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# Effect of Intermittent Fasting on Weight and Body Composition in Men and Women with Overweight, Obesity, and Early Metabolic Syndrome

## Efecto del ayuno intermitente en el peso y la composición corporal en hombres y mujeres con sobrepeso, obesidad y síndrome metabólico incipiente

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**Abstract**

This study aimed to evaluate the effect of intermittent fasting on body weight and composition in men and women with overweight, obesity, and early-stage metabolic syndrome. Additionally, it sought to assess its impact on key metabolic parameters, compare its effectiveness to classical caloric restriction, and examine adherence and potential adverse events.
A narrative review of recent scientific literature was conducted, focusing on studies published between 2020 and 2025 in English. Sources included PubMed and Google Scholar. Inclusion criteria comprised original research in human participants over 19 years of age. Meta-analyses and review articles were excluded.
The reviewed studies suggest that intermittent fasting, whether through time-restricted eating (TRE), alternate-day fasting (ADF), modified alternate-day fasting (MADF), or prolonged fasting (PF), is an effective and generally well-tolerated strategy for weight loss. Some protocols also demonstrated additional benefits on glycemic and lipid profiles. However, evidence regarding long-term adherence and adverse effects remains scarce. Despite some limitations in the current body of evidence, findings support the potential of intermittent fasting as a viable nutritional intervention. Further high-quality research with longer follow-up periods and diverse populations is warranted to better determine its long-term efficacy, safety, and sustainability. Intermittent fasting could be considered a complementary tool in nutritional therapy, either as a stand-alone approach or in combination with conventional dietary strategies, provided it is implemented under appropriate professional guidance.

**Palabras clave:**

**RESUMEN**

El objetivo de esta investigación fue evaluar el efecto del ayuno intermitente sobre el peso y la composición corporal en hombres y mujeres con sobrepeso, obesidad y síndrome metabólico incipiente.

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|---|---|
| Ayuno intermitente, Pérdida de peso, Sobrepeso, Síndrome metabólico, Efectos adversos | Además, se analizó su impacto sobre parámetros metabólicos clave, su eficacia comparada con la restricción calórica clásica, la adherencia y la aparición de eventos adversos. Se realizó una revisión narrativa de la literatura científica publicada entre 2020 y 2025, en idioma inglés, a través de bases de datos como PubMed y Google Académico. Se aplicaron filtros que incluyeron estudios en humanos mayores de 19 años, excluyendo revisiones y metaanálisis, y limitando la búsqueda a los últimos cinco años. Los estudios incluidos indican que el ayuno intermitente, en sus distintas modalidades; alimentación con restricción de tiempo (RET), ayuno en días alternos (ADF), ayuno modificado en días alternos (MADF) y ayuno prolongado (AF), resulta una estrategia eficaz y bien tolerada para la reducción de peso. En algunos casos, se observaron mejoras adicionales en parámetros glucémicos y lipídicos. No obstante, la evidencia relacionada con la adherencia a largo plazo y los posibles efectos adversos aún es escasa. A pesar de las limitaciones encontradas, los resultados respaldan el potencial del ayuno intermitente como herramienta de intervención nutricional. Se sugiere profundizar en estudios de mayor duración y con poblaciones diversas, para validar su eficacia y seguridad a largo plazo bajo supervisión profesional. |

## Introduction

It is projected that by 2035, more than 4 billion people worldwide will be overweight or obese, an increase from the 2.6 billion recorded in 2020. This increase represents a rise from 38% to 50% of the world's population during that period. As for obesity, it is projected to rise from 14% to 24% of the population, affecting nearly 2 billion adults, children, and adolescents (1).

Obesity is a chronic, multifactorial disease characterized by excess body fat, which has negative health implications. This condition significantly increases the risk of developing other diseases, such as type 2 diabetes and cardiovascular problems, and also negatively impacts bone and reproductive health, potentially leading to the onset of metabolic syndrome. It is also associated with an increased risk of certain types of cancer and affects quality of life in key areas such as sleep and physical mobility. (1, 2, 4 – 6).

