

# Study The Effect Of Intermittent Fasting Diet On Obese And Lipid Profile

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## Abstract

Obesity is a worldwide epidemic due to the availability of unhealthy food options and limited physical exercise. Restriction of the daily food intake results in weight loss, which is associated with better health outcomes including triglycerides, total cholesterol, low density lipoprotein cholesterol, blood pressure, glucose, insulin, and C-reactive protein. Intermittent fasting is a method of weight loss, as an alternative to daily caloric restriction which may improve serum high density lipoprotein and other lipids thereby reducing the risk of cardiovascular diseases, it include several forms such as alternate-day fasting or time-restricted feeding regimens, several studies published confirm that intermittent fasting can be a useful and safe therapeutical option for obesity, it aim to weight loss (>70%) energy restriction interspersed with normal eating, the focus of this article is obesity, lipid profile and the potential benefits of intermittent fasting on overall human health. The present study aimed to evaluate the effect of intermittent fasting for 16 hours on lipid profile and HDL-cholesterol in a sample of women in Najran. In all, thirty women overweight and obese participants (30-45) years. A 6-months quasi-experimental clinical trial was conducted on participants with low HDL <50 mg/dl. The participants were recommended to fast for 16 h during day time, five days per week for 6 months. Body weight, waist circumference, serum lipid profile, blood pressure, and blood glucose levels were measured at baseline after 6 months. The study found statistically significant difference in the weight loss between groups pre and post treatment with intermittent fasting, body measurements, including BW, BMI and WC, showed significant interaction effects ( $p < 0.05$ ), indicating that there were larger reductions post the treatment with intermittent fasting ( $68 \pm 1$ ,  $25.1 \pm 1.1$  and  $48 \pm 2.1$ ), compared to the results before treatment ( $95 \pm 1$ ,  $37.58 \pm 1$  and  $85 \pm 1.2$ ), also significant interaction effects were observed in TC, TG, LDL, HDL, BP and blood glucose ( $198 \pm 1.2$ ,  $201 \pm 1$ ,  $45.51 \pm 0.6$ ,  $55 \pm 5.0$ ,  $123 \pm 1/86 \pm 1.1$  and  $126 \pm 0.2/79 \pm 0.1$ ) compared to the results before treatment ( $237.9 \pm 1.2$ ,  $230.4 \pm 3.0$ ,  $80.78 \pm 26.2$ ,  $45.6 \pm 11.5$ ,  $159 \pm 2/110 \pm 3$  and  $170.5 \pm 1.8/95 \pm 2.0$ ) during the six months respectively. This study suggests that intermittent fasting protect cardiovascular health by improving the lipid profile and raising high density lipoprotein. Intermittent fasting may be adopted as a healthy lifestyle for the prevention, management and treatment of cardiovascular.

**Keywords:** Intermittent fasting, Obesity, lipid profile, Triglycerides, healthy life style.

## Introduction

Overweight and obesity development is associated with numerous metabolic complications including insulin resistance, which increase risk of type 2 diabetes and cardiovascular diseases [1], lipid homoeostasis can be improved through weight loss

[2]. Dietary patterns, such as the Dietary approaches which aid to stop hypertension and improvement cardiac health, current human studies suggest that diet could reduce the risk for cardiovascular disease with improvement in weight control, hypertension, dyslipidemia, and diabetes,

including reducing oxidative stress, optimization of circadian rhythms, and ketogenesis [3]. Human fasting is considered as food abstinence and even beverages between 4 h to three weeks [4]. Intermittent fasting occurs in the holy month of Ramadan, it is a period abstains from caloric and water intake from sunrise to sunset. On average, the Ramadan day is divided in 12 h of fasting and 12 h of non-fasting [5], but, intermittent fasting as life style may be one day or more a week, fasting period is during the day for 16 h of fasting for and 8 h of non-fasting and do not require restriction of water intake [6], It focuses on the timing of when one can consume meals either within a day or a week, there is two types of intermittent fasting are alternative day fasting and time restricted fasting. For time restricted fast programs include 16-hour fasts with 8-hour feeding times or 20-hour fasts with 4-hour feed times to decrease caloric intake and intermittent fasting has been linked to better glucose control in both humans and animals [7]. Intermittent fasting has received considerable interest as an alternative dietary strategy for weight loss and entails intermittent periods of substantial energy restriction interspersed with periods of normal eating [8], it is a unique dietary defined as periods of eating alternated with periods of not eating [9], it is a dietary practice in which periods of regular consumption of foods and beverages by fasting, typically in to 3 days per week. The objective of fasting is to reduce the total energy value, which results in weight loss [10], during fasting periods, glucose switches from liver to ketones. Fasting stimulates adaptive cellular responses, improved glucose regulation, increased stress resistance, suppressed inflammation and damaged molecules are removed or repaired to defend against oxidative and metabolic stress, also clinical trials have demonstrated the benefits of intermittent fasting, especially obesity, diabetes, and cardiovascular diseases, through reduced weight and improved cardiometabolic parameters [11], the altering body metabolism will lead to long-term health benefits; the excessive intake of energy is associated with increase in the incidence of chronic diseases, including obesity, type 2 diabetes mellitus and metabolic syndrome, but caloric restriction by intermittent fasting increases longevity and reduces the incidence of chronic

