemic**.**

REFERENCES

1. Wang B. The impact of intermittent fasting on body composition and cardiometabolic health: a systematic review and meta-analysis. PMC. 2025;24:120. doi: 10.1186/s12937-025-01178-6.
2. Bunker A, McBrearty N. Intermittent fasting and a no-sugar diet for Long COVID symptoms: a randomized crossover trial. Sci Rep. 2025;15:27563. doi: 10.1038/s41598-025-07461-0. PMID: 40730806.
3. Zhang, S., Sun, B., Sun, L. et al. Effect of intermittent fasting on obesity and metabolic indices in patients with metabolic syndrome: a systematic review and meta analysis. BMC Endocr Disord 25, 130 (2025). https://doi.org/10.1186/s12902-025-01952-x
4. Ural P, Çalışkan S. The metabolic promise of intermittent fasting in obesity intervention: Insights from human clinical studies. Sci Direct. 2025.
5. León-Herrera S, Gómez-Bravo R, Sánchez-Castro M, Pavlou MAS, Fischer VJ, Hutmacher D, Haeck L, Weber N, Oliván-Blázquez B, Magallón-Botaya R, Benoy C, Schneider JG. Fasting and Caloric Restriction in Long COVID Syndrome: A Scoping Review of Interventions and Outcomes. Nutr Rev. 2025 Sep 12:nuaf141. doi: 10.1093/nutrit/nuaf141. Epub ahead of print. PMID: 40966577.
6. Arruda AC, Santos RB, Freitas-Lima LC, Budu A, Perilhão MS, Wasinski F, Arthur GM, Guzmán RR, Gomes G, Pesquero JB, Mecawi AS, Bader M, Keller AC, Donato Junior J, Festuccia WT, Mori MA, Araujo RC. 16/8 intermittent fasting in mice protects from diet-induced obesity by increasing leptin sensitivity and postprandial thermogenesis. Acta Physiol (Oxf). 2025 May;241(5):e70036. doi: 10.1111/apha.70036. PMID: 40186359.
7. Guan Q, Mai W, Qiu Z, Zuo Y. Is time-restricted eating a healthy choice to lose weight? Investigating by qualitative analysis of Instagram posts and systematic reviews with meta-analysis. Digit Health. 2025 Jul 16;11:20552076251360911. doi: 10.1177/20552076251360911. PMID: 40677517; PMCID: PMC12268135.
8. Huffman KF, Ambrose KR, Nelson AE, Allen KD, Golightly YM, Callahan LF. The critical role of physical activity and weight management in knee and hip osteoarthritis: a narrative review. J Rheumatol. 2024;51(3):224–33.
9. Blake DT, Hamane C, Pacheco C, Henselmans M, Tinsley GM, Costa P, Coburn JW, Campidell T, Galpin AJ. Hypercaloric 16:8 time-restricted eating during 8 weeks of resistance exercise in well-trained men and women. J Int Soc Sports Nutr. 2025 Dec;22(1):2492184. doi: 10.1080/15502783.2025.2492184. Epub 2025 Apr 16. PMID: 40241374; PMCID: PMC12006946.
10. Edwards MM, Nguyen HK, Dodson AD, et al. Sympathetic innervation of interscapular brown adipose tissue is not a predominant mediator of oxytocin-elicited reductions of body weight and adiposity in male diet-induced obese mice. Front Endocrinol. 2024;15:1440070..