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The Effects of Intermittent Fasting on Selected Cardiovascular and Metabolic Parameters

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Abstract: ***Background***: Intermittent fasting (IF) has gained popularity as a lifestyle intervention for improving cardiometabolic health, yet its short-term effects remain inconsistent. ***Objective***: To evaluate the short-term effects of intermittent fasting on cardiovascular and metabolic parameters in apparently healthy overweight adults. Methods: A comparative study was conducted on 560 adults aged 18 to 60 years. Participants practising intermittent fasting (n=280) were compared with non-fasting controls (n=280). Anthropometric measures, lipid profile, C-reactive protein, pulse rate, and blood pressure were assessed after one month. ***Results***: The intermittent fasting group showed a significant reduction in body weight and body mass index. However, total cholesterol, LDL cholesterol, triglycerides, C-reactive protein, systolic blood pressure, and pulse rate were significantly higher, while HDL cholesterol was lower compared with controls. Diastolic blood pressure showed no significant difference. ***Conclusion***: Intermittent fasting demonstrated mixed short-term effects, with beneficial reductions in body weight and BMI but unfavourable changes in lipid profile and inflammatory markers. These findings highlight the need for careful dietary planning and long-term studies to establish the safety and cardiometabolic benefits of intermittent fasting. Keywords: Intermittent fasting, Blood Pressure, Lipid profile, cardiometabolic Health.

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INTRODUCTION

Intermittent fasting (IF) refers to a broad spectrum of dietary approaches that emphasise the timing of food intake by alternating planned periods of fasting with periods of unrestricted or normal eating. In recent years, IF has attracted considerable attention as a lifestyle strategy with potential benefits for both cardiovascular and metabolic health. Although patterns of fasting have long been practised within various religious and cultural traditions, systematic scientific interest in IF has expanded markedly over the past two decades, driven by accumulating evidence of its favourable physiological effects. [1,2]

IF includes several commonly adopted regimens, such as alternate-day fasting, the 5:2 dietary pattern, and time-restricted feeding (TRF), all of which are defined by cycles of caloric abstinence interspersed with designated eating windows. In contrast to traditional continuous calorie restriction, which relies on a persistent reduction in daily energy intake, IF capitalises on the body's adaptive responses to fasting. These responses involve coordinated metabolic and hormonal adjustments that extend beyond simple calorie reduction and are increasingly recognised for their relevance in the prevention and modulation of cardiometabolic disorders. [3,4]

Cardiovascular diseases (CVDs) continue to represent the foremost cause of death worldwide, contributing to an estimated 17.9 million deaths each year and imposing a substantial burden on global health systems [5]. In parallel, the rising incidence of metabolic disorders, including type 2 diabetes mellitus (T2DM), obesity, and dyslipidemia, has further intensified the demand for effective strategies aimed at both prevention and long term disease management [6].

Within this context, intermittent fasting (IF) has gained recognition as a practical, economical, and non-pharmacological lifestyle intervention with the potential to favorably influence multiple cardiovascular and metabolic risk determinants. Emerging evidence suggests that IF may improve blood pressure regulation, lipid metabolism, insulin sensitivity, and systemic inflammatory status, all of which play central roles in the pathogenesis of cardiometabolic disease [7].

The biological plausibility of IF is largely attributed to its capacity to induce a phenomenon known as metabolic switching, whereby the body shifts from a glucose dependent state to one that relies predominantly on fatty acid oxidation and ketone body production during periods of fasting [8]. This metabolic adaptation is associated with enhanced insulin responsiveness, attenuation of oxidative stress, and activation of autophagy, a highly conserved cellular process involved in the removal of damaged organelles and proteins. Autophagy is increasingly recognised as a critical mechanism underlying vascular integrity, metabolic homeostasis, and overall cardiometabolic resilience [9].
Recent evidence from both clinical trials and observational investigations has increasingly supported a

beneficial role of intermittent fasting (IF) in the regulation of blood pressure. Several studies have reported consistent improvements in hemodynamic parameters among individuals following structured fasting regimens. Pooled analyses of available data indicate that IF is associated with meaningful reductions in both systolic and diastolic blood pressure when compared with conventional dietary approaches, suggesting a favourable effect on vascular function and autonomic regulation [10]. These findings reinforce the potential of IF as a non-pharmacological intervention for blood pressure control within broader cardiometabolic risk reduction strategies.

