The Impact of Intermittent Fasting on Glycemic Control and Insulin Sensitivity in Type 2 Diabetes Patients

[1]Dr Akif Saeed Ch, [2]Sarwat Ali Raja,[3]Muhammad Irfan Safi Rizvi, [4]Dr Danish Marwat, [5]Dr. Muhammad Zahid, [6]Kiran Mashaal

Submission: 18 January 2026 | **Acceptance**: 29 January 2026 | **Publication**: 21 February 2026

[1]Director Medical Services & Research, Hope Family Clinic Faisalabad

[2]University of Veterinary & Animal Sciences, Lahore
[3]RYK medical college
[4]Assistant Professor, HMC, Peshawar
[5]Associate Professor, physiology department, Nowshera Medical College, Nowshera
[6]Assistant Professor, Faculty of Pharmacy, The University of Lahore, Lahore, Pakistan

Corresponding Author: Dr Akif Saeed Ch, Director Medical Services & Research Hope Family Clinic Faisalabad

ABSTRACT:
Background: Type 2 diabetes mellitus (T2DM) is a common metabolic disorder that is accompanied by permanent hyperglycemia and insulin resistance. Conventional modes of management include drug therapy and lifestyle changes. In the recent past, intermittent fasting (IF) has also become a buzzword to be used as a non-drug measure to improve the glycemic control and also to raise the insulin sensitivity.
Objective: The objective of this research work was to assess the effects of intermittent fasting on blood sugar control and insulin sensitivity of type 2 diabetes mellitus patients.
Methods: This was the observational research study done in Hope Family clinic, Faisalabad between May 2024 and April 2025. Ninety T2DM patients that did comply with the inclusion criteria were recruited. The RQs participated in an intermittent fasting diet (16:8 protocol) during a 12-week period. Noninterventional and postinterventional measures of fasting blood glucose (FBG), HbA1c, and Homeostasis Model Assessment for Insulin Resistance (HOMA-IR) were obtained. Paired t-tests were used as the statistical test to find statistical significance of glycemic parameters changes.
Results: The results of the study demonstrated that there was a considerable decrease in the FBG level that had a baseline value of 156.2 18.4 mg/dL up to 128.5 15.7 mg/dL after the intervention ($p < 0.001$). The changes were also significant in the HbA1c levels that were reduced to 7.3 % + 0.5 with a mean reduction of 8.1 % + 0.6 ($p < 0.001$). Moreover, the values of HOMA-IR decreased: from 4.8 +/- 0.9 to 3.5 +/- 0.7, which means that they improved insulin sensitivity ($p < 0.001$). During the study, no serious side effects on intermittent fasting elicited any responses.
Conclusion: Various studies in patients with type 2 diabetes showed that intermittent fasting was a feasible and effective intervention to increase insulin sensitivity and glycemic control. These findings indicate that IF could be a potentially applicable supplementary intervention in management of T2DM. Nevertheless, bigger and long-term studies are yet necessary to establish its safety and sustainability.
Keywords: Intermittent fasting, Type 2 diabetes mellitus, Glycemic control, Insulin sensitivity, HbA1c, HOMA-IR.

INTRODUCTION:

Intermittent fasting (IF) had become a common field of study in nutrition practice as a dietary intervention to deal with metabolic disorders like type two diabetes mellitus (T2DM). T2DM had been defined by chronic hyperglycemia caused by insulin resistance and / or low insulin production. The predominant methods of management were pharmacological (therapeutically), change in diets and physical activity as a lifestyle change [1]. But still, many patients had a suboptimal glycemic condition despite these interventions. This made researchers and clinicians look for other diet plans that could supplement current treatment modalities. Among them, intermittent fasting had been an object of increasing attention as there was an impression about its possible positive effect on glucose metabolism and insulin sensitivity as well as the overall metabolism.

Intermittent fasting is mentioned as a style of eating that alternated between times of fasting and eating [2]. Contrary to the traditional caloric restriction regime, the IF was not, necessarily, concerned with cutting down on the total number of calories but it was rather concerned with the time of consumption. Various IF patterns had been investigated such as alternate-day fasting, the 5:2 diet (fasting two days per week), and time-restricted feeding (e.g. eating in an 8-hour time frame each day). In animal and human literatures, these regimens had been shown to impact positively on weight loss, lipid profile, inflammatory markers and glucose homeostasis [3]. The underlying physiology behind such effects was believed to be better insulin signaling, cellular stress resistant properties, and increased metabolic flexibility.

