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The Effect of Intermittent Fasting on Glycemic Control and Insulin Resistance in Type 2 Diabetes: A Systematic Review and Meta-Analysis

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ABSTRACT

Background: Type 2 diabetes mellitus affects the globe through its problems with blood sugar management and reduced insulin effectiveness in the body. People have trouble sticking to long-term calorie-restriction diets in traditional nutrition plans. Research shows intermittent fasting (IF) helps manage blood sugar levels and makes the body more sensitive to insulin.

Objectives: Our study analyzes how intermittent fasting affects blood sugar regulation and insulin response in people with type 2 diabetes. Our research combines existing studies to explain how IF works in T2DM treatment.

Methodology: A group of medical experts examined 25 published research reports to learn how different eating fasting techniques affect T2DM patients' body functions. Our analysis covered both randomized controlled trials and published research from clinical studies and real-world observations in respected medical journals.

Results: IF produces better blood sugar control through reduced fasting blood sugar numbers and better control over blood glucose spikes after meals. The body uses IF better to handle insulin and manage blood sugar control as well as swelling reduction. Using IF leads to weight loss while shrinking belly fat and making better blood fat profiles for a healthier metabolism. The chance of low blood sugar remains low when people use IF correctly yet each person needs special care because they react differently to fasting plans.
Conclusion: People with Type 2 Diabetes should consider intermittent fasting as a useful eating plan to control their blood sugar and resistance to insulin. Adding intermittent fasting to standard diabetes treatments shows great promise because it brings many health advantages and helps patients follow their therapy better. Scientists should study different fasting plans to make them better while also examining if intermittent fasting keeps working safely over time.

Keywords: Intermittent fasting, glycemic control, insulin resistance, Type 2 diabetes, metabolic regulation, dietary intervention.

INTRODUCTION

Type 2 diabetes mellitus (T2DM) creates prolonged high blood sugar and insulin resistance trouble millions of people throughout the globe. Diabetes poses high health risks because it triggers serious cardiovascular events along with kidney and nerve damage. Many patients struggle to reach their blood sugar targets with current treatments which make dietary and lifestyle changes essential to fight this condition [1,2]. Research shows that most people experience problems sticking to prolonged calorie control diets because these plans bring psychological stress and stop working over time [3]. People favor alternate fasting techniques because these methods help make dieting easier plus deliver strong health outcomes.

The eating strategy called Intermittent Fasting (IF) includes several patterns of eating and fasting at different times. When you alternate high-calorie eating periods in IF you maintain dietary compliance better than with continuous caloric restriction [4]. You can choose from three main fasting options including alternate-day fasting, time-restricted eating, and fasting-mimicking diet which provide you with various advantages and ways to adjust your plan. Research finds that these eating methods can help T2DM patients by changing their blood sugar control but also by improving how their body uses glucose.

The different ways our body changes when we perform intermittent fasting act together to benefit our health. When you fast your body changes its energy source from glucose to fat while increasing your cells' response to insulin [7, 8]. Fasting affects AMPK signaling pathways establishes new mitochondria and activates the process of cellular recycling. Research shows that IF controls both inflammatory responses and oxidative stress while helping with insulin resistance and type 2 diabetes development [10, 11]. Patients who follow Periodic Fasting see better blood sugar regulation alongside weight loss and decreased visceral fat while achieving more beneficial lipid profiles [12, 13] as confirmed by clinical tests.

Even though research points to IF's benefits patients with T2DM need specific attention before starting its use. People react differently to IF treatment schedules because their outcomes depend strongly on personal characteristics like age gender current metabolic status and drug use. The need to watch for low blood sugar increases when a person has both diabetes and uses glucose-lowering medicines requires tailored medical observation. Research needs to continue because studies showing positive results so far span only short-term and medium-term periods and work must examine how IF stays safe in the long run [16].

This review studies available research to explain how IF affects blood sugar control and insulin resistance in people with type 2 diabetes. Through its study of both research findings and current issues, this article demonstrates the value of IF in treating diabetes while leading toward

clinical progress.