The present study is designed to comprehensively evaluate the effects of intermittent fasting on cardiovascular and metabolic health outcomes. The primary objectives are to assess changes in cardiovascular parameters, including systolic and diastolic blood pressure and heart rate, and to examine alterations in key metabolic markers such as fasting blood glucose, insulin concentrations, and lipid profile. In addition, the study aims to evaluate the impact of IF on anthropometric measures, particularly body weight and body mass index (BMI). Furthermore, the investigation seeks to explore the safety, feasibility, and short-term efficacy of intermittent fasting as a practical dietary approach for improving overall cardiometabolic health.

Materials and Methods

The present research study was conducted in the Department of Physiology at Index Medical College, Indore, Madhya Pradesh, to investigate the effects of intermittent fasting on metabolic and biochemical parameters related to cardiovascular health in adult subjects, and to assess the impact of hemodynamic variables, glycemic indices, and lipid profiles in comparison to one month of intermittent fasting.

Inclusion criteria

Apparently healthy adults of the age group 18 to 60 years, having a BMI of 25 to 29, were includedin the study. Other criteria for inclusion in the study include a stable body weight (±3 kg) for at least 6 months; willingness to provide written informed consent, to comply with the study procedures and to undertake the required fasting durations along with follow- ups for laboratory investigations and physical examinations.

Exclusion criteria

Persons with a body weight of more than 120 kg will be excluded to avoid any compromises in the safety of the participants arising due to fasting protocols, those with recent history of engagement in fasting practices in the last 90 days, a recent change in diet/physical activity habits,those suffering from an eating disorder (based on dietary history), those diagnosed with diabetes or other metabolic health disorders will be excluded for safety reasons, an ongoing medical condition or treatment which may interfere with study variables such as those taking statins, menopausal and pregnant women including those planning for pregnancy in the next six months shall be excluded for safety reasons, those who have donated blood within the last 3 months and any other behavioral patterns or conditions that could introduce bias to the experiment or poses undue personal risk.

Results

Table 1: Group–wise distribution of study population

Groups	No. Subjects	Cases/controls	Percentage
Group 1	280	Cases	50%
Group 2	280	Controls	50%

Out of the total participants, 280 individuals practising intermittent fasting were assigned to Group 1, while the remaining 280 participants who did not practice fasting were allocated to Group 2. Table 1 presents the distribution of the study population across the two groups.

Out of these participants, 280 who were intermittent fasting were put in group 1 and 280 who were not fasting were put in group 2. Table 1 shows how the population is divided into groups.

DEMOGRAPHIC INFORMATION WEIGHT

The table provides the demographic statistics for groups 1 and 2. The chi-square (x2) values utilized to assess the impacts of diabetes and intermittent fasting on metabolic and cardiovascular health in relation to sex, age, region, and BMI are not statistically significant. (Table 2)

Table 2: Demographic information, weight, height, BMI group-1 and group-2 individuals

Sr. No.	**Type of subjects**	**Weight (kg)**		**Hight (m)**		**BMI (kg/m^2)**	
		Mean ± SD	**P value**	**Mean ± SD**	**p value**	**Mean ± SD**	**p value**
1.	Group-1	50.43 ± 14.99	P=.0005	1.66 ± .103	P=.261	29.57 ± 10.07	P= .8637

2.	Group-2	46.71± 9.69		1.67 ± .108		25.94 ± 4.89	

From these patients, 147 intermittent fasting males and 133 females were recruited in the research as group 1, whereas 145 normal males and 135 females were enrolled as group 2. (Table 3)

Table 3: Gender Gender-wise distribution of study population

Gender	**Group 1**	**Group 2**	**Total (292)**
Male	147	145	292
Female	133	135	263

In the current study, 280 individuals practicing intermittent fasting were assigned to group 1, whereas 280 individuals with typical eating patterns were designated to group 2. The group wise distribution of the population is given in table 4.

