RESEARCH PAPER

Impact of Intermittent Fasting on Metabolic and Cardiovascular Parameters

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ABSTRACT

Background: Intermittent fasting (IF) has emerged as a popular dietary intervention for weight management and improvement of metabolic health. Evidence suggests that IF may positively influence body weight, glucose metabolism, lipid profile, and cardiovascular risk factors. **Objective:** To evaluate the impact of intermittent fasting on metabolic and cardiovascular parameters among overweight and obese adults. **Materials and Methods:** A prospective non-interventional study was conducted in the Departments of Biochemistry and Physiology, KIMS, Bhubaneswar, among 100 overweight and obese adults aged 25-55 years. Participants followed a 16:8 intermittent fasting regimen for 12 weeks. Anthropometric measurements, fasting blood glucose (FBG), glycated hemoglobin (HbA1c), lipid profile, blood pressure, and heart rate were assessed at baseline and repeated at 12 weeks. Data were analyzed using paired t-tests, with $p < 0.05$ considered statistically significant. **Results:** After 12 weeks of intermittent fasting, significant reductions were observed in body weight (82.4 +/- 10.2 kg vs. 77.8 +/- 9.6 kg), BMI (29.8 +/- 3.4 kg/m^2 vs. 28.1 +/- 3.2 kg/m^2), fasting blood glucose (108.5 +/- 12.6 mg/dL vs. 98.7 +/- 10.8 mg/dL), systolic blood pressure (132.4 +/- 11.2 mmHg vs. 124.6 +/- 9.8 mmHg), LDL cholesterol (134.2 +/- 21.5 mg/dL vs. 118.7 +/- 19.6 mg/dL), and triglycerides (176.4 +/- 35.2 mg/dL vs. 148.8 +/- 29.5 mg/dL). HDL cholesterol increased from 42.6 +/- 5.4 mg/dL to 47.2 +/- 6.1 mg/dL. **Conclusion:** Intermittent fasting significantly improved metabolic and cardiovascular parameters in overweight and obese adults, suggesting its potential as a non-pharmacological strategy for reducing cardiometabolic risk.

Keywords: Intermittent fasting; Obesity; Cardiovascular health; Metabolic parameters; Lipid profile; Blood pressure.

How to cite this article: Samantaray A, Rout V, Chand A. Impact of Intermittent Fasting on Metabolic and Cardiovascular Parameters. Int J Drug Deliv Technol. 2026;16(65s):1254-1257. DOI: 10.25258/ijddt.16.65s.129

INTRODUCTION

Obesity and associated metabolic disorders have become major public health concerns worldwide. The increasing prevalence of overweight and obesity contributes significantly to the burden of type 2 diabetes mellitus, hypertension, dyslipidemia, and cardiovascular diseases (CVDs) [1]. According to the World Health Organization, obesity has nearly tripled globally over the past four decades, making the identification of effective dietary interventions essential for disease prevention and health promotion [2].

Intermittent fasting (IF) is a dietary pattern characterized by alternating periods of eating and fasting. Unlike traditional calorie-restricted diets, IF focuses primarily on the timing of food intake rather than continuous caloric restriction [3]. Common forms of IF include alternate-day fasting, the 5:2 diet, and time-restricted feeding such as the 16:8 method, where food consumption is limited to an eight-hour window each day [4].

The physiological effects of intermittent fasting are attributed to metabolic switching from glucose utilization to fatty acid oxidation and ketone production during fasting periods [5]. This metabolic adaptation enhances insulin sensitivity, promotes lipolysis, and may reduce oxidative stress and inflammation [6]. Animal and human studies have demonstrated that fasting can activate cellular repair mechanisms, improve mitochondrial function, and enhance metabolic flexibility [7].

Several clinical trials have reported beneficial effects of IF on body weight, insulin resistance, lipid metabolism, and blood pressure [8]. Weight reduction achieved through IF has been associated with improvements in cardiovascular risk factors, including lower levels of low-density lipoprotein cholesterol (LDL-C), triglycerides, and inflammatory biomarkers [9]. Furthermore, IF may influence circadian rhythms, which play an important role in metabolic regulation and cardiovascular function [10].

Cardiovascular disease remains the leading cause of mortality worldwide. Modifiable risk factors such as obesity, hypertension, diabetes, and dyslipidemia significantly contribute to cardiovascular morbidity and mortality [11]. Therefore, interventions that

simultaneously target these risk factors are of considerable clinical importance. Intermittent fasting has gained attention as a potentially effective and sustainable lifestyle approach that may improve cardiometabolic health without requiring complex dietary modifications [12].