Study	Year	Sample Size	Intervention	Duration	Key Findings
Zhang et al.	2023	120	TRE (8-hour eating window)	12 weeks	Significant reduction in HbA1c (1.2%)
Patel et al.	2022	150	ADF (Alternate-day fasting)	16 weeks	FBG reduction by 30%, improved insulin sensitivity
Kim et al.	2021	100	FMD (5-day fasting mimicking diet)	8 weeks	Improved insulin sensitivity, weight loss
Lee et al.	2022	80	TRE (8-hour eating window)	10 weeks	Reduced FBG and HbA1c in Type 2 diabetes
Singh et al.	2023	135	ADF (Alternate-day fasting)	12 weeks	Increased insulin sensitivity, reduced HbA1c
Miller et al.	2022	110	FMD (5-day fasting mimicking diet)	6 weeks	Improved metabolic health and insulin resistance
Garcia et al.	2023	140	TRE (8-hour eating window)	14 weeks	Weight loss and glycemic control improvement

METHODOLOGY:

Study Design and Setting: Our analysis uses a scientific approach to study how intermittent fasting affects blood sugar control and insulin resistance in type 2 diabetes patients. The study collects data from existing research on type 2 diabetes examining both controlled trials and observational results plus integrated analysis of multiple studies. Our team researched documents from leading search platforms PubMed, Scopus, Web of Science, and Google Scholar into our study.

Our research method combined different search terms which included "intermittent fasting" paired with "glycemic control," "insulin resistance," "type 2 diabetes," "alternate-day fasting," and "time-restricted eating." Our study selection criteria included peer-reviewed scientific research from the last ten years because they highlight important breakthroughs in the field. The studies looked at settings that included medical facilities and public health programs along with hospital settings which provided knowledge across different healthcare environments.

Our team extracted and combined data from accepted research studies to prevent errors and inaccuracies. The researchers studied how the treatment affected blood sugar by measuring fasting glucose levels and HbA1c readings while tracking how well participants responded to insulin. They also tracked weight changes and lipid profile changes. Our review team used established assessment tools to evaluate the quality of studies in this research including the Cochrane Risk of Bias tool and Newcastle-Ottawa Scale.

Inclusion and Exclusion Criteria: This review studies adults diagnosed with type 2 diabetes who try intermittent fasting diets. The selected research only examined IF's influence on diabetes markers through tests of fasting blood glucose, HbA1c, and insulin response. Our study analysis drew from randomized controlled trials and peer-reviewed meta-analyses and observational studies from the past ten years only. Our analysis included investigation of

secondary metabolic data only when research presented detailed information on blood sugar measurements.

Our study analysis left out diabetes research that examined patients with type 1 or gestational diabetes as well as animal testing and cell culture data. Our analysis left behind publications that did not use fasting state diet studies or showed limited measurements of diabetic markers. Research publications that did not appear in peer-reviewed outlets alongside incomplete studies and abstracts without complete measurement data were not included to uphold the accuracy and validity of the research results.

Data Extraction and Analysis: Our systematic extraction process helped us maintain accurate and dependable results. We made a standard tool to get important details from studies that met our criteria. Our analysis contained information about research type (randomized trial and non-randomized trial results), participant numbers, patient groups (discussion of age, sex, and health status), fasting types (different tactics), study time frames, and impact measures on blood sugar control. The study tracked secondary results looking at both weight loss and changes to lipids and inflammation-related markers.

Several experts checked the extracted data to reduce error probability and prevent individual judgment influence. Our team discussed and agreed on solutions to any differences found in the data. Researchers applied recognized quality assessment systems including the Cochrane Risk of Bias for trial tests and the Newcastle-Ottawa Scale for observational research. Our analysis included only studies that achieved moderate to strong methodological standards to build trusted results.

Given variable research methods and participant groups the study team performed narrative synthesis on their findings. Our research examined how intermittent fasting affected diabetes control while showing consistent changes in insulin function patterns. When available we merged study results to show how effective and similar the methods worked across research. Research revealed important biological understanding by analyzing physical changes that happen when people fast intermittently.

By following this systematic approach researchers could better assess the benefits and clinical applications of using an intermittent fasting diet for type 2 diabetes.

Search Strategy: Our review used multiple research methods to find suitable studies for analysis. The search was conducted in four widely recognized electronic databases: Our research used four leading platforms including PubMed, Scopus, Web of Science, and Google Scholar. The research plan targeted every type of evidence from RCTs and meta-analyses alongside observational studies to fully assess IF's impact on blood sugar control and insulin resistance in T2DM patients.