Over the past decade, the focus on nutrition has shifted from the Mediterranean diet toward trends such as the ketogenic diet, low-carb diets, and extended fasting. Fasting, defined as abstaining from food and caloric beverages—whether for therapeutic, spiritual, religious, or even fashion-related reasons—has been shown to have various physiological benefits. (3)

Although improvements in weight and body fat reduction have been observed, it is essential to establish clear guidelines for fasting and non-fasting days in order to optimize adherence and maximize the benefits in terms of body composition. Despite the available evidence on fasting and calorie restriction, there is still no safe, standardized protocol to guide nutritionists and health professionals. Therefore, it is crucial to explore this topic in greater depth in order to maximize its benefits in clinical practice. Fasting is part of daily life for the entire population; it is an inevitable physiological process, as it occurs naturally during periods when no food is consumed. Therefore, understanding and learning more about it is crucial for managing it properly (4–10).

Given the above, the objective of this study was to evaluate the effect of intermittent fasting on weight and body composition in men and women who are overweight, obese, or have early-stage metabolic syndrome. In addition, the study analyzed its impact on key metabolic parameters, its efficacy compared to traditional calorie restriction, adherence, and the occurrence of adverse events.

## Method

A narrative review of the scientific literature was conducted. To ensure the relevance and timeliness of the articles analyzed, a structured search strategy was used to analyze recent evidence on the effects of intermittent fasting (IF) on body composition and metabolic parameters in overweight or obese individuals.

The search for articles was conducted between February and March 2025. The primary database used was PubMed. In addition, Google Scholar was used as a supplementary source to identify relevant studies that might not have been indexed in the main search.

The keywords used, in various Boolean combinations (AND/OR), included: "intermittent fasting," "fasting," "weight loss," "metabolic syndrome," and "calorie restriction."

The following inclusion criteria were established: clinical trials in humans; study population aged 19 years or older, who were overweight, obese, or had early-stage metabolic syndrome; articles published in the last 5 years (January 2020–March 2025); and articles in English.

The following exclusion criteria were applied: literature reviews, systematic reviews, and meta-analyses; studies in animal models; and study protocols, editorials, or letters to the editor. The initial search using those keywords yielded a large number of results. To manage the selection process, a two-phase screening process was implemented:

Phase 1: The titles and abstracts of all identified articles were reviewed to exclude duplicates and those that clearly did not meet the inclusion criteria (e.g., reviews, animal studies).

Phase 2: A full-text review of the shortlisted articles was conducted.

Since the objective was to conduct a narrative review, the final selection was not intended to be exhaustive (as in a systematic review), but rather representative. Priority was given to clinical trials that provided relevant data on the various types of AI (RET, ADF/MADF, etc.), their effect on body composition, and adherence. Through this qualitative selection process, a final set of 14 articles was identified that were considered the most relevant and methodologically sound for the analysis and discussion in this study.

## Discussion and Conclusions

The implementation of intermittent fasting through a restricted eating window (RET), particularly using the 16:8 protocol (which involves fasting for 16 hours and limiting food intake to an 8-hour window), has been evaluated in various clinical trials as a strategy to improve body composition, glycemic control, and metabolic parameters in people who are overweight, obese, or at risk of developing metabolic diseases. Most of the selected studies agree that there are positive short- and medium-term effects (6, 7, 9–11), although there are nuances depending on the study population and the intervention design, as shown in Table 1.

Several controlled trials have demonstrated the effectiveness of the 16:8 intermittent fasting regimen in overweight or obese adults. For example, the study by Schroder et al. (6) In middle-aged women, it resulted in significant reductions in body weight, total body fat, and waist circumference. Furthermore, that study observed a decrease in BMI without significant changes in metabolic markers, leading the authors to conclude that RET is an effective strategy for weight loss and reducing cardiovascular risk (6), suggesting that the benefits may be primarily mediated by fat loss. This anthropometric improvement could have a positive impact on adherence.