Despite growing evidence supporting the health benefits of IF, variations in study design, fasting protocols, and participant characteristics have led to inconsistent findings. Further research is needed to evaluate its effectiveness in different populations and to better understand its impact on metabolic and cardiovascular parameters [13]. Therefore, the present study aimed to assess the effect of a 12-week intermittent fasting regimen on anthropometric, metabolic, and cardiovascular parameters among overweight and obese adults.

MATERIALS AND METHODS

Study Design

A prospective, non-interventional study was conducted in the Departments of Biochemistry and Physiology at Kalinga Institute of Medical Sciences (KIMS), Bhubaneswar. The study was carried out over a period of 12 weeks in a tertiary care teaching hospital setting. The design was intended to evaluate changes in measurable cardiometabolic variables before and after a 16:8 intermittent fasting regimen under routine lifestyle guidance.

Study Population

A total of 100 overweight and obese adults aged between 25 and 55 years were enrolled. Participants were selected on the basis of body mass index and willingness to participate. Baseline clinical and laboratory parameters were recorded before initiation of the fasting schedule.

Inclusion Criteria

- Adults aged 25-55 years.
- BMI >= 25 kg/m^2.
- Willingness to participate and provide informed consent.

Exclusion Criteria

- Pregnancy and lactation.
- Type 1 diabetes mellitus.
- Severe cardiovascular disease.
- Chronic kidney or liver disease.
- Individuals taking weight-loss medications.

Intervention

Participants were instructed to follow a 16:8 intermittent fasting protocol. They fasted for 16 consecutive hours daily and consumed all meals within an 8-hour eating window. Water, black coffee, and unsweetened tea were permitted during fasting periods.

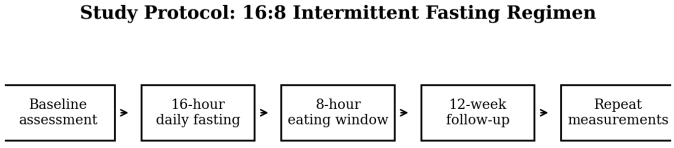

Figure 1: Study protocol illustrating baseline evaluation, daily 16-hour fasting, 8-hour eating window, 12-week follow-up, and repeat cardiometabolic assessment.

Data Collection

Baseline assessments included body weight, body mass index (BMI), waist circumference, fasting blood glucose (FBG), HbA1c, lipid profile (total cholesterol, LDL, HDL, triglycerides), blood pressure, and resting heart rate. All measurements were repeated after 12 weeks.

Ethical Considerations

Ethical approval was obtained from the Institutional Ethics Committee. Written informed consent was obtained from all participants.

Statistical Analysis

Data were analyzed using SPSS version 26. Continuous variables were expressed as mean +/- standard deviation (SD). Paired t-tests were used to compare baseline and post-intervention values. Statistical significance was set at $p < 0.05$.

RESULTS

Anthropometric Outcomes

A significant reduction was observed in body weight, BMI, and waist circumference after 12 weeks of intermittent fasting, indicating improved body composition and reduced central obesity.

Table 1: Changes in Anthropometric Parameters

Parameter	Baseline (Mean +/- SD)	12 Weeks (Mean +/- SD)	p-value
Weight (kg)	82.4 +/- 10.2	77.8 +/- 9.6	<0.001
BMI (kg/m^2)	29.8 +/- 3.4	28.1 +/- 3.2	<0.001
Waist circumference (cm)	101.2 +/- 8.6	95.4 +/- 7.9	<0.001

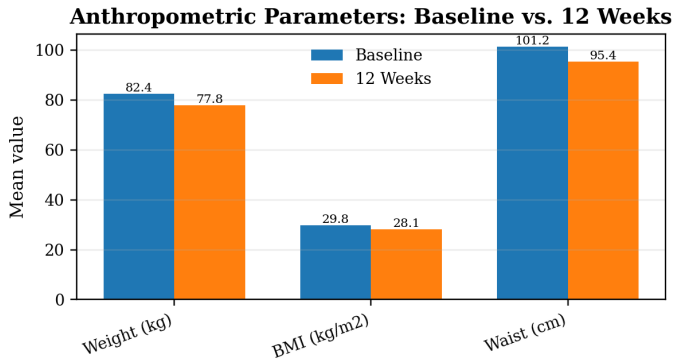

Figure 2: Baseline and 12-week comparison of body weight, BMI, and waist circumference. All reductions were statistically significant ($p < 0.001$).

Metabolic Outcomes

Intermittent fasting significantly improved glycemic control, reflected by reductions in fasting blood glucose and HbA1c levels.