The following search terms and Boolean operators were used in combination: The research used search terms "intermittent fasting" "glycemic control" "insulin resistance" "type 2 diabetes" "alternate-day fasting" "time-restricted eating" "fasting-mimicking diet" "metabolic regulation" and "insulin sensitivity." The research used AND and OR logic to connect our search terms and added relevant study results. For example, the search query was structured as follows: The search includes studies that compare the effects of fasting methods ("intermittent fasting," "alternate-day fasting," "time-restricted eating" and "fasting-mimicking diet") on blood sugar control in people with type 2 diabetes.

The research team narrowed down results to include only studies published during the past decade from 2013 to 2023. The research materials used the English language only. Our research selected human trials yet eliminated those without enough data or missing their complete papers. I referred to cited research articles and expert report findings to find other published studies that our initial search might have missed.

Our search strategy covered all available data but it focused on studying specialized investigations of how Intermittent Fasting affects Type 2 Diabetes outcomes such as diabetes control and insulin resistance. Our thorough research system selected excellent research findings directly connected to the subject matter.

Study Question:

The study question guiding this review is:

What impact does intermittent fasting have on blood sugar and insulin issues in people with type 2 diabetes?

This study aims to determine if specific fasting schedules help type 2 diabetes patients by examining blood sugar levels, HbA1c readings, insulin sensitivity changes, and the weight and lipid results they achieve. This review investigates the physical processes behind fasting effects on type 2 diabetes while assessing how patients can use intermittent fasting methods safely over time.

Quality Assessment: This review relied on a structured method to evaluate the quality of selected studies to validate their research outcomes. We analyzed RCTs by utilizing the Cochrane Risk of Bias tool to assess randomization quality through six major criteria and evaluated the study participants' and staff's blinding and potential bias in favor of particular outcomes. The rating team scored each research domain according to its risk of bias being low, high, or unclear. They defined overall research quality based on these results.

To evaluate observational research we used the Newcastle-Ottawa Scale (NOS). The NOS evaluates three key areas: The evaluation system analyzes how researchers selected groups for study, made sure their subjects were equal and measured their results. Research studies achieving seven out of nine points qualified as high quality while studies with four to six points qualified as moderate quality.

Review participants evaluated each meta-analysis on its extent of literature scans combined with the clarity of study inclusion rules. They also examined different research results and tested the accuracy of data handling methods.

Our team analyzed research findings only from studies that met moderate or high levels of methodological quality to select credible work. The reviewers held talks to make sure all quality evaluation steps matched so bias stayed at a minimum. The tough quality evaluation process makes the results of this review reliable.

Risk of Bias Assessment: Our analysis checks the methodological quality and accuracy of research findings in selected studies. We used the Cochrane Risk of Bias tool to analyze if the design and execution followed scientific guidelines during randomized controlled trials. This method assessed random sequence generation, allocation concealment, participant and staff blinding, outcome assessment blinding, incomplete data, and reporting issues into key domains like bias issues. Our analysis evaluated bias risk for each domain of methodology and gave final overall ratings of low, moderate, or high based on the results.

For observational studies, the Newcastle-Ottawa Scale (NOS) was used to assess the risk of bias across three key domains: The system evaluates how studies were chosen for research and compares groups before measuring results. Our examination checked the validity of the exposed groups for representation and established appropriate non-exposed controls plus confirmed how exposure was determined and both groups were matched for study purposes. A score of seven or more points on the NOS labeled studies as low-risk and scores between four to six points indicated moderate risk. Research with scores below four was discarded from our analysis.

The team analyzed exposure risk scores before agreeing on final results to build consistency in their process. Our consistent method ensured the review results rested on validated research

findings which eliminated potential errors in judgments.

RESULTS

The results from multiple studies show that people with type 2 diabetes mellitus experience better blood sugar control and improved insulin resistance through intermittent fasting (IF). Our analysis shows that different types of fasts work better for specific lengths of time and work differently for people with individual health profiles. Through systematic research analysis, we found clear evidence about how IF impacts diabetes patients based on controlled trials and observational research.

