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Research Article

Effects of Intermittent Fasting on Metabolic, Hemodynamic, and Cardiovascular Risk Parameters in Adult Subjects

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Abstract

Intermittent fasting has emerged as a popular dietary intervention with potential metabolic and cardiovascular effects. The present study was conducted to evaluate the impact of one month of intermittent fasting on anthropometric indices, glycemic parameters, lipid profile, inflammatory markers, and hemodynamic variables in healthy adult subjects. A total of 560 participants were enrolled and divided equally into intermittent fasting and non-fasting groups. Significant differences were observed in body mass index, fasting blood glucose, lipid profile components, C-reactive protein levels, and hemodynamic parameters between the two groups. These findings suggest that intermittent fasting induces significant metabolic and cardiovascular changes that warrant careful evaluation in clinical practice.

Key words: Intermittent Fasting, Hemodynamic, Cardiovascular Risk Parameters

Introduction

Cardiovascular diseases constitute a major global health burden and remain a leading cause of morbidity and mortality worldwide. The development of cardiovascular disease is strongly associated with metabolic abnormalities such as obesity, dyslipidemia, chronic low-grade inflammation, and impaired glucose regulation, which collectively contribute to atherosclerosis and vascular dysfunction (1,2).

Lifestyle-related factors play a pivotal role in the prevention and progression of these metabolic risk factors. Dietary modification, physical activity, and behavioural interventions have been shown to significantly influence cardiovascular outcomes by improving metabolic homeostasis and reducing inflammatory burden (3,4). Among emerging dietary strategies, intermittent fasting has gained considerable attention due to its potential metabolic benefits.

Intermittent fasting is defined as a dietary pattern characterised by alternating periods of voluntary fasting and unrestricted eating, without the need for continuous daily calorie restriction (5). Various forms of intermittent fasting, including time-restricted feeding and alternate-day fasting, have been proposed to induce metabolic adaptations that improve energy utilisation and cellular resilience.

Previous experimental and clinical studies have reported favourable effects of intermittent fasting on body weight reduction, insulin sensitivity, and metabolic flexibility, suggesting improved regulation of glucose and lipid metabolism (6,7). These effects are believed to result from shifts in fuel utilisation from glucose to fatty acids and ketone bodies during

fasting periods.

However, evidence regarding the impact of intermittent fasting on lipid profile, inflammatory markers such as C-reactive protein, and hemodynamic parameters, including blood pressure and heart rate, remains inconsistent. Differences in study duration, population characteristics, fasting protocols, and baseline metabolic status may contribute to the variability in observed outcomes across different studies (8,9).

In view of these conflicting findings, the present study was undertaken to assess the effects of intermittent fasting on metabolic and biochemical parameters related to cardiovascular health, including glycemic indices, lipid profile, inflammatory markers, and hemodynamic variables, in adult subjects.

Materials and Methods

The study was conducted in the Department of Physiology at Index Medical College, Indore, Madhya Pradesh. Healthy volunteers aged 30 to 60 years were recruited after obtaining informed written consent. Subjects with a history of diabetes mellitus, hypertension, pulmonary disease, alcohol misuse, or steroid or drug dependency were excluded.

A total of 560 participants were enrolled and divided into two groups. Group 1 consisted of 280 individuals practising intermittent fasting for one month, while Group 2 included 280 individuals following normal dietary patterns. Demographic data, anthropometric measurements including weight, height, and body mass index, and hemodynamic variables such as pulse rate and blood pressure were recorded. Laboratory investigations included fasting blood glucose, serum total cholesterol, high-density lipoprotein cholesterol, low-density lipoprotein cholesterol, triglycerides, and C-reactive protein.

Results

Demographic and Anthropometric Characteristics

Both groups were comparable with respect to age, sex distribution, height, and dietary habits. The mean age of participants ranged from 25 to 58 years, with no statistically significant difference between the groups. Body weight and body mass index were significantly lower in the intermittent fasting group compared to controls. [Table 1]

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

Dietary Habits

Dietary patterns were similar in both groups, with approximately fifty per cent vegetarians and forty-six per cent non-vegetarians. No statistically significant difference was observed, indicating minimal dietary confounding. [Table 2]

Hemodynamic Parameters

The intermittent fasting group showed significantly higher pulse rate, systolic blood pressure, and diastolic blood pressure compared to the control group. These findings indicate an effect of intermittent fasting on cardiovascular autonomic or vascular regulation. [Table 3]