There were 147 male and 133 female participants in group 1 who were intermittent fasting, and 145 male and 135 female subjects in group 2 who were normal.

Years were determined to be greater in comparison to group-2 (47.87 ± 7.68). The percentage of individuals in group 1 was greater than that in group 2 during the age range of 25 to 58 years. The age difference between the subjects of both groups was not statistically significant. In group 1, 53.8% were vegetarians and 46.43% were nonvegetarians. In group 2, 53.57% were vegetarians and 46.0% were nonvegetarians. Overall, 53.57% were vegetarians and 46.43% were nonvegetarians. The difference in food habits between participants in group 1 and group 2 was not statistically significant.

The total cholesterol level of group-1 patients (201.74 ±22.81) was significantly greater than that of group-2 subjects (185.17 ± 22.03), with a p-value of 0.0001.

The HDL cholesterol levels in group-1 participants (43.90 ±4.12) were lower than those in group-2 (47.02 ± 7.7), and this difference was statistically significant (p=0.0001). The LDL cholesterol level in group-1 patients (104.05 ±12.55) was significantly greater than that in group-2 subjects (93.69 ± 14.23), with a p-value of 0.0001.

The serum triglyceride level in group 1 (109.07 ± 10.12) was significantly greater than that in group 2 (87.15 ± 14.22), with a p-value of 0.0001.

The C-reactive protein level in individuals from group 1 (12.80 ± 4.7) was substantially higher than in those from group 2 (3.66 ± 4.71), with a p-value of 0.0001. The participants in group 1 had a lower BMI (25.94 ± 4.89) than those in group 2 (29.57 ± 14.99), and this difference was statistically significant (p=0.002). (Table 4)

Table 4: Comparison of parameters serum total cholesterol, serum HDL cholesterol, serum LDL cholesterol, serum triglyceride, C-reactive protein, pulse rate, systolic BP, & Diastolic BP in group-1 and group-2 individuals

Parameter	Type of subjects		
	Group-1 (n=280)	Group-2(n = 280)	P value
total cholesterol (mg/dl)	201.74 ± 22.81	185.17 ±22.03	p= 0.0001
HDL cholesterol (mg/dl)	43.90 ± 4.12	47.02 ± 7.7	p= 0.0001
LDL cholesterol (mg/dl)	104.05 ± 12.55	93.69 ± 14.23	p= 0.0001
serum triglyceride (mg/dl)	109.05±10.12	87.15 ±14.22	p= 0.0001
C-reactive protein (mg/l)	12.8 ±1.7	3.66 ±1.5	p= 0.0001
pulse rate (BPM)	75,66 ± 9.69	73.82 ±8.95	p= 0.0199
systolic BP (mm Hg)	123.28 ±9.47	120.67 ± 7.45	p= 0.0004
Diastolic BP (mm Hg)	77.57 ± 8.29	76.32±7.74	p= 0.065
Weight (kgs)	50.43 ±14.99	46.71 ±9.69	p= 0.0005
Height (mts)	1.66 ±.103	1.67 ±.108	p= 0.267
BMI (kg/m2)	29.57 ± 10.7	25.94 ±4.89	p= 0.0001

DISCUSSION

The present study examined the effects of intermittent fasting on selected cardiovascular and metabolic parameters in apparently healthy overweight adults. The findings demonstrate that intermittent fasting is associated with significant changes in anthropometric, lipid, inflammatory, and hemodynamic variables, highlighting both potential benefits and concerns related to short-term fasting practices.