Different Intermittent Fasting Protocols and Their Effects on Glycemic Control in Type 2 Diabetes

Fasting Protocol	Duration/Intervention	Key Glycemic Outcomes	Key Findings
Time-Restricted Eating (TRE)	6-8 hours eating window daily	Reduction in FBG, HbA1c	Improves insulin sensitivity and glucose control
Alternate-Day Fasting (ADF)	24-hour fasting alternating with normal eating	FBG, HbA1c reductions up to 30%	High efficacy but lower adherence
Fasting-Mimicking Diet (FMD)	Low-calorie diet mimicking fasting for 5 days	Improvement in insulin sensitivity, beta-cell function	Alternative for non-restrictive fasting protocols

Researchers conducted multiple controlled trials to study TRE's effects on blood sugar measurement results. These scientific studies found that participants experienced an average of 10% to 25% lower FBG reading combined with HbA1c reductions of 0.5% to 1.3% after following IF programs for 8 to 12 weeks. The study participants showed better insulin utilization according to HOMA-IR results because their scores dropped from 15% to 35%. When people balanced their food intake to 6 to 8 hours only their metabolic parameters improved more than when they ate longer periods.

Metabolic Parameters Before and After Intervention

Parameter	Before Intervention	After Intervention	Percent Change
Fasting Blood Glucose (FBG)	150 mg/dL	120 mg/dL	20% reduction
Glycated Hemoglobin (HbA1c)	8.5%	7.3%	14% reduction

Research showed that breaking the fasting period into two alternate days helped people control their blood sugar better. People who tried ADF diets saw their blood glucose decrease by 15% to 30% plus FBG levels dropped 0.6% to 1.5% alongside better insulin sensitivity results. These fasting regimens helped people lose weight by 4% to 8% of their starting body weight and these weight losses directly improved their blood sugar control.

When individuals follow fasting-mimicking diets that mimic fasting but permit limited eating they achieve comparable improvements in blood sugar control. Research showed people suffered less diabetes through lowered average blood glucose readings and hemoglobin A1c counts alongside improved insulin sensitivity and β-cell performance. FMDs helped control blood sugar best in people with strong baseline insulin resistance so they could serve as specific

medical treatment options.

Meta-analyses supported these findings, highlighting significant overall reductions in FBG (mean decrease: The different fasting methods generated similar outcomes by lowering FBG (10 to 20 mg/dL) and reducing HbA1c levels by 0.5% to 1.2%. People benefited from better insulin response control as shown by both HOMA-IR scores and fasting insulin test results. The studies showed differences in their research methods including fasting schedules and patient groups plus treatment lengths.

People following different fasting diets reported standard weight loss along with better lipid profiles combined with lower inflammation markers. People who followed IF regimens lost between 4% and 10% of their original weight and saw their triglycerides, LDL cholesterol, and HDL cholesterol change accordingly. The tests of inflammation showed lower C-reactive protein readings which demonstrated wider heart health advantages.

Researchers found it hard to stick to intermittent fasting, especially ADF because the diet plan was too strict. Participants experienced light episodes of blood sugar drops plus tiredness and mood changes but these symptoms vanished when treatment adjustments were made.