Similarly, Kotarsky et al. (10) found that RET 16:8, compared with a normal diet, resulted in greater weight loss (-3.3%) and body fat loss (-9.0%). This finding allowed them to propose RET as an effective short-term strategy for reducing body fat and increasing lean body mass in overweight and obese adults (10).

Along the same lines, Sukkriang et al. (7) and Teong et al. (11), using larger sample sizes and comparisons with other groups, also demonstrated significant improvements in fasting glucose, HbA1c, and lipid profile. In fact, Sukkriang et al. (7) concluded that both the 16:8 and 14:10 diets showed clear benefits in terms of weight loss, improved glycemic control, and lipid profile. For its part, the study by Teong et al. (11), which included a longer follow-up period, highlighted a greater improvement in glucose tolerance compared with conventional calorie restriction, validating RET as a superior alternative for this parameter (11). However, it is important to note that this latest study also reported mild side effects (fatigue, headache, constipation), which underscores the importance of adapting the protocol.

Finally, Domaszewski et al. (9) provided relevant evidence regarding older adults, an underrepresented population. Although weight loss was observed across the board, the reduction in visceral fat and waist circumference was significant only in men. As the authors point out, this intervention was effective in reducing weight in both sexes, but the difference in visceral fat suggests an interaction between biological sex and the physiological response to RET (9). The high adherence rate (>98%) suggests that this strategy may also be feasible in the context of healthy aging.

Overall, the studies reviewed suggest that the 16:8 intermittent fasting regimen is an effective and generally well-tolerated intervention for improving body weight, with potential additional metabolic benefits. However, this conclusion should be viewed with caution due to persistent methodological limitations in this set of studies. The short duration of the interventions (typically 6–12 weeks) is a critical factor; for example, the high adherence (>98%) reported by Domaszewski et al. (9) In older adults, this is a promising finding, but it is unclear whether this sustainability could be maintained at a 6- or 12-month follow-up. In addition, the lack of robust control groups in some study designs makes it difficult to isolate the effect of the time-of-day pattern. Non-randomized studies, such as the one by Schroder et al. (6) do not rule out the possibility that the observed benefits stem from spontaneous calorie restriction rather than from fasting itself. Finally, there is considerable heterogeneity in the metabolic results: while Teong et al. (11) reported clear improvements in glucose tolerance, Schroder et al. (6) They found no significant changes in biomarkers. This discrepancy underscores that the physiological mechanisms have not yet been fully elucidated, and the adverse effects—although mild (11)—must be taken into account during clinical follow-up.

**Table 1** Studies on RET fasting and a control group in people who are overweight, obese, and/or have early-stage metabolic syndrome.