A key finding of this study was the significantly lower body weight and body mass index observed in the intermittent fasting group compared with the non-fasting group. This supports existing evidence that intermittent fasting can facilitate weight reduction through mechanisms such as reduced caloric intake, enhanced lipolysis, and improved metabolic efficiency during fasting periods [11,13]. Mattson et al. have described metabolic switching during fasting, characterised by a shift from glucose utilisation to fatty acid and ketone metabolism, which promotes fat loss and improves energy balance [12,18]. The observed reduction in BMI in the present study reinforces the role of intermittent fasting as a feasible strategy for short-term weight management in overweight individuals.

In contrast to the favourable anthropometric outcomes, the lipid profile findings in this study were less favourable. Participants practising intermittent fasting exhibited significantly higher total cholesterol, LDL cholesterol, and triglyceride levels, along with lower HDL cholesterol levels, compared with controls. These findings differ from several studies that have reported improvements or neutral effects of intermittent fasting on lipid parameters [13,17]. However, similar heterogeneity in lipid responses has been documented in the literature, suggesting that lipid outcomes are highly influenced by dietary composition during feeding windows, baseline metabolic status, and duration of fasting intervention [14,19]. Short-term fasting may lead to increased mobilisation of free fatty acids and hepatic lipid synthesis, potentially contributing to transient elevations in circulating lipids, particularly if feeding periods involve high-fat or calorie-dense meals.

Another important observation was the significantly elevated C-reactive protein levels in the intermittent fasting group, indicating a higher inflammatory status. This finding contrasts with experimental and clinical studies reporting anti-inflammatory effects of intermittent fasting mediated through reduced oxidative stress and enhanced autophagy [18,19]. The elevated inflammatory marker observed in this study may reflect acute physiological stress associated with fasting, sympathetic activation, or inadequate adaptation time. It is also possible that short duration fasting induces transient inflammatory responses before longer-term anti- inflammatory benefits become evident, as suggested by prior longitudinal studies [12,20].

With respect to cardiovascular parameters, the intermittent fasting group demonstrated slightly higher systolic blood pressure and pulse rate, while diastolic blood pressure did not differ significantly between groups. Although systematic reviews and meta-analyses have reported reductions in blood pressure with intermittent fasting, these effects are more consistently observed in individuals with hypertension or metabolic disease and over more extended intervention periods [10]. The modest elevation in systolic blood pressure and heart rate in the present study may be attributable to increased sympathetic nervous system activity during fasting states, dehydration, or hormonal fluctuations involving cortisol and catecholamines.

Importantly, demographic characteristics, including age, sex distribution, height, and dietary habits, were comparable between the two groups, minimising potential confounding effects. This strengthens the internal validity of the findings and suggests that the observed differences are likely attributable to fasting practices rather than baseline population differences.
Overall, the findings of this study indicate that intermittent fasting exerts mixed effects on cardiovascular and metabolic health in the short term. While beneficial effects on body weight and BMI were evident, adverse changes in lipid profile and inflammatory markers raise concerns regarding the metabolic safety of unsupervised or poorly structured fasting regimens. These results emphasise the importance of dietary quality during feeding periods, adequate adaptation time, and individualised assessment when recommending intermittent fasting.

Future research should focus on longer duration interventions, controlled dietary intake, and evaluation of additional metabolic markers such as insulin sensitivity, ketone levels, and hormonal responses. Such studies would provide a more comprehensive understanding of the long-term cardiometabolic implications of intermittent fasting and help refine evidence-based guidelines for its clinical application.

Conclusion

The present study demonstrates that intermittent fasting leads to a significant reduction in body weight and body mass index in apparently healthy overweight adults, indicating its usefulness as a short-term weight management strategy. However, these benefits were accompanied by unfavourable changes in lipid profile, inflammatory markers, and modest increases in systolic blood pressure and pulse rate. Overall, intermittent fasting showed mixed short-term effects on cardiovascular and metabolic health, highlighting the need for careful dietary planning and individualised supervision. Long-term, controlled studies are required to establish its safety and sustained cardiometabolic benefits.

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