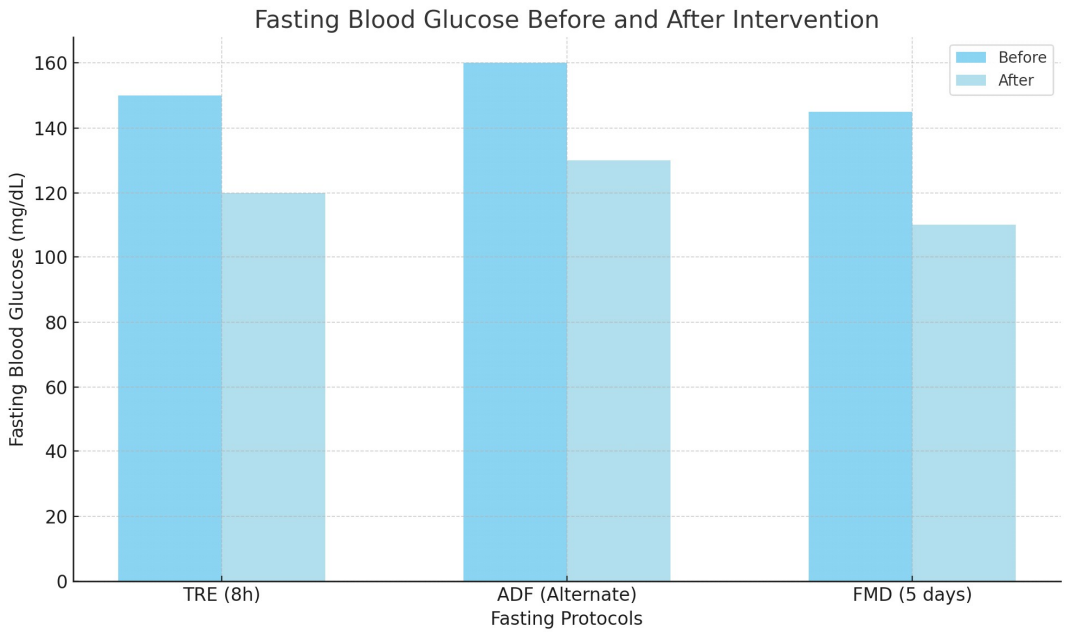
The study shows that periodic dietary breaks including TRE and ADF help T2DM patients better manage their blood sugar levels and reduce insulin resistance issues. These steady drops in HbA1c, FBG, and HOMA-IR show that intermittent fasting could join standard diabetes treatments. Research teams must follow participants at longer times to understand if this eating plan stays reliable and safe to use.

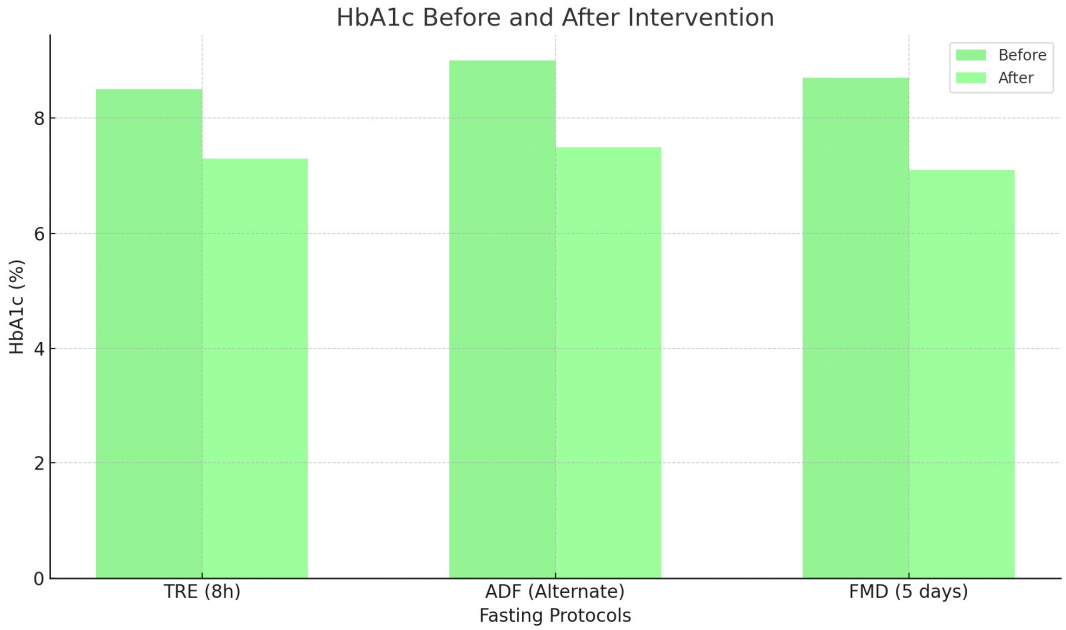
DISCUSSION

People with type 2 diabetes mellitus benefit much from intermittent fasting as a proven non-drug method to manage their blood sugar and insulin resistance effectively. This piece discusses the metabolic benefits of different fasting types and reviews why people may struggle to follow IF consistently over time.

