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TOPIC SYNOPSIS

# Do Adults Utilizing Intermittent Fasting Improve Lipids More Than Those Following a Restricted-Calorie Diet? A Clin-IQ

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**Abstract** With approximately 95 million Americans diagnosed with high cholesterol, and many searching for a nonmedicinal treatment, intermittent fasting as a method to improve health has become increasingly popular in the lay public. We conducted a clinical inquiry to determine whether intermittent fasting is superior to a low-calorie diet in improving lipids, searching the Cochrane, EBSCO*host*, Embase, MEDLINE, and Scopus databases using the terms intermittent fasting, lipids, and calorie-restricted diet. Studies that included surgical weight loss or medicine-assisted weight loss were excluded. We identified 6 published studies, 5 of which were randomized controlled trials. In reviewing the selected studies, there did not appear to be a consistent difference in lipid change between restricted-calorie diet and intermittent fasting. Because of differences in study methods and in how intermittent fasting was defined, additional studies are needed. (*J Patient Cent Res Rev.* 2020;7:282-285.)

**Keywords** intermittent fasting; calorie-restricted diet; lipids; diet; cholesterol; randomized controlled trials

## Clinical Question

In adults over the age of 18, does intermittent fasting improve lipids more than a continual restricted-calorie diet?

## Brief Answer

No. Upon examining the published evidence, it became clear that limitations of study size and/or patient adherence, as well as between-study differences in the specific feed/fast regulations of intermittent fasting, cloud the comparison of results. However, if one takes into account the differences in study methods, the general direction of the evidence suggests that there is not a statistically significant difference in lipid change between intermittent fasting and continuous calorie restriction. While some studies do show improvement in lipid levels in the intermittent fasting groups, the difference between the methods of dietary intervention was not statistically significant.

***Level of Evidence:*** *A*

***Date Answer Was Determined:*** November 18, 2019

## Literature Search

***Databases Searched:*** Cochrane databases, Embase, EBSCO*host*, MEDLINE, and Scopus.

***Search Conducted:*** October 2019.

***Inclusion Criteria:*** Age of 18 years or older, randomized controlled trials, intermittent fasting diet.

***Exclusion Criteria:*** Surgically or medically assisted weight loss, age under 18 years.

***Search Terms:*** Intermittent fasting, lipids, calorie-restricted diet.

## Summary of Issues

It can be argued that early in human history, food sources may not have been consistently available in all

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climates, leading to mandatory intermittent fasting in at least a subset of populations across the planet. With the advent of modern farming and distribution, such deficiencies are no longer prevalent in much of the western world, nor is mandatory intermittent fasting a part of the typical diet seen in the United States. Evidence is beginning to accumulate that demonstrates that artificially reintroducing intermittent fasting can be useful to eventuate weight loss.[1] The reported efficacy of intermittent fasting on weight loss has piqued interest in examining what other benefits intermittent fasting may lend. Specifically, given that 95 million people in the United States had a total cholesterol level above 200 mg/dl in 2014,[2] the question can be raised whether artificially reintroducing intermittent fasting to a patient's diet would be useful for the purpose of reducing lipid levels.

To this end, we identified, examined, and compared 6 published articles, using the forenamed search criteria, in an attempt to discover a consensus regarding this issue. Five of these studies were randomized controlled trials (RCT),[1,3-6] characteristics of which are summarized in Table 1.

## Summary of Evidence

In a RCT published in 2016, Catenacci et al[3] compared zero-calorie alternate-day fasting (ADF) with daily calorie restriction (decrease of 400 kilocalories per day) in 25 obese adults (19 women, 6 men) over 8 weeks, with follow-up 24 weeks later. Four subjects withdrew before completion of 8 weeks. There was statistically significant improvement in both weight and cholesterol in each group, but there was no significant difference between the groups, despite an estimated overall decrease of approximately 376 kcal consumed per day in the ADF group. Limitations included small size, gender bias (more females than males, making it difficult to account for body mass index [BMI] or determine difference in applicability between genders), and all food was provided (making results more difficult to generalize to the greater population).

In a RCT published in 2017, Trepanowski et al[4] studied ADF versus daily calorie restriction versus no intervention in 100 obese adults (86 women, 14 men) over 1 year consisting of 6 months of weight loss followed by 6 months of maintenance. A total

**Table 1.** Study Characteristics of Individual Randomized Controlled Trials

| | Protocol | Length | Total cohort | Men | Women | Dropouts |
|---|---|---|---|---|---|---|
| Catenacci et al[3] | | 8 weeks | 29 | | | 4 |
| IF | 0 kcal alternating with TDEE | | | 3 | 10 | |
| CER | Decrease of 400 kcal per day | | | 3 | 9 | |
| Trepanowski et al[4] | | 12 months | 100 | | | 31 |
| IF | 25% CND fasting, 125% CND feast days | | | 4 | 30 | |
| CER | 75% CND | | | 6 | 29 | |
| Control | No change in diet | | | 4 | 27 | |
| Conley et al[5] | | 6 months | 23 | | | 1 |
| IF | 5:2*, 600 kcal on fasting days | | | 23 | 0 | |
| CER | Decrease of 500 kcal per day | | | | | |
| Sundfør et al[6] | | 6 months | 112 | | | |
| IF | 5:2*, 400 kcal women, 600 kcal men | | | 28 | 26 | 4 |
| CER | TDEE: (400/600 kcal [female/male] x 2)/7 | | | 28 | 30 | 3 |
| Pinto et al[1] | | 4 weeks | 45 | | | 2 |
| IF | 600 kcal on 2 consecutive fasting days | | | 6 | 15 | |
| CER | Decrease of 500 kcal per day | | | 6 | 16 | |