Table 2: Changes in Metabolic Parameters

Parameter	Baseline	12 Weeks	p-value
Fasting blood glucose (mg/dL)	108.5 +/- 12.6	98.7 +/- 10.8	<0.001
HbA1c (%)	6.1 +/- 0.5	5.7 +/- 0.4	<0.001

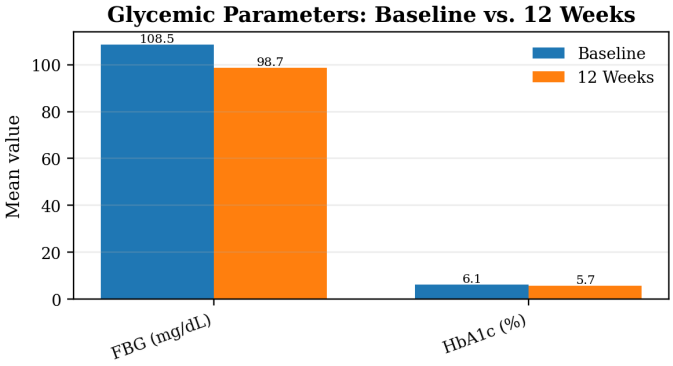

Figure 3: Glycemic parameters before and after the 12-week intermittent fasting regimen. Reductions in fasting blood glucose and HbA1c indicate improved glycemic control.

Lipid Profile Outcomes

The lipid profile improved significantly following intermittent fasting, with reductions in total cholesterol, LDL cholesterol, and triglycerides, while HDL cholesterol increased.

Table 3: Changes in Lipid Profile

Parameter	Baseline	12 Weeks	p-value
Total cholesterol (mg/dL)	210.8 +/- 28.4	190.6 +/- 24.2	<0.001
LDL cholesterol (mg/dL)	134.2 +/- 21.5	118.7 +/- 19.6	<0.001
HDL cholesterol (mg/dL)	42.6 +/- 5.4	47.2 +/- 6.1	<0.001
Triglycerides (mg/dL)	176.4 +/- 35.2	148.8 +/- 29.5	<0.001

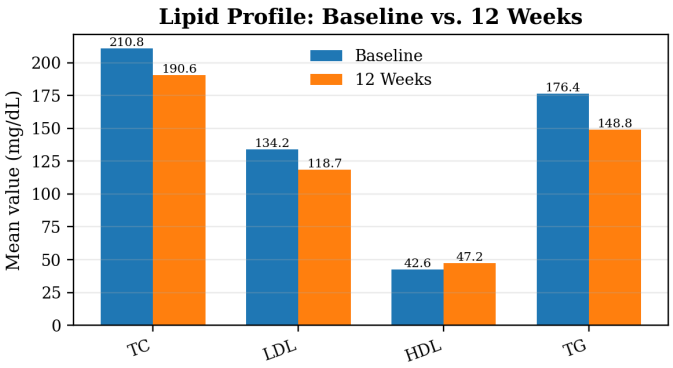

Figure 4: Changes in lipid profile after intermittent fasting. Total cholesterol, LDL cholesterol, and triglycerides decreased, while HDL cholesterol increased.

Cardiovascular Outcomes

Significant reductions in blood pressure and heart rate suggest improved cardiovascular function and reduced cardiovascular risk.

Table 4: Changes in Cardiovascular Parameters

Parameter	Baseline	12 Weeks	p-value
Systolic BP (mmHg)	132.4 +/- 11.2	124.6 +/- 9.8	<0.001
Diastolic BP (mmHg)	84.8 +/- 7.2	79.6 +/- 6.4	<0.001
Heart rate (beats/min)	78.5 +/- 8.2	73.1 +/- 7.6	<0.001

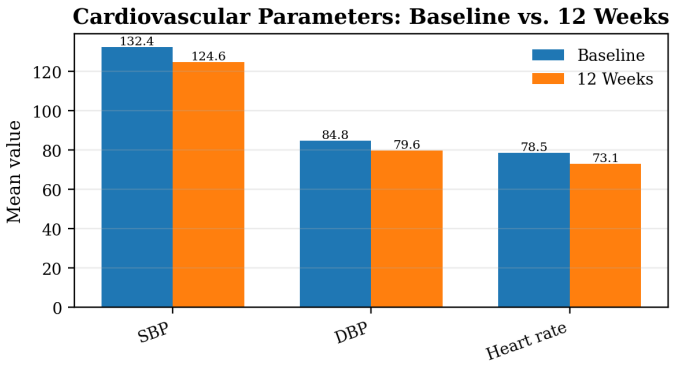

Figure 5: Cardiovascular parameters at baseline and after 12 weeks. Both blood pressure and resting heart rate showed statistically significant reductions.

Percentage Change Summary

For presentation similar to a comprehensive statistical article, the available baseline and 12-week means were also summarized as percentage change. This descriptive conversion was derived directly from the reported means and was used only to show the direction and magnitude of improvement.