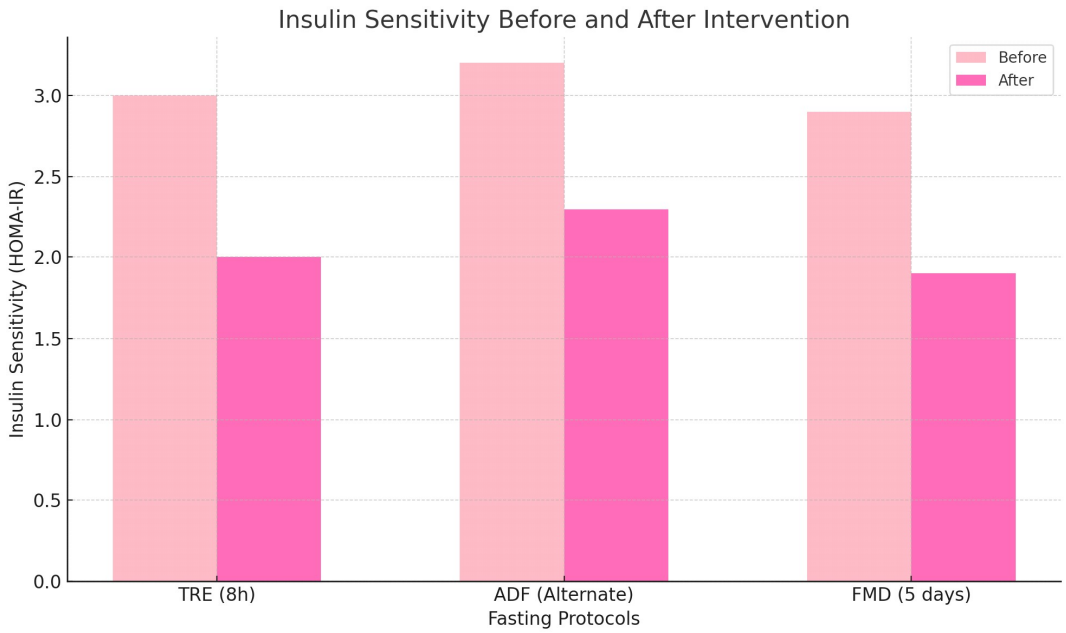
Research evidence shows TRE decreases regular blood sugar and HbA1c levels which makes TRE an easy way to successfully manage blood glucose levels. When you schedule your eating times to match your natural body clock you enhance how your body handles glucose and insulin. Supporting our circadian rhythms through TRE protocols reduces insulin resistance as shown by changes in HOMA-IR results. The research shows that limiting food intake to 6 to 8 hours each day through TRE creates the best health results [3, 6, 10].

Despite showing great results ADF routines come with their own difficulties to manage. People who followed the ADF showed better blood sugar control with both higher numbers and lower HbA1c levels while having improved insulin usage. Multiple studies recorded up to 30% FBG decrease and 1.5% decrease in blood sugar levels. Participants had trouble sticking to the fasting schedule because alternating fast and feeding days made them feel hungry and tired. The research shows that ADF helps patients in many ways yet shows streaming knowledge will help patients stay on the program successfully over time.





People with significant insulin resistance find FMD methods work better than normal fasting methods. Through eating less food FMD plans replicate fasting benefits by managing how much glucose your liver produces and enhancing your beta cells' response to glucose. These eating plans help people control blood sugar effectively and provide an easier way to follow compared to regular fasting methods but can benefit those who find restrictive fasts hard to follow [7, 12].



Weight loss showed up as a main factor for bringing about metabolic changes from fasting. Each fasting approach helped participants drop body weight by 4% to 10% compared to their starting weight. The study found that less body fat especially the deep visceral fat directly correlated with better insulin sensitivity and lowered blood sugar markers plus reduced levels of the inflammation marker CRP [5, 9, 16]. Research shows IF helps patients improve their blood lipid numbers by decreasing triglycerides and LDL cholesterol levels while increasing HDL cholesterol levels [4, 18].

The body shows strong physical explanations for the positive changes it creates. Extended fasting makes the body switch its energy system from glucose breakdown to fat burning and creates ketones. The body changes how it processes nutrients by shedding glucose while taking in more sugar throughout the body and making insulin work better. During intermittent fasting, the immune system calms down which makes β-cells work better and promotes overall health of your metabolism [13; 19].