diseases, such as obesity, cardiovascular diseases, cancer, renal disease, and diabetes [12], Intermittent fasting is associated with weight loss in short periods of time (8 to 12 weeks) , accompanied by the control of dyslipidemia, arterial pressure, and changes in body composition, in addition, increases in insulin sensitivity [13]. On other hand, the intermittent fasting effectives on blood glucose and lipid metabolism and weight loss in overweight and obese participants, the results have showed that intermittent fasting superiority in reducing postprandial lipemia and weight loss [14]. According to [15] studied the beneficial of intermittent fasting which supports the role of its to weight loss for adults with overweight or obesity, intermittent fasting may be a dietary method to aid in the improvement of the lipid profile and raising HDL, obese and dyslipidemic in healthy men and women by reducing total cholesterol, LDL, triglycerides and increasing HDL levels and it may be adopted as a lifestyle intervention for the prevention, management and treatment of cardiovascular disorders [16-17]. Weight loss, triglycerides and cholesterol levels assessments were conducted following 16 h fasting periods, the present study aimed to the effects intermittent fasting on lipid responses and changes in fasting cardiometabolic disease risk factors, the dietary practice by using intermittent fasting has an impact on the bodyweight of overweight or obese individuals, as well as in reducing the risk of health problems. Therefore, the objective of this study was to investigate the effect of intermittent fasting on the bodyweight of overweight, obese and cholesterol individuals.

## **Materials and Methods**

### **Study design**

This was a quasi-experimental study conducted on women Najran region. Women were informed through emails, phone calls and personal contacts. Good clinical Practice guidelines were followed. After explaining the study protocol to the participants, written informed consent was collected; participants did not receive any incentive, monetary for participating in this study. In this study was recorded significant improvement



Gender	Female	Female	Female	Female	Female	Female	Female
BMI kg/m <sup>2</sup>	37.58±1	36.79±1	35.59±1.5	33.62±1	32.04±2	29.67±1.2	25.1±1.1
High/ Cm	159±3	159±3	159±3	159±3	159±3	159±3	159±3
BW /Kg	95±1	93±0.5	90±0.7	85±1.0	81±1	75±1	68±1
PW /Kg	60±1	60±1	60±1	60±1	60±1	60±1	60±1
WC cm	85±1.2	81±0.5	78±0.7	71±1	67±1.5	58±0.8	48±2.1
Overweight case description	35±0.8	33±1.0	30±0.6	25±1.1	21±1.1	15±0.6	8±1.2
	Obese	Obese	Obese	Obese	Obese	Overweight	Normal
SBP mmHg	159±2	152±1	146±2	138±3	133±1.1	128±1	123±1
DBP mmHg	110±3	107±5	105±1	100±2	96±0.5	90±2	86±1.1

Results are presented as mean ± SD at  $p < 0.05\%$

BMI: Body mass index

BW: Body weight

PW: perfect weight

WC: Waist circumference

BP: Blood Pressure

DBP: Diastolic blood pressure

SBP: systolic blood pressure

### Statistical analysis

Data were analyzed using SPSS. Data are presented as mean ± standard deviation (SD) in Tables 1. The level of significance was set to  $P < 0.05$  to detect changes over time and differences between the groups, repeated-measures ANOVA with factors time (pre, post) the treatment to test for interaction effects.

### Results and discussion

Data represented **table 1** showed the changes in the baseline before and post the intermittent fasting at the six month such as BMI, BW, WC, Overweight, SBP and DBP (37.58±1, 95±1, 85±1.2, 35±0.8, 159±2 and 110±5) and (25.1±1.1, 68±1, 48±2.1, 8±1.2, 123±1 and 86±1.1) respectively. Intermittent fasting led to weight loss, ranging from 0.8% to 13.0% of body weight [18]. In the study of 2 to 12 weeks duration that measured BMI, BMI decreased on average 4.3% to a median of 33.2 kg/m<sup>2</sup> [19]. Waist circumference decreased by 3 cm to 8 cm in studies longer than 4 weeks [20-21]. On other hand, Ramadan is an example of intermittent fasting, those who fast 14 hours per day for 30 days, presenting an opportunity to loss the overweight in obese adults [22]. Daily BP changes during fasting periods ranging from 4 to 41 days, Long-term fasting tends to decrease BP in