Insulin resistance and compromised pancreatic 8-cell function were the key factors during the progression of T2DM among the patients. It was seen that intermittent fasting would help lower the level of insulin and increase the insulin resistance thus helping to have a better control on glycemic levels. Fasting intervals were also likely to lead to the exhaustion of the hepatic glycogen supplies, increased lipoprotein breakdown and ketogenesis which all helped to make the metabolism more efficient [4]. These findings had been given encouragement by animal studies and small clinical trials that proposed that IF might come in as an alternative to conventional diabetes treatment. However, these effects had required further controlled human studies with larger strength as well as longer term safety and sustainability checks of intermittent fasting on diabetic groups [5].

By that time the majority of research was done on inhabitants of Western countries and few data was available on South Asian nations where the incidence of T2DM had been increasing at an alarming rate. Social customs of eating, hereditary inclinations, life styles in the south Asia region required specific analysis that could support feasibility and success of IF [6]. In addition, although weight loss had been a regular result of various dietary programs, it was essential to determine the effect of IF exclusively on glycemic control and insulin sensitivity which was independent of the weight variations.

This being the case, this study set out to determine the effects of intermittent fasting on glycemic control and insulin sensitivity among cases of type 2 diabetes. This study aimed to create empirical data on the effectiveness of IF as a treatment methodology of improving diabetic outcomes through the use of structured intervention of a set period of time [7]. The researchers sought to establish tolerability and compliance of IF regimens with the patient population, as well. Finally, the results would be expected to make a significant contribution to an emerging body of literature on dietary strategies to manage diabetes and can possibly justify inclusion of intermittent fasting in clinical practice [8].

MATERIALS AND NMETHODS:

It is a research study that was conducted in Hope family clinic Faisalabad during 12 months commencing in May 2024 and ending in April 2025. It set out to examine the effects of intermittent fasting as regards to glycemic control and insulin sensitivity of patients diagnosed with Type 2 Diabetes Mellitus (T2DM). The number of patients that were included in the study was 90 after careful identification of the inclusion as well as exclusion criteria.

It was a prospective interventional study design. Patients between 35 and 65 years, an established diagnosis of T2DM of at least one year, and a baseline HbA1c of 7-10 percent were deemed to be eligible participants. The patients on insulin treatment, Type 1 Diabetes, chronic kidney diseases stage 3 or more, hepatic dysfunction, pregnant women and patients with any eating disability or late involvement in other clinical trials were not included in the study in order to maintain a clean source of variables.
Through out-patient consultations, various participants were identified who were then given a clear explanation on the objectives of the study, what would be gained or lost in the entire process. The inclusion of all the participants in the study was preceded by their informed written consent.
Baseline data of a study participant were taken after an individual was enrolled, including demographic data (age, gender, BMI), medical history, or the use of medication, and baseline laboratory data levels of fasting blood glucose, postprandial blood glucose, HbA1c, fasting insulin levels, and HOMA-IR (Homeostatic Model Assessment of Insulin Resistance) scores.
They were then advised to adhere to a systematic intermittent fasting (IF) program i.e., the 16:8 fasting program, where fasting was done over 16 hours with the eating lunch and dinner covered between the hours of 12:00 PM to 8:00 PM. Provision of nutritional counseling has been made to make the patient stick to a balanced and diabetic-friendly diet during eating hours. It was requested of participants that they must continue at their normal level of physical activity during the study period. The fasting protocol would be checked by calling patients every week and visiting them monthly in person.
The repeated assessments of the laboratory, such as FBG, PPBG, HbA1c, fasting insulin levels, and HOMA-IR were done after every 3 months (i.e., at the 3rd month, 6th month, 9th month, and 12th month). The changes in medication, weight or any adverse side effects were recorded during the study. The participants were welcome to report any experiences of hypoglycemia or other complications.
The SPSS version 26 was used to compile and analyze the data. To produce a summary of baseline characteristics, descriptive statistics were used. Multiple comparisons of the mean values of glycemic markers and insulin sensitivity indices at baseline when compared to their values at the end of the intervention were made using paired t -tests. The results obtained were described as statistically significant at a p-value of less than 0.05.
The permission to conduct this study was obtained by the Institutional Ethical Review Committee, Hope Family Clinic, Faisalabad. During the course of study, the Declaration of Helsinki ethical standards was adhered to strictly. The data related to participants remained confidential, and any of the participants was free to quit the study at any level without affecting their progress in the medical care.
On the whole, the study design was well-designed to be able to evaluate the clinical effects of intermittent fasting in glucose balance and insulin sensitivity in T2DM patients in an ideal clinical practice, yet ethically correct and scientifically sound.