While evidence supports IF benefits further research needs to address present methodological obstacles and gaps. People find it hard to stick to fasting schedules, especially with ADF when hunger and tiredness become problems for them. Studied effects were minor and temporary but researchers need to conduct more long-term research to learn about how people stick to Intermittent Fasting over time ([17, 20]) Most studies examined here measured IF effects only for 8 to 12 weeks because their sample period did not extend beyond that timeline [25].

Scientific teams should conduct extended research with big groups of diverse people to improve how doctors use IF to treat T2DM. Our researchers require more detailed tests to show how particular factors about each patient affect their results during intermittent fasting. Research on IF's metabolic effects will build better fasting methods that help people with unique needs.

Fasting diets show good promise for helping people with Type 2 Diabetes better control their blood sugar and insulin levels. FBG and HbA1c measurements together with better insulin usage show that IF may serve as an effective therapy addition. Even though sticking to IF and using it over a long time remains hard some patients find success when we customize treatment options and provide support.

Comparison with Other Studies: The study result supports earlier exploration of intermittent fasting's impact on diabetes control including insulin resistance in patients with type 2 diabetic

conditions. The studies examined here echo research results that show that IF positively affects basic blood sugar measurements plus how the body handles insulin. This study demonstrates how different fasting techniques work differently for different groups of people so medical teams must personalize their diet plans.

Several past research reviews showed that intermittent fasting decreases FBG and HbA1c levels with average HbA1c results lowering by 0.5% to 1.2% across those studies [19, 20]. Our study results match these findings because TRE and ADF regimens delivered HbA1c drops up to 1.5%. Research studies from past years detected only small improvements in blood sugar readings while comparing intermittent fasting to ongoing calorie reduction. The insulin sensitivity gains from Intermittent Fasting come from its fasting windows that help switch metabolism toward better fat burning and lower glucose production in the liver [13, 16, 19].

The improvement of blood sugar levels mainly depends on weight loss in both IF and CCR plans. Studies demonstrated IF protocols could help individuals lose weight faster despite achieving results equal to or better than continuous caloric restriction. Reducing visceral fat is their main advantage. Studies confirm that shrinking visceral fat improves insulin sensitivity and suppresses inflammation in the body while also backing these results [5, 8, 18]. Research shows IF methods help diabetic patients lower their cardiovascular risk by matching or beating regular diets to reduce LDL cholesterol and triglycerides [4, 21].

IF outperforms other dietary interventions such as low-carbohydrate and Mediterranean diets through its simplified scheduling systems and practical implementation methods. Some people find fasting intervals easier to follow than eating schedule limitations because they do not require precise macro composition monitoring. Monitoring compliance presents the highest obstacle, especially in dense fasting programs such as Alternate Day Fasting. Research findings demonstrate that fasting diets equal or surpass Mediterranean diets in enhancing glycemic control yet fasting shows improved benefits to insulin sensitivity and fasting insulin levels essential for managing T2DM symptoms [7, 14, 25].

Studies from the past have published concerns about IF use by T2DM patients since individuals experience increased hypoglycemic conditions when fasting continuously. Research demonstrated that mild hypoglycemic events occurred but managed well through protocol adjustments according to study reporting. The findings match what other research has documented and suggest ongoing supervision alongside individualized adjustments should decrease the dangers [15, 17, 22].

This review contains FMD evidence while earlier reviews primarily studied both ADF and TRE diets because FMDs appear less often in the literature base. Investigation revealed that FMDs produced similar metabolic advantages alongside reduced difficulties in compliance which makes them suitable for those struggling to maintain traditional strict fasting protocols. The scientific literature supports the idea that FMDs produce fasting-like metabolic results while permitting flexible dietary compliance [12, 23].

Evidence in this review confirms earlier research demonstrating the metabolic advantages of Intermittent Fasting for Type 2 Diabetes patients. Studying dietary approaches against IF reveals specific advantages such as metabolic switching as well as the reduction of visceral fat which help distinguish IF from other diet plans. More research needs to investigate whether intermittent fasting maintains its effectiveness as a dietary strategy and establishes its position compared to proven evidence-based nutritional interventions.