| Author, year | Study Design | Population | N (Sample) | Duration | Speech | Key Findings |
|---|---|---|---|---|---|---|
| Schroder et al. 2021. (6) | Non-randomized controlled clinical trial | Middle-aged obese women. | 32 (RET = 20, Control 12) | 3 months | RET (16:8) vs. Control | Weight loss (-4 kg; $p < 0.05$), decrease in BMI ($p < 0.05$), % Body Fat, and Circ. Waist circumference ($p < 0.05$). (No changes in biomarkers; $p > 0.05$). |
| Sukkriang, et al. 2024. (7) | Randomized Controlled Clinical Trial | Adults with obesity | 99 (in 3 groups) | 3 months | RET (16:8) vs. RET (2:10 PM) vs. Control | Significant weight loss in RET groups (vs. Control; $p < 0.001$). Greater weight loss with the 16:8 diet than with the 14:10 diet ($p < 0.001$). Significant improvements in glucose and lipid profile (vs. Control). |
| Domaszewski et al. 2023. (9) | Randomized clinical trial | Overweight older adults (ages 65–74) | 166 | 6 weeks | RET (16:8) vs. Control | Weight Loss (Men: -1.8 kg; Women: -1.3 kg; $p = 0.03$). Men: Reduction in visceral fat ($p <= 0.001$) and Circ. Waist circumference ($p <= 0.015$). (Women with no significant changes in body fat or waist circumference; $p > 0.05$). |
| Kotarsky et al. 2021. (10) | Randomized Controlled Clinical Trial | Adults who are overweight or obese | 21 | 8 weeks | RET (16:8) vs. Control | Weight loss (-3.3%; $p < 0.05$ vs. control) and body fat reduction (-9.0%; $p < 0.05$ vs. control) in the RET group. |
| Teong, et al. 2023. (11) | Randomized, controlled clinical trial | Adults at Risk for Type 2 Diabetes | 209 | 6 months (12-week follow-up) | RET + Calorie Restriction vs. Classic Calorie Restriction vs. Control | Greater improvement in glucose tolerance in the RET group (vs. RCC; $p = 0.03$ at 6 months). (Mild and transient adverse effects reported: fatigue, headache, constipation). |

In addition to the 16:8 protocol, other forms of intermittent fasting have been studied, such as alternate-day fasting (ADF) and its modified version (MADF), which have shown positive effects on body composition and metabolic variables in overweight or obese individuals (4,8,12,13–15). Although the mechanisms of action differ, studies consistently show clinically relevant benefits, with some variations depending on the protocol, as summarized in Table 2.

As for the ADF, the studies by Chair et al. (4) and Ekberg et al. (15) compared this protocol with other approaches. Chair et al. (4) highlighted greater weight loss and BMI reduction in the ADF group compared with RET, concluding that, although both strategies are effective, ADF may lead to greater weight loss in the short term (4). For their part, Ekberg et al. (15) demonstrated that the 5:2 protocol (a variation of the MADF that generally consists of five days of normal eating and two nonconsecutive days of modified fasting or very low-calorie intake) was effective in people with type 2 diabetes, resulting in improvements in insulin sensitivity in subjects without diabetes. This led the authors to validate the 5:2 diet as a viable and effective intervention for managing overweight in both patient groups (15), suggesting that ADF/MADF can be adapted to different clinical profiles.

Despite these positive findings, questions remain as to whether the effects are due to the timing pattern itself or to the total calorie reduction, which is not always controlled. Furthermore, the physiological mechanisms underlying its effect on insulin sensitivity or visceral fat are not yet fully understood. In terms of tolerability, the ADF may present practical challenges due to its alternation between restriction days and free-eating days, which could affect long-term adherence. The available evidence on its impact on eating behavior, satiety, or mood is still limited, making it difficult to assess its sustainability outside of controlled settings.

As far as the MADF (5:2 protocol) is concerned, the evidence is mixed. Keenan et al. (8) and Pannen et al. (14) They compared it to continuous calorie restriction (CCR). Although Keenan et al. (8) reported greater reductions in total cholesterol and LDL, noting that both strategies were well tolerated (8); the study by Pannen et al. (14) (with a follow-up of 102 weeks) concluded that, although weight loss was similar to that achieved with RCC, adherence to the MADF was more difficult to maintain in the long term (14). This issue of sustainability is central. In addition, nutritional quality is a concern, as Scholtens et al. (13) noted that, although effective for weight loss, the 5:2 diet may lead to deficiencies in essential micronutrients such as calcium, zinc, and magnesium (13). Finally, Witjaksono et al. (12) found that, although the 5:2 diet promoted weight loss, it did not have a significant impact on body composition compared with the control group (12), casting doubt on its clinical relevance in that context.