subjects with hypertension, this effect persisted during the 4 days, and even subjects stopped their antihypertensive medication [23]. **Table 2** summarizes the changes in lipid profile and blood glucose levels before and post the intermittent fasting for six months compared to the standard values. Body measurements including BW, BMI and WC, the intermittent fasting had significant interaction effects and significant reductions in BW (68±1), BMI (25.1±1.1) and WC (48±2.1), also significant interaction effects were showed with TC (198±1.2), TG (201±1), LDL (45.51±0.6), HDL (55±5.0) and BG (126±0.2/79±0.1) at  $P < 0.05\%$ . The parameters at baseline were respectively (95±1, 37.58±1, 85±1.2, 237.9±1.2, 227.4±3.0, 80.78±26.2, 45.6±11.5 and 170.5±1.8/95±2.0), compared to the standard (65, 25%, 45, 200, 200-240, Less than 129, More than 65 and 120/80) respectively. According to [24] studies combining intermittent fasting with physical activity, there are different types of intermittent fasting [25] suggests the potential intermittent fasting as an effective lifestyle modification for reducing the risks of cardiovascular diseases and reduce body weight and reduce diabetes parameters such as fasting glucose, fasting insulin [26]. According to study of [27] concluded that there are different types of intermittent fasting can increase HDL by 1–14 mg/dl, decrease LDL by 1–47 mg/dl, TC by 5–88 mg/dl and TG by 3–64 mg/dl, as compared to the other types of intermittent fasting, it is an effective and can be adopted in daily life without any financial burden, also individuals can prepare low calorie meals and the 16 h fastmainta might be ined by an early breakfast and having lunch at an appropriate time for weekdays.

**Table 2: The standard and Lipid profile, blood glucose values, before and post the intermittent fasting**

Parameters	Before (Baseline, n= 30)	Post treatment with intermittent fasting for the six months	Standard
BW kg	95±1	68±1	65
BMI kg/m <sup>2</sup>	37.58±1	25.1±1.1	25
WC cm	85±1.2	48±2.1	45
TC mg/dl	237.9±1.2	198±1.2	200
TG mg/dl	227.4±3.0	201±1	200-240
LDL mg/dl	80.78±26.2	45.51±0.6	Less than 129
HDL mg/dl	45.6±11.5	55±5.0	More than 65
Blood glucose mg/dl	170.5±1.8/ 95±2.0	126±0.2/79±0.1	120/80

Results are presented as mean ± SD at  $p < 0.05\%$

TC: Total cholesterol

TG: Triglycerides

LDL: Low density lipoprotein

HDL: High density lipoprotein

BG: Blood glucose

**Table 3** shows the mean changes in Blood glucose, triglycerides and total cholesterol level from baseline to post treatment with intermittent fasting. The treatment post six months led to significant reductions in BG level from (170.5±1.8/ 95±2.0 to 126±0.2/78±0.5), TG from (227.4±3.0 to 196±1) and TC from (237.9±1.2 to 198±1.2). The study suggests that intermittent fasting has the potential of improving the lipid profile such as total cholesterol (LDL and HDL), reducing body weight and waist circumference. These results are in line

with the study of [28-29] showing that there are different types of intermittent fasting like Ramadan fasting and alternative day fasting which reduce body weight and lipid levels, also intermittent fasting of 12–36 h leading to a break down of triglycerides into fatty acids and glycerol and conversion of fatty acids to ketone bodies in the liver [11] it increases fatty acid oxidation, HDL levels and decreases hepatic triglycerides and LDL levels [30]. On other hands, intermittent fasting a successful strategy, lead to reduction in cholesterol by regulating sterol regulatory element binding protein [31], weight loss and improving glycemic control for individuals with type 2 diabetes [32], also a daily fast for 16 hours to caloric restriction led to a significantly lower fasting glucose levels [33].

**Table 3: Blood glucose, triglycerides and total cholesterol level for six months**

Analysis	Pre treatment	Post treatment					
		1	2	3	4	5	6
Blood glucose level	170.5±1.8/ 95±2.0	161±1.0/ 92±1.1	158±2.0/ 91±1.0	149±2.5/ 87±0.2	141±0.1/ 84±0.1	135±1.2/ 81±0.3	126±0.2/ 79±0.1
TG	227.4±3.0	226±1.4	221±1.0	217±2.0	211±1.0	203±1.2	196±1
TC	237.9±1.2	232±1.1	223±0.4	216±1.0	208±1.0	200±1.0	198±1.2

## Conclusion

Calorie-restricted diets aide to obesity treatment. Intermittent fasting shows as a primary care for obesity. Human studies show positively impact of intermittent fasting for cardiovascular, also it impacts on multiple cardiovascular risk factors,

including obesity, hypertension, dyslipidemia, and diabetes. in addition to, it has been associated with improvement after a cardiac event, restriction of food intake for 16-h/day for 5 days/week leads to weight reduction and improvement in lipid profile, particularly HDL, which can reduce the risk of

cardiovascular diseases, so should encourage future studies to optimize the potential of intermittent fasting to improve cardiovascular outcomes.

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