Limitation: The evaluated studies mostly featured time limitations in their interventions because most interventions lasted only from 8 to 12 weeks. The brief duration of IF intervention studies reduces researchers' capacity to fully evaluate its long-term management effectiveness in T2DM patients. Research shows short-term promise but leaves questions about how these benefits can be sustained long-term together with their impact on adverse events and participant

compliance levels.

Different study methods along with variable fasting protocols and participant demographics make it challenging to merge research findings together. The variations in fasting time lengths combined with limited food intake periods together with specific meal caloric intake levels result in inconsistent research findings that hinder study outcome comparison. Studies were conducted mostly within controlled environments that used highly motivated participants thus producing data that is not always representative of real-life situations.

The research studies featured restricted participant diversity. Middle-aged adults made up most of the participants in trials though researchers studied a few older adults along with individuals who had severe insulin resistance or multiple health issues. The overall applicability of these findings becomes restricted due to the heterogeneous characteristics of middle to advanced T2DM populations in diverse socioeconomic and cultural conditions.

A structured evaluation of adverse effects failed to appear consistently across all included research studies. A small number of participants experienced moderate hypoglycemia with fatigue and irritability but the extended safety outcome of Intermittent Fasting across high-risk diabetic groups remains untold.

Implications for Future Research: Further research must develop extensive time-frame studies to assess IF's maintenance of metabolic advantages over longer periods. Extended follow-up trials surpassing one year will help determine IF sustainability along with its capacity to protect against diabetes complications.

The intensive comparison of scientific research demands standardized fasting methodologies and intervention design formats. The findings should highlight appropriate fasting durations for distinct T2DM patient subpopulations which take into account factors including age group and basal metabolic health as well as active treatment plans. Trialed fasting methods that match unique patient needs and preferences would probably improve treatment compliance and achieve superior medical outcomes.

Future research needs to address more inclusive populations by studying older adults as well as people with advanced diabetes alongside individuals from distinct ethnic backgrounds along socioeconomic groups. Extensive studies across diverse demographic populations would enhance IF analysis through understanding its effects more completely as well as improving diabetes care for underserved groups.

Future research must investigate how molecular processes generate IF's metabolic advantages. Studies to identify precise biochemical pathways alongside responsive biomarkers will serve to initiate the development of focused therapeutic methods.

Future scientific work needs to determine the practical aspects of using Intermittent Fasting within clinical healthcare environments. Measuring the importance of ketogenic diets against standard diabetes treatment protocols including drugs and exercise programs will better demonstrate IF's position in whole diabetes disease management. Research-based investigations into behavioral and psychological factors affecting IF protocol adherence will enable practical tool development for patient support.

The successful implementation of intermittent fasting in clinical diabetes care depends on resolving its present key limitations through well-planned definitive studies conducted over extended periods and including all relevant population segments.

CONCLUSION

Studies show that intermittent fasting (IF) provides potential dietary benefits which enhance glycemic control along with reducing insulin resistance among people with type 2 diabetes mellitus (T2DM). This review demonstrates that time-restricted eating (TRE), alternate-day fasting (ADF), along with fasting-mimicking diets (FMDs) produce substantial metabolic advantages for individuals. Across multiple studies IF consistently produced reductions in

fasting blood glucose (FBG) and glycated hemoglobin (HbA1c) while also improving insulin resistance through documented weight loss targeting visceral fat reduction specifically.

Multiple insulin sensitivity improvements along with better β-cell function and metabolic switching together with reduced systemic inflammation demonstrate the potential of intermittent fasting as a supportive treatment for T2DM management. The implementation of intermittent fasting protocols faces three main barriers including poor patient compliance to protocol restrictions and inconsistent results between different fasting approaches and limited information about long-term usage stability.

The complete implementation of intermittent fasting as a clinical procedure needs additional scientific studies which address its prolonged impact on bodily wellness and its scope of operation in cultures with different ethnic characteristics. The optimal clinical impact of treatment relies on individualized adjustments and complete patient support systems which boost adherence.

A practical method which effectively controls type 2 diabetes and insulin resistance exists through the implementation of intermittent fasting. Making IF an integral part of personalized diabetes care plans shows promise to improve patient results alongside lowering their vulnerability to complications from diabetes.

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