Overall, the evidence suggests that ADF and MADF may be effective for weight loss, but there are concerns about their sustainability and safety. The methodological limitations in this group of studies are significant: the duration varies widely, ranging from 3 weeks in the study by Chair et al. (4) up to 102 weeks, according to Pannen et al. (14), which makes it nearly impossible to compare actual sustainability. The main challenge with these protocols is sustained adherence; although compliance rates in clinical trials exceed 80%, the evidence from Pannen et al. (14) suggests that this decreases dramatically in real-world contexts. Furthermore, assessments of overall nutritional status are scarce; the findings on micronutrient deficiencies reported by Scholtens et al. (13) is a warning sign that indicates the need for rigorous professional support. Therefore, both ADF and MADF should be approached with caution, requiring a patient-tailored approach and further long-term research to establish their role within a comprehensive nutritional approach.

**Table 2** Studies on ADF and MADF fasting and a control group in individuals who are overweight, obese, and/or have early-stage metabolic syndrome.

| Author, year | Study Design | Population | N (Sample) | Duration | Speech | Key Findings |
|---|---|---|---|---|---|---|
| Chair, et al. 2022. (4) | Randomized, controlled clinical trial. | Adults who are overweight or obese and have prediabetes | 101 (in 3 groups) | 3 weeks | ADF vs. RET (16:8) vs. Control | Weight loss, BMI, and waist circumference (ADF and RET vs. Control; $p < .05$). Greater weight loss and BMI reduction in the ADF group (vs. RET; $p < .001$). Improvements in glucose and triglycerides (vs. Control; $p < .05$). |
| Scholtens et al. 2020. (13) | Randomized clinical trial. | Overweight/obese adults (with and without T2DM) | 38 (F=27, M=11) | 6 weeks | MADF (5:2 Protocol) | A significant decrease in carbohydrate and fiber intake ($p < 0.001$). Micronutrient intake (Ca, Zn, Mg, K) is below the recommended levels. |
| Pannen et al. 2021 (14) | Randomized clinical trial. | Overweight or obese adults (ages 35–65) | 98 | 12 weeks (follow-up at 102 weeks) | MADF vs. Classic Calorie Restriction (CCR) | Similar effectiveness in weight loss (MADF vs. RCC) at 2 years ($p = 0.63$). No significant differences in long-term dietary composition. (Worse adherence reported in MADF compared to RCC). |
| Keenan, et al. 2022 (8) | Randomized clinical trial. | Adults (F=17, M=17) with a BMI > 27.0 kg/m$^2$ | 34 | 12 weeks | MADF (5:2) vs. Classic Calorie Restriction (CCR) | A significant reduction in total cholesterol (TC; $p < 0.001$) and LDL-C ($p < 0.001$) was observed in both groups. Greater reduction in TC and LDL-C in the MADF group (vs. RCC). High adherence (~80%) was reported in both groups. |
| Witjaksono et al. 2022. (12) | An open-label, randomized, controlled clinical trial. | Participants (adults) | 50 (AI=25, Control=25) | 3 months | MADF (5:2 Protocol) vs. Control | Significant weight loss in the fasting group ($p = 0.023$). No significant changes in body composition (fat mass, lean mass) were observed between groups (vs. control; $p > 0.05$). |
| Ekberg et al. 2024. (15) | Non-randomized controlled clinical trial. | Adults with Type 2 Diabetes and controls without diabetes | 97 (DBT=35, Control=62) | 6 months (12-month follow-up) | MADF (5:2 Protocol) | Reduction in glucose (DBT2; $p<0.05$) and insulin (Control; $p<0.05$). Both groups: Improvements in C-peptide, HOMA-IR, waist circumference, BMI, and body fat percentage ($p<0.05$). Greater |

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| | | | | | | improvement in glucose and waist circumference in DBT2 (vs. Control; p<0.05). |

As shown in Table 3, studies that evaluated intermittent fasting protocols with fasting periods longer than 24 hours reported improvements in body weight, total body fat, and cardiometabolic parameters (5,16,17). Although less commonly reported in the literature, these interventions could offer greater benefits in terms of certain indicators, although doubts remain about their long-term feasibility.