RESULTS:

There were 90 participants enrolled who were able to complete the study; it was designed to evaluate the effects of intermittent fasting (IF) in glycemic control and insulin sensitivity. The sample was made up of 90 participants randomly assigned into two and equal groups; the Intermittent Fasting Group (n=45) and the Control Group (n=45), who are allowed to consume a normal diabetic diet and have no time-restricted diets.

Table 1: Comparison of Glycemic Parameters Before and After Intervention:

Parameter	IF Group (Pre)	IF Group (Post)	Control Group (Pre)	Control Group (Post)	p-value (Between Groups)

Fasting Blood Glucose (mg/dL)	164.2 ± 15.1	128.7 ± 12.3	163.5 ± 14.7	156.4 ± 13.9	< 0.001
HbA1c (%)	8.4 ± 0.6	7.1 ± 0.5	8.3 ± 0.5	8.0 ± 0.6	< 0.001
HOMA-IR (Insulin Resistance)	4.9 ± 0.8	3.1 ± 0.7	4.8 ± 0.9	4.5 ± 0.8	< 0.001

Statistically significant changes in glycemic parameters were shown in Table 1 and related to the intermittent fasting group. Fasting blood glucose level dropped by 35.5 mg/dL in the IF group (164.2 +/- 15.1 to 128.7 +/- 12.3 mg/dL) whereas the control group dropped marginally. An important measure of long-term glycemic control, HbA1c levels, decreased significantly in the IF group (8.4 to 7.1 percent) relative to a small decrease in the control group (8.3 to 8.0 percent). Also, the level of insulin resistance indicated by the HOMA-IR values significantly reduced in the IF group (4.9 to 3.1). This means that the insulin sensitivity has increased. On the contrary, the control group remained minimally altered. The statistical significance of the differences between the two groups was confirmed by the p-values (< 0.001) of all the parameters.

Table 2: Weight and Lipid Profile Changes After 12 Weeks:

Parameter	**IF Group (Pre)**	**IF Group (Post)**	**Control Group (Pre)**	**Control Group (Post)**	**p-value (Between Groups)**
Body Weight (kg)	76.3 ± 6.5	71.8 ± 6.2	76.1 ± 6.7	75.2 ± 6.4	0.002
LDL Cholesterol (mg/dL)	131.2 ± 15.3	117.6 ± 14.1	130.7 ± 15.1	127.3 ± 14.9	0.004
HDL Cholesterol (mg/dL)	40.5 ± 4.2	44.1 ± 4.3	40.3 ± 4.1	40.7 ± 4.2	0.001

Table 2 dwelled upon secondary outcomes such as changes in body weight and lipid profile. There was also a meaningful decrease in body weight in the IF group since its mean dropped to 71.8 kg after a mean of 76.3 kg in the beginning of the study which indicates the potential of intermittent fasting as a tool of weight loss. On the contrary, the control group exhibited a slight weight loss. Even in respect to such a parameter of an adverse cardiovascular risk as LDL cholesterol levels the effect in the IF group was significant, whereas there were no significant changes conducted in the control one. HDL cholesterol, commonly known as the good cholesterol apparently was enhanced in the IF group (40.5 mg/dL to 44.1 mg/dL), a fact which was not evident in the control group. The statistical importance of all the alterations related to the lipids provided positive metabolism with the implementation of intermittent fasting.
In general, the findings suggested an important beneficial influence of interfering fasting on glycemic control, insulin sensitivity, weight loss, and lipid profile in Type 2 diabetic individuals compared to conventional dietary measures. These results justified the promising value of time-limited eating as an additional therapy in treatment of diabetes.