Table 5: Derived Percentage Change from Baseline to 12 Weeks

Parameter	Baseline	12 Weeks	% Change
Weight (kg)	82.4	77.8	-5.6
BMI (kg/m^2)	29.8	28.1	-5.7
Waist circumference (cm)	101.2	95.4	-5.7
Fasting blood glucose	108.5	98.7	-9.0
HbA1c	6.1	5.7	-6.6
Total cholesterol	210.8	190.6	-9.6
LDL cholesterol	134.2	118.7	-11.5
HDL cholesterol	42.6	47.2	+10.8
Triglycerides	176.4	148.8	-15.6
Systolic BP	132.4	124.6	-5.9
Diastolic BP	84.8	79.6	-6.1
Heart rate	78.5	73.1	-6.9

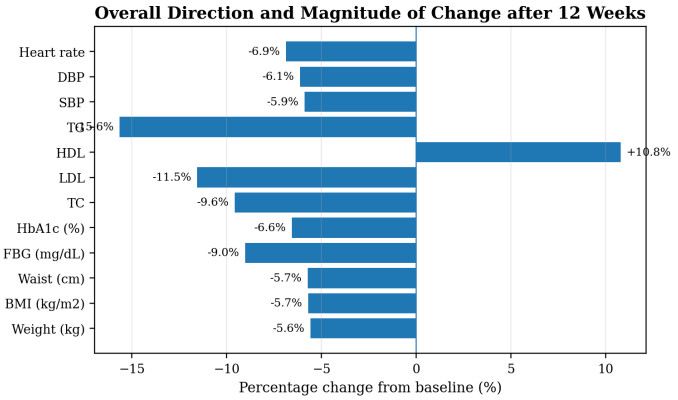

Figure 6: Overall percentage change from baseline after 12 weeks. Improvements were observed across anthropometric, glycemic, lipid, and cardiovascular domains.

DISCUSSION

The present study demonstrated that a 12-week intermittent fasting regimen significantly improved anthropometric, metabolic, and cardiovascular parameters among overweight and obese adults. These findings support previous research indicating that intermittent fasting is an effective dietary strategy for improving cardiometabolic health.

A significant reduction in body weight, BMI, and waist circumference was observed after the intervention. Similar findings were reported by Varady et al., who found that intermittent fasting promotes weight loss through reduced energy intake and enhanced fat oxidation [14]. Weight reduction is particularly important because excess adiposity is strongly associated with insulin resistance and cardiovascular disease.

The present study also showed significant improvements in fasting blood glucose and HbA1c levels. Sutton et al. reported that time-restricted feeding improves insulin sensitivity and pancreatic beta-cell responsiveness even in the absence of significant weight loss [15]. Improved glucose metabolism may result from enhanced insulin signaling and reduced hepatic glucose production during fasting periods.

The favorable changes observed in lipid parameters are consistent with previous studies. Patterson and Sears reported that intermittent fasting decreases total cholesterol, LDL cholesterol, and triglyceride concentrations while increasing HDL cholesterol [16]. These improvements may be explained by increased utilization of stored fat as an energy source during fasting periods.

Significant reductions in systolic and diastolic blood pressure were also observed. These findings align with the work of de Cabo and Mattson, who suggested that fasting may improve vascular function through reductions in oxidative stress, inflammation, and sympathetic nervous system activity [5]. Lower blood pressure contributes substantially to reducing cardiovascular risk.

The observed decrease in resting heart rate further supports the beneficial cardiovascular effects of intermittent fasting. Improved autonomic balance and enhanced cardiovascular efficiency may contribute to this outcome. Previous studies have demonstrated that fasting can improve endothelial function and reduce markers of systemic inflammation, both of which are associated with better cardiovascular health [17].

The mechanisms underlying the benefits of intermittent fasting involve metabolic switching, increased ketogenesis, enhanced mitochondrial function, and activation of cellular stress-response pathways [5,7]. These physiological adaptations may collectively contribute to improved metabolic homeostasis and cardiovascular protection.

Although the findings are encouraging, certain limitations should be considered. The study duration was relatively short, and dietary adherence was self-reported. Long-term randomized controlled trials are needed to establish the sustainability and long-term safety of intermittent fasting.

Overall, the present study adds to the growing body of evidence supporting intermittent fasting as an effective lifestyle intervention for reducing cardiometabolic risk factors and improving overall health.

CONCLUSION

Intermittent fasting significantly improved body weight, BMI, waist circumference, glycemic control, lipid profile, blood pressure, and heart rate among overweight and obese adults. These findings suggest that intermittent fasting may serve as an effective, low-cost, and non-pharmacological approach for improving metabolic and cardiovascular health. Further long-term studies are recommended to evaluate its sustainability and long-term clinical benefits.

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