Arciero et al. (5) They compared the effectiveness of one versus two consecutive days of prolonged fasting per week, as part of a low-calorie, high-protein diet. Both approaches reduced weight, body fat, waist circumference, and blood pressure, although the group that fasted for two consecutive days (AI-2) showed significantly greater reductions in weight (-29%) and waist circumference (-38%). Furthermore, no increases in hunger or changes in appetite-related hormones (ghrelin, GLP-1) were observed, possibly due to an increase in ketone bodies, a diet rich in protein and fiber, and a possible modulation of the gut-brain axis. These findings reinforce the feasibility and good tolerability of prolonged fasting, even with a 40% calorie restriction.

In the study by Teong et al. (16) Overweight or obese women fasted for 24 hours three times a week, compared with continuous calorie restriction. The fasting group achieved greater weight and body fat loss, with no adverse effects on mood, sleep, cognition, or eating behavior. The inclusion of light breakfasts and low-calorie broths on fasting days, along with structured supervision, may have improved adherence. Despite the intensity of the protocol, the authors found no evidence of cognitive impairment, which supports its psychological safety in this population.

An interesting aspect of this study is that the assessments were also conducted on fasting days, which lends greater credibility to the findings, as it rules out possible transient effects of mental fatigue or immediate emotional changes during prolonged fasting. This suggests that, at least in the short term, overweight or obese women can maintain this type of routine without compromising their cognitive performance or emotional well-being.

Furthermore, the protocol's structure highlights the importance of practical intervention design. Allowing small amounts of food in the form of broths or light breakfasts, far from invalidating the concept of fasting, appears to have been a useful strategy for maintaining adherence without interfering with metabolic and body composition outcomes. This point opens the discussion on the flexibility that prolonged intermittent fasting protocols may offer and on how relatively small adjustments can make a difference in clinical feasibility.

Finally, Liu et al. (17) compared three strategies: 24-hour fasting three times a week with 70% (AI70) or 100% (AI100) of caloric needs on eating days, and continuous caloric restriction to 70% (CR70). The AI70 group showed greater weight and fat loss, as well as greater lipid mobilization (reduction in nonesterified fatty acids), but also exhibited decreased insulin sensitivity and lower expression of antioxidant enzymes, suggesting a possible adverse metabolic effect when sufficient intake is not achieved on feeding days.

Overall, the data support the effectiveness of prolonged intermittent fasting as a strategy for weight loss and cardiometabolic improvement. However, its effects on insulin sensitivity and oxidative stress raise questions about its safety, especially in overweight women. Furthermore, the short duration of the studies (4–8 weeks) limits the generalizability of the results. Future trials should address the long-term sustainability, tolerability, and safety of these protocols in various populations.

**Table 3.** Studies on PF Fasting and a control group in individuals who are overweight, obese, and/or have early-stage metabolic syndrome.

| Author, year | Study Design | Population | N (Sample) | Duration | Speech | Key Findings |
|---|---|---|---|---|---|---|
| Arciero et al. 2022 (5) | Randomized controlled clinical trial. | Overweight Adults | 20 | 4 weeks | 1-Day Fast (AI-1) vs. 2-Day Fast (AI-2). (Both are high in protein.) | Significant reduction in weight, waist circumference, body fat percentage, and lipid levels in both groups (AI-1 and AI-2; $p < 0.05$). Greater reduction in weight (-29%) and waist circumference (-38%) in the AI-2 group (vs. AI-1; $p < 0.05$). A trend toward greater reductions in fat and glucose was observed in AI-2 ($p < 0.10$). |
| Teong, et al. 2021 (16) | Secondary analysis of a randomized controlled clinical trial. | Overweight or obese women (average age 50) | 46 | 8 weeks | 24-Hour Fasting (AI) vs. Classic Calorie Restriction (CCR). (Both at 70% of energy requirements.) | Greater weight and body fat loss in AI (vs. RCC; $p < .001$). No differences (vs. RCC) on eating behavior, mood, sleep, or quality of life ($p > .05$). No adverse effects on cognition or mood during fasting days ($p > .05$). |
| Liu et al. 2021 (17) | Secondary analysis of a randomized controlled clinical trial. | Women (BMI 25–40) | 76 (in 3 groups) | 8 weeks | CR70 (RCC 70%) vs. AI70 (24-hour fast 3 times a week, 70% calories) vs. AI100 (24-hour fast 3 times a week, 100% calories) | Greater weight and fat loss in AI70 (vs. RCC70/AI100; $p<0.05$). AI Groups: Significant reduction in antioxidant enzymes (vs. RCC70; $p<0.05$). 24-hour fast: Insulin sensitivity worsened ($p<0.05$). |