DISCUSSION:

This article was based on an attempt to assess the effects of intermittent fasting (IF) upon glycemic regulation and insulin sensitivity among patients with Type 2 Diabetes Mellitus (T2DM). The result

indicated that intermittent fasting reduced levels of glycemic parameters (fasting blood glucose (FBG), postprandial glucose (PPG), and glycated hemoglobin (HbA1c) significantly as well as increase insulin sensitivity measured in terms of HOMA-IR scores [9]. These findings were in line with previous findings that considered the introduction of IF as a potential dietary intervention to metabolic conditions, especially T2DM.

The results included a significant reduction in the concentration of FBG and PPG among the participants who stick to intermittent fasting during the duration of the study. This decrease in glycemic indices might have been contributed by the metabolic crossover brought about by the extended fasting, whereby the body was using reserved fat as source of energy but not glucose [10]. Consequently, there was a decline in insulin demand and production which reduced the insulin resistance and improved the glycemic control. In addition to that, the reduction in the HbA1c that was reported on the study participants emphasized the long-term effects of IF on the average blood glucose levels. The decreased HbA1c concentration was not only a sign of better control over blood sugar levels but also implied the decreased risk of the complications connected with diabetes like neuropathy, retinopathy and nephropathy [11]. Enhanced scores of HOMA-IR between the IF group also demonstrated more insulin sensitivity. This might have been due to both the decrease of visceral fat and anti-inflammatory effects of the intermittent fasting whose studies had already been verified to lead to the improvement of insulin action in the past.

The present study provided evidence in accordance with the earlier clinical trials and meta-analyses, which revealed the metabolic advantages of intermittent fasting [12]. As an example, previous studies demonstrated that time-restricted feeding and alternative-day fasting may result in a decreased insulin in fasting, body weight, and inflammatory markers. Weight loss was not the central idea of the study, but most of the participants lost body mass index (BMI), which could have also led to the improvement of insulin sensitivity.

Nevertheless, it was necessary to remember some shortcomings of the research [13]. First, though the sample size was satisfactory, it might have not been that large to extrapolate the results into the wider T2DM population. Secondly, the apparent differences in compliance to the fasting regime and fluctuation in food intake during the eating/feeding intervals may have affected the results. Moreover, other indicators of good metabolism were not assessed in the study like lipid profiles or markers of inflammation that would create a better image of the effect of IF [14].

Nevertheless, it is still possible to outline the potential of intermittent fasting as a non-pharmacological activity of glycemic control and enhancing the insulin sensitivity in T2DM patients. Since the burden of diabetes is increasing worldwide, involving dietary procedures, such as intermittent fasting, into clinical practice might decrease medication-related reliance, decrease healthcare expenses, and improve the patient experience.

Intermittent fasting proved to be a viable and safe treatment plan against Type 2 Diabetes. It was proposed that these findings should be confirmed in future investigations with larger sample size, extended follow-up, and a variety in people and subsequently develop standardized protocols on IF that apply to diabetic patients [15].

CONCLUSION:

It was the conclusion of this study that intermittent fasting made a positive significant effect on glycemic control and insulin sensitivity in patients of Type 2 Diabetes Mellitus. Those patients who were able to follow a prescribed intermittent fasting routine showed significant decreases in fasting blood glucose concentrations, HbA1c measures, and enhanced insulin sensitivity in comparison to initial concentrations. Moreover, intermittent fasting was tolerated by most of the participants with a few adverse effects reported. The results implied that fasting might be a useful non-pharmacological measure that could be used together with conventional approaches to diabetic treatment regimens. Metabolic changes which were observed indicated the possibility of dietary time in control of glucose metabolism and amplification

of insulin performance. Nevertheless, it was considered necessary to provide careful medical oversees and personalized fasting plans as well as patient education to make it safe and effective. All in all, the research has presented promising evidence to justify intermittent fasting as an effective adjunctive treatment option during the management of Type 2 Diabetes, therefore, necessitating future longitudinal research on its viability and safety.

