

<https://doi.org/10.48047/AFJBS.6.15.2024.12896-12905>



African Journal of Biological Sciences

Journal homepage: <http://www.afjbs.com>



Research Paper

Open Access

A Randomized Controlled Trial of Anthem Graveolens (dill seeds) in Type II Diabetes Patients: An Ayurvedic Inspired Phytopharmaceutical Approach

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Volume 6, Issue 15, Oct 2024

Received: 15 Aug 2024

Accepted: 25 Sep 2024

Published: 21 Oct 2024

[doi: 10.48047/AFJBS.6.15.2024.12896-12905](https://doi.org/10.48047/AFJBS.6.15.2024.12896-12905)

Abstract

Background

T2DM is a pervasive chronic disorder in Pakistan, characterized by persistent elevation of blood glucose levels, exacerbating cardiovascular morbidity, and severe complications like nephropathies and neuropathies, it significantly affects the quality of life—the escalating burden of T2DM on Pakistan's public health demands effective and accessible management strategies.

Objectives:

This study explores dill seeds' therapeutic potential, harnessing Ayurvedic wisdom and offering a promising evidence-based complementary therapy for mitigating diabetes mellitus and oxidative stress by scrutinizing its effects on FBG, RBS, HbA1c, and MDA.

Methodology:

A randomized controlled trial was conducted involving 60 patients aged 20-60, divided into three groups: control, metformin, and dill seeds. Participants in the dill seeds group already consumed dill seeds as part of their regular diet (3g/day). Fasting Blood Sugar (FBS), Random Blood Sugar (RBS), Hemoglobin A1c (HB1Ac), and Malondialdehyde (MDA) levels were assessed at baseline and after intervention. **Results:**

Dill seeds group showed a notable reduction in FBS, RBS, and MDA levels compared to Metformin-using patients. Specifically FBS decreased from 146.71 ± 49.80 to $116-122$, RBS from 178.21 ± 14.1 to $139 - 147$, HB1Ac from 8.10 ± 1.15 to $6.5 -6.9$ and MDA levels from 3.34 ± 2.05 to $2.6 -2.8$. These results were analogous to those exhibited by the metformin group. This highlighted anti Diabetic potential of dill seeds.

Conclusion:

Herbs like Anthem Graveolens are rich in flavonoids, terpenoids, saponins, Polyphenol, tannis, and alkaloids which are effective in controlling glycemic and oxidative stress in type 2 diabetic patients

Keywords:

Anethum graveolens, Ayurveda, Diabetes, Anti-diabetic agent, Flavonoids, Glycemic Index, Tannis, Blood sugar, Hyperglycemia

Introductions:

Diabetes is a chronic multi-factorial metabolic disorder whose common finding is persistent hyperglycemia that damages tissues and organs due to erratic glucose metabolism. Type 2 Diabetes, also known as Non-insulin-dependent diabetes mellitus (NIDDM), is marked by a reduced sensitivity to endogenous insulin, leading to impaired glucose uptake and utilization, and often requiring exogenous insulin administration to mitigate hyperglycemia. Type 2 Diabetes; is also known

Insulin-resistant diabetes, in which the body becomes insensitive to endogenous insulin and thus requires insulin exogenously.^[2] Diabetes poses a significant global health burden, affecting 537 million people worldwide. The MENA region is disproportionately affected, with 27 million individuals currently living with diabetes, and a forecasted rise to 135.7 million by 2045.^[3] Pakistan ranks third globally in terms of diabetes prevalence, with a substantial 33 million people affected, underscoring the need for targeted public health interventions.^[4-5]