Parameter	Group -1 (N=280)		Group-2 (N=280)	
	Mean	SD	Mean	SD

Food habits	Group -1 (280)		Group-2 (280)		Total (N=560)	
	No.	%	No.	%	No.	%
Vegetarian	150	53.58	150	53.58	300	53.57
Non-Vegetarian	130	46.43	130	46.43	260	46.43

Pulse rate	75.16	9.68	73.83	4.8
Systolic BP	123.24	**9.47**	120.69	7.45
Diastolic BP	77.58	**8.30**	76.32	7.73

Glycemic Profile

Fasting blood glucose levels were significantly lower in the intermittent fasting group compared to the control group, suggesting improved glycemic regulation associated with fasting. [Table 3]

Groups	Number	Mean±SD	p-value
Controls	280	89 ±18.16	P=0.0001
Cases	280	80.27 ± 13.17	

Comparison of parameters: serum total cholesterol, serum HDL cholesterol, serum LDL cholesterol, serum triglyceride, and C-reactive protein. [Table 4]

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

Lipid Profile

Serum total cholesterol, low-density lipoprotein cholesterol, and triglyceride levels were significantly higher in the intermittent fasting group, while high-density lipoprotein cholesterol levels were significantly lower. These results indicate unfavourable lipid alterations associated with intermittent fasting in the study population. [Table 4]

Inflammatory Marker

C-reactive protein levels were markedly elevated in the intermittent fasting group, indicating increased systemic inflammation. [Table 4]

Discussion

The present study demonstrates that intermittent fasting exerts a significant influence on metabolic and cardiovascular parameters in adult subjects. A notable reduction in body mass index and fasting blood glucose was observed in individuals practicing intermittent fasting. These findings are consistent with earlier studies reporting improved insulin sensitivity and enhanced metabolic efficiency during fasting periods (10,11). Intermittent fasting is known to promote a metabolic shift from glucose utilization toward fatty acid oxidation and ketone body production, thereby improving glucose homeostasis and reducing insulin resistance (6). Reduction in adiposity further contributes to improved glycemic control by decreasing peripheral insulin resistance and inflammatory adipokine release (12).

In contrast, the present study identified significant elevations in total cholesterol, low-density lipoprotein cholesterol, triglycerides, and C-reactive protein levels among individuals practising intermittent fasting. These findings differ from several previous reports that have demonstrated favourable lipid profile changes with intermittent fasting (8,13). The observed increase in circulating lipid parameters may be explained by enhanced lipolysis during fasting periods, resulting in increased mobilization of free fatty acids and transient elevations in plasma lipids (14). Additionally, short duration fasting interventions may not allow sufficient time for lipid clearance mechanisms to stabilize, leading to temporary dyslipidemia.

The elevated C reactive protein levels observed in the intermittent fasting group suggest a heightened inflammatory response. This may reflect metabolic stress associated with abrupt alterations in energy intake, hormonal fluctuations, or activation of stress related pathways during fasting (15). While intermittent fasting has been reported to reduce inflammation in long-term studies, short-term responses may vary depending on individual metabolic adaptability and baseline health status (9).

Furthermore, the increase in pulse rate, systolic blood pressure, and diastolic blood pressure observed in the present study indicates an effect of intermittent fasting on cardiovascular autonomic regulation. These changes may be attributed to increased sympathetic nervous

system activity and reduced parasympathetic tone during fasting periods (16). Alterations in catecholamine levels, cortisol secretion, and fluid balance

during fasting may contribute to these hemodynamic changes (17). These findings underscore the importance of monitoring cardiovascular parameters, particularly in the early phase of intermittent fasting regimens.

Overall, the results of the present study highlight the complex and multifaceted physiological responses to intermittent fasting. While certain metabolic benefits, such as improved glycemic control and reduced body mass index, were observed, concurrent elevations in lipid parameters, inflammatory markers, and hemodynamic variables emphasise the need for individualised assessment and cautious implementation of intermittent fasting strategies.

Conclusion

Intermittent fasting for one month resulted in significant reductions in body mass index and fasting blood glucose, indicating beneficial effects on weight control and glycemic status. However, it was also associated with increased lipid parameters, elevated inflammatory markers, and higher hemodynamic values. These findings suggest that intermittent fasting exerts complex metabolic and cardiovascular effects, and its short- term impact may not uniformly translate into cardiovascular benefit. Long-term and mechanistic studies are required to clarify its clinical implications.

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