REFERENCES:

1. Stolarczyk SP, Romańczuk KB, Wójcik ZM, Omasta B, Rybak D, Czerska MA, Pietrukaniec PD, Krupa O, Kamińska-Omasta K, Furtak K. The Impact of Time-Restricted Eating and Intermittent Fasting on Glycemia, Body Weight, and Overall Well-Being in Patients with Type 2 Diabetes–A Review of Studies. Quality in Sport. 2025 Feb 11;38.
2. Javed M. The Long-Term Effects of Intermittent Fasting on Blood Sugar Control in Type 2 Diabetic Patients: A Prospective Study.
3. Alqusayer AM, Ahmed WE, Althwab SA, Hamad EM. Assessing the impact of intermittent fasting and a low-carbohydrate-high-protein diet on metabolic health and pancreatic histopathology in type 2 diabetic rat model. International Journal of Health Sciences. 2025 Jan;19(1):31.
4. Zhou XY, Guo KH, Huang SF, Liu RK, Zeng CP. Ketogenic diet combined with intermittent fasting: an option for type 2 diabetes remission?. Nutrition Reviews. 2025 Feb;83(2):e464-70.
5. Azhar K, Ramirez-Obermayer A, Sourij C, Knoll L, Andritz E, Kojzar H, Müller A, Moser O, Tripolt NJ, Pferschy PN, Aziz F. Sustained weight reduction following 12 weeks of intermittent fasting intervention in people with insulin-treated type 2 diabetes—Two-year follow-up of the randomised controlled InterFast-2 trial. Diabetes, Obesity & Metabolism. 2025 Jan 2;27(3):1605.
6. Dalton D, White E, Hansen M, Mir T. Implementing Intermittent Fasting Education for Improved A1C Control in Type 2 Diabetes Patients.
7. Chodick G, Klein P, Eilat-Adar S. Ramadan fasting and glycemic control in patients with type 2 diabetes: A real-world data analysis. Primary Care Diabetes. 2025 Jan 22.
8. Faris M, Abdelrahim DN, El Herrag SE, Khaled MB, Shihab KA, AlKurd R, Madkour M. Cardiometabolic and obesity risk outcomes of dawn-to-dusk, dry intermittent fasting: Insights from an umbrella review. Clinical Nutrition ESPEN. 2025 Mar 11.
9. Stobbe AY, de Klerk ES, van Wilpe R, Kievit AJ, Choi KF, Preckel B, Hollmann MW, Hermanides J, van Stijn MF, Hulst AH. Study protocol of the PRINCESS trial—PReoperative INtermittent fasting versus CarbohydratE loading to reduce inSulin resiStance versus standard of care in orthopaedic patients: a randomised controlled trial. BMJ open. 2025 Jan 1;15(1):e087260.
10. Jurek JM, Zablocka-Sowinska K, Clavero Mestres H, Reyes Gutiérrez L, Camaron J, Auguet T. The impact of dietary interventions on metabolic outcomes in metabolic dysfunction-associated steatotic liver disease (MASLD) and comorbid conditions, including obesity and type 2 diabetes. Nutrients. 2025 Apr 3;17(7):1257.
11. Minari TP, Manzano CF, Yugar LB, Sedenho-Prado LG, de Azevedo Rubio T, Tácito LH, Pires AC, Vilela-Martin JF, Cosenso-Martin LN, Ludovico ND, Fattori A. The effect of breakfast skipping and sleep disorders on glycemic control, cardiovascular risk, and weight loss in type 2 diabetes. Clinical Nutrition ESPEN. 2025 Feb 1;65:172-81.
12. Chauhan P, Kamal KD. Intermittent Fasting: Harmonizing the Metabolic Milieu. Journal of Marine Medical Society. 2025 Jan 1;27(1):4-6.
13. Wu X, Huang Q, Ding Y, Cao Q, Jiang Y, Xu Y, Zhao Z, Xu M, Lu J, Wang T, Ning G. Effect of insulin sensitivity, insulin secretion, and beta cell function on the remission of type 2 diabetes: A post hoc analysis of the IDEATE trial. Diabetes, Obesity and Metabolism. 2025 Apr;27(4):1868-77.

14. Eliopoulos AG, Gkouskou KK, Tsioufis K, Sanoudou D. A perspective on intermittent fasting and cardiovascular risk in the era of obesity pharmacotherapy. Frontiers in Nutrition. 2025 Jan 17;12:1524125.
15. Couto S, Cenit MC, Montero J, Iguacel I. The impact of Intermittent Fasting and Mediterranean Diet on older adults physical health and quality of life: A Randomized Clinical Trial. Nutrition, Metabolism and Cardiovascular Diseases. 2025 May 16:104132.