



# Effect of Fenugreek Supplementation on Inflammation in Diabetic Patients: a Double-Blind Randomized Controlled Clinical Trial

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## ABSTRACT

**Introduction:** Diabetes Mellitus is a chronic metabolic disease, with over 90% of cases classified as type 2 diabetes (T2DM). It is estimated that the number of individuals with diabetes will reach 700.2 million by 2045. The causes of diabetes include Insulin resistance (IR), poor diet and lifestyle choices, genetic factors, and inflammation. Elevated levels of pro-inflammatory cytokine interleukin 1 beta (IL-1 $\beta$ ) in visceral fat are associated with an increased risk of T2DM. Also, adiponectin, a major peptide released by adipose tissues, is linked to obesity, insulin resistance, and inflammation; its levels decrease in individuals with obesity-related visceral fat accumulation. One natural supplement commonly used to manage complications and treat diabetes mellitus is fenugreek (*Trigonella foenum-graecum* Linn.), which is widely recognized for its anti-diabetic and anti-inflammatory properties. However, most studies on fenugreek and inflammation have been conducted in animal models, with relatively few human studies available. Furthermore, many of these studies have used plant seed powder rather than pure extracts. This study aimed to evaluate the impact of fenugreek supplementation on inflammation in Patients with T2DM.

**Methods and Materials:** In this double-blind randomized controlled clinical trial conducted over eight weeks, 46 patients with T2DM of both genders, with an average age of 55 years, were randomly assigned using RAS software into two groups: the supplement group (n = 23), which received 335 mg of dry fenugreek seed extract, and the placebo group (n = 23), which received microcrystalline cellulose. Statistical analysis of the data was performed using the Wilcoxon, Mann-Whitney, ANCOVA, and paired samples t-test.

**Results:** A total of 46 patients were included in the study, with 23 patients receiving fenugreek and the remaining 20 receiving a placebo. There was no statistically significant difference in the general characteristics between the two groups of participants at the beginning of the study. After an eight-week intervention period, the results indicated a marginal decrease in adiponectin levels ( $p = 0.055$ ), while a notable and statistically significant decline was observed in interleukin levels ( $p = 0.037$ ).

**Conclusion and Discussion:** Fenugreek can significantly decrease the level of the inflammatory factor IL-1 while increasing the non-inflammatory factor adiponectin. It activates the Peroxisome proliferator-activated receptor (PPAR) receptor pathway, which plays a crucial role in regulating adiponectin expression. Additionally, fenugreek can decrease insulin levels and increase the mRNA expression of PPAR- $\gamma$ , as well as serum adiponectin levels, due to the presence of 4-hydroxyisoleucine and diosgenin. Further research should be conducted to confirm these findings.

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