## Discussion of the Underlying Physiological Mechanisms

The consistent results regarding weight and fat mass reduction observed in most of the studies analyzed (6, 10, 16) are based on the profound metabolic changes induced by fasting. When food intake ceases, the body shifts from an anabolic state to a catabolic state in order to maintain energy homeostasis. Once liver glycogen stores are depleted (usually within the first 12–16 hours), the body activates a "metabolic switch," initiating a key transition from glucose utilization to the mobilization of fatty acids from adipose tissue.

This metabolic change triggers a cascade of physiological adaptations. Fasting promotes lipid catabolism to maintain blood glucose levels, and its benefits include the induction of ketogenesis, hormonal regulation (notably a reduction in basal insulin), a reduction in oxidative stress and inflammation, as well as increased stress resistance, and the activation of lipolysis and autophagy (3). The activation of lipolysis and the subsequent ketogenesis are the direct mechanisms that explain the reduction in fat mass reported in nearly all studies (5, 10, 16). At the same time, reducing oxidative stress and inflammation (3) is crucial to understanding improvements in cardiometabolic health. These mechanisms are consistent with the findings of Teong et al. (11) and Ekberg et al. (15), who reported significant improvements in glucose tolerance and insulin sensitivity, respectively.

It is important to note, however, that most of the clinical trials included in this review (Tables 1–3) did not directly measure these molecular mechanisms; they focused on anthropometric outcomes and standard biomarkers. Therefore, the connection between the mechanism (e.g., autophagy) and the outcome (e.g., weight loss) is inferred theoretically (3). Furthermore, the relationship is not always positive. The study by Liu et al. (17) serves as a reminder of this complexity, as its findings of reduced insulin sensitivity and lower expression of antioxidant enzymes in the AI70 group suggest that excessive restriction may, paradoxically, induce a state of adverse metabolic stress. This underscores that the physiological benefits of fasting are not linear and depend on the intensity of the protocol.

## General Discussion of the Findings

An analysis of the 14 studies reviewed reveals that intermittent fasting, in its various forms, is an effective strategy for reducing body weight and improving body composition in people who are overweight, obese, or have early-stage metabolic syndrome. The most common protocols, such as the 16:8 intermittent fasting (6, 10) or alternate-day fasting (4), have shown significant reductions in body fat. In direct comparison with traditional continuous calorie restriction (CCR) diets, AI has been shown to be at least as effective (14), although some studies suggest greater fat loss (16) or superior metabolic benefits (11).

With regard to metabolic parameters, AI improves blood glucose levels, insulin resistance, and lipid profile, although these findings are more inconsistent than those related to weight loss. Studies such as those by Teong et al. (11) and Ekberg et al. (15) showed clear improvements in glycemic control. Others, such as Keenan et al. (8) reported reductions in LDL cholesterol. However, the extent of these effects varies across studies (6), and some even warn of potential metabolic risks (such as decreased insulin sensitivity in highly restrictive prolonged fasting regimens) (17). This suggests that the benefits of AI may depend heavily on the specific protocol and the individual's baseline metabolic state.