**5:2 = 5 days ad libitum with 2 nonconsecutive days of fasting within a week.*

*CER, continuous energy restriction; CND, caloric needs daily; IF, intermittent fasting; TDEE, total daily energy expenditure.*

of 31 subjects withdrew. The ADF group consumed 25% of daily energy needs on fast days and 125% of daily needs on “feast days” versus 75% of daily needs every day in the restriction group. Diet logs showed the ADF group was noncompliant, consuming excess food on fast days and too little on “feast days.” Weight loss was comparable between study groups. High-density lipoprotein (HDL) showed a statistically significant difference at 6 months in the ADF group compared to the daily caloric restriction group (+6.2 mg/dL), with loss of this significance by 12 months (+1 mg/dL). Low-density lipoprotein (LDL) showed the opposite, with lack of a statistically significant difference at 6 months in the ADF group compared to the daily caloric restriction group (+2.5 mg/dL), which became statistically significant at 12 months (+11.5 mg/dL). Limitations included noncompliance, gender bias, and subjects limited to otherwise healthy obese adults. After publication of this article, there was an official comment made regarding these limitations,[7] to which Trepanowski et al concurred, discussing that there may be benefit in a generalized patient population but that more research would be required to clarify this point.[8]

In a randomized pilot study published in 2018, Conley et al[5] examined whether a 5:2 intermittent energy restriction diet was more effective for weight loss compared to continuous energy restriction in 24 subjects over 6 months. All subjects were obese male combat veterans. One subject withdrew. The intermittent diet allowed subjects 5 days of ad libitum eating with 2 nonconsecutive days of 600 kcal/day; the energy restriction diet decreased the subject’s kilocalories by 500 every day. Weight loss occurred in both groups, without a statistically significant difference between the two, and there was no statistically significant change in total, LDL, and HDL cholesterol or in triglycerides in either group. Limitations included small sample size; short duration; and subjects limited to obese male combat veterans, raising the question as to how applicable these results would be to other demographics.

In a RCT published in 2018, Sundfør et al[6] studied the effects of 5:2 intermittent fasting compared to continuous energy restriction in a group of 112 subjects (56 women, 56 men) over 1 year. Seven subjects withdrew. The first 6 months included face-to-face dietician visits; the remainder did not. The intermittent fasting group had 5 days of ad libitum eating with 2 nonconsecutive days of 400/600 kcal (female/male) allotted for each day. Both groups reduced energy intake by an average of 26%–28%. While there was weight loss, decreased triglycerides, and increased HDL in both groups, there was no statistically significant difference between the groups. While the project had a longer study period and larger group of subjects, the authors mentioned that timing of testing was different between groups, which may have played a slight role in blood levels. There was a lack of activity monitoring in this study.

In a RCT published in 2019, Pinto et al[1] performed a study specifically aimed to examine if there was cardiometabolic benefit in intermittent fasting compared to consistent calorie restriction over a short period of time. The 4-week study sorted 45 subjects into two groups. Participants in the intermittent fasting group were instructed to eat 600 kcal/day for 2 days followed by 5 days of a Mediterranean-style diet. Those in the consistent calorie restriction group also followed a Mediterranean diet but were told to eat 500 less kcal/day every day, with the goal of averaging 3500 less kcal/week. Two subjects withdrew. The researchers found that the weight loss was comparable between study groups and that there was no significant difference in lipid levels. Limitations included small sample size, short length of study, and a possible gender bias due to having 12 male subjects to 31 female subjects. There is also the question on how much of the benefits seen in the study are from the change to a Mediterranean-style diet.

In a systematic review and meta-analysis of 11 RCTs, Cioffi et al[9] found “comparable” changes in both metabolic health and weight change in obese adults, whether the patient followed a continuous or intermittent calorie-restricted diet.

## Conclusions

While current evidence is limited by study size, patient adherence, and differing definitions of intermittent fasting (Table 1), the studies do not show a consistent statistically significant difference in lipid levels when comparing calorie-restriction methods. This lack of consistent difference allows clinicians to discuss with their patients that while intermittent fasting appears to be a reasonable option for weight loss, the change in lipid levels compared to consistent calorie restriction is unpredictable and that further study is needed.

## Patient-Friendly Recap

- Intermittent fasting, the practice of committing a specified number of days per week to greatly reduced calorie consumption, has emerged as a popular diet option for weight loss.
- The authors reviewed published studies on intermittent fasting to determine whether this diet was better or worse at lowering cholesterol levels compared to other low-calorie diets that do not employ fasting.
- Based on evidence from small studies, they found that there was no difference in lipid levels, in terms of both HDL and LDL cholesterol, between those who sometimes fasted and those restricting caloric intake in a continuous fashion.

## Author Contributions

Study design: M. Sanford, T. Sanford, Campbell, Tandberg, Eagle Road. Data acquisition or analysis: all authors. Manuscript drafting: M. Sanford, T. Sanford, Campbell. Critical revision: M. Sanford, T. Sanford.

## Conflicts of Interest

None.

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