With regard to adherence, although AI is generally well tolerated, it is not without its challenges. Some individuals experience initial side effects such as fatigue, headache, or irritability (11), although these are usually temporary. Long-term sustainability is the real challenge: more flexible protocols such as RET 16:8 appear to have high adherence (9), while more restrictive protocols such as MADF 5:2 have shown declining adherence in long-term follow-ups (14). The available evidence suggests that flexibility, professional supervision, and a gradual adjustment process are key to promoting continuity over time.

When comparing the different types of intermittent fasting analyzed, all of them show positive effects on weight loss. The RET pattern (especially 16:8) stands out for its balance between effectiveness and sustainability, making it likely the most viable option for initial clinical practice. The ADF/MADF (5:2 Protocol) appears to lead to greater short-term weight loss (4) and improvements in insulin sensitivity (15), but at the cost of potentially lower long-term adherence (14) and nutritional risks (13). Finally, prolonged fasting (>24 hours) shows great potential (5), but the evidence regarding its safety and clinical efficacy is still limited and presents conflicting results (17).

## Conclusions and Future Implications

This narrative review confirms that intermittent fasting (IF), in its various forms (RET, ADF/MADF, and prolonged fasting), is an effective nutritional intervention strategy for reducing body weight and improving body composition in overweight and obese adults. The findings from the 14 clinical trials analyzed suggest that its benefits are, at a minimum, comparable to continuous calorie restriction (CCR) (11, 14), and for certain parameters—such as fat loss (16) or improved glucose tolerance (11)—they may even be superior. However, the main advantage of AI does not appear to be universal metabolic superiority, but rather its potential as a viable alternative that can improve adherence in patients for whom RCC has failed. The success of the procedure does not lie in a single protocol, but rather in its customization. The implementation should be tailored to the patient's individual characteristics, baseline metabolic status (15), and lifestyle. Essentially, this strategy should always be implemented under professional supervision in order to optimize adherence and reduce risks (such as fatigue or headaches, as reported by Teong et al. (11)) and monitor nutritional quality to prevent micronutrient deficiencies (13) or adverse metabolic effects (17).

It is essential, however, to put the scope of this review into context. The study design, which focuses on a qualitative synthesis, means that the selection of 14 articles—while intentionally representative of AI modalities—is not exhaustive. This can introduce selection bias by prioritizing certain findings over others, potentially overlooking studies with null or contradictory results. Furthermore, the search methodology has its own limitations: since it is restricted to the PubMed database (supplemented by Google Scholar) and the English language, it is possible that relevant research from other regions or in other languages may have been excluded. An additional limitation is the absence of a formal assessment of the methodological quality (e.g., risk of bias) of each trial. For this reason, studies with less methodologically robust designs (e.g., non-randomized) are discussed alongside controlled trials, and the findings should be interpreted as an analysis of the current landscape, not as a quantitative meta-analysis.

Finally, to strengthen the available evidence, future research should address the limitations identified here. It is imperative to conduct randomized controlled trials with larger and more diverse samples that include different age and ethnic groups. The duration of the studies is the most critical factor; long-term follow-up (>1 year) is needed to assess the actual sustainability of adherence, a weakness identified in protocols such as the MADF (14). Beyond weight, future research should systematically assess the impact on nutritional quality (addressing the micronutrient risks identified in Scholtens et al. (13)), bone health, and metabolic safety, especially during prolonged fasting (given the findings of Liu et al. (17) on insulin sensitivity). In addition, more research is needed on the long-term impact of AI on mental health, sleep quality, and eating behavior—aspects that Teong et al. (16) They only measured short-term effects. Another under-explored area is the cost-effectiveness analysis of AI compared with RCC or pharmacological treatments for obesity. Furthermore, it is essential to establish standardized intervention protocols and conduct direct comparisons with RCC in non-inferiority trials in order to more clearly define the advantages and limitations of intermittent fasting as a therapeutic tool in clinical practice.

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