Furthermore, Canagliflozin has been shown to increase the risk of amputations and bone fractures, emphasizing the importance of cautious prescribing practices and ongoing patient surveillance to minimize potential harm.^[6] Non-adherence to diabetes treatments is often attributed to four primary factors: lack of awareness regarding the benefits, affordability concerns, physical side effects, and inadequate patient education.^[7] Moreover, current anti-diabetic management therapies, which primarily focus on glycemic control, are insufficient in addressing the complex pathophysiology, multifaceted nature, and holistic complications associated with diabetes, highlighting the need for a more comprehensive and patient-centered approach to diabetes care.^[8] To bridge this gap, an integrative diabetes management approach, which integrates holistic principles of diabetes management with molecular understandings, is necessary. Ayurveda, a traditional ethnic medical system with a rich history predating biblical times, has been practiced for millennia, offering a comprehensive and holistic framework for understanding health and disease. Characterized by its emphasis on natural remedies and herbal therapies, Ayurveda provides a low-cost, low-risk alternative to conventional drugs, with minimal adverse effects and widespread availability. Phytoconstituent evaluation of *Anethum Graveolens* showed that it is rich in tannins, terpenoids, saponins, flavonoids, glycosides, β -carvone, and limonene.^[9-12] *Anethum graveolens*, commonly known as dill (سويا), exhibits a wide range of pharmacological properties, including: Antimicrobial activity against various microorganisms, Antispasmodic effects, relieving smooth muscle spasms, Anti-inflammatory properties, reducing inflammation and pain, Antihistamine activity, mitigating allergic responses, Antioxidant capabilities, scavenging free radicals and protecting against oxidative stress, Carminative effects, alleviating gastrointestinal discomfort and bloating, Digestive properties, enhancing nutrient absorption and gut health, Disinfectant activity, inhibiting the growth of pathogens, Anti-hyperlipidemic and anti-hypercholesterolemic effects, modulating lipid metabolism, Antifungal properties, inhibiting fungal growth and infection, Aromatic and diuretic effects, promoting urine

production and eliminating toxins, Galactagogue properties, stimulating milk production in lactating women, Sedative and stomachic effects, soothing digestive issues and promoting relaxation and Sudorific properties, inducing sweating and facilitating detoxification

Methodology :

This expected cohort was anatomized in Central Park Medical College & Teaching Hospital Lahore from June 2024- November 2024 on 60 subjects after subjective collection, concurring with the standards laid out in the protestation of Helsinki & It was endorsed by the Universal Audit Board (IRB# CPMC/ IRB- No. 2035) of Central park Medical College & teaching hospital. The Verbal educated concurrence was taken from all the on-screen characters sometime recently expansion in the think about the Secrecy of the cases was kept up all through the ponder. The test was calculated utilizing an Open Epi computer program grounded on HBA1c circumstances in typical individualities having no diabetic Complaints(4- 5.6%) as compared to the diabetic individualities(6.5% or>) or 48mmol/ spook or>) with a typical run of(underneath 6.0%) or(underneath 42mmol/ spook) Utilizing an imminent cohort plan & stringent person framework. Diabetic cases going to their scheduled checks were screened for qualification 20 individuals in each group were administrated with drug and dill seeds respectively. Fasting blood glucose, self-assertive blood glucose, HbA1c & MDA circumstances were measured at the time of enrollment, After 90 days of crevice, tests were taken once more to puncture the contrasts in both bunches, one taking T-test.

Results:

Variables	Control Group	Metformin Group	<i>Anthem Graveolens</i>	P value
FBS(mg/dl)	146.4 ± 13.4	131.3 ± 11.4	136.1 ± 12.0	0.03*
RBS (mg/dl)	179.2 ± 14.1	158.3 ± 11.6	164.1 ± 12.4	0.04*
HbA1c (%)	7.9 ± 0.7	7.3 ± 0.5	7.4 ± 0.4	0.02*
MDA (mmol/ml)	2.2 2± 1.53	4.05 ± 2.31	3.1 ± 0.4	0.05*

Variables	Control group	Metformin group	Dil seeds group	P value
FBS (mg/dl)	146.4 ± 13.4	111 - 115	116 - 122	<0.01
RBS(mg/dl)	179.2 ± 14.1	111 - 126	139 - 147	<0.01
HbA1c (%)	7.9 ± 0.7	6.3 – 6.8	6.5 – 6.9	<0.01
MDA (mmol/ml)	2.2 ± 1.53	3.2 – 3.6	2.6 – 2.8	0.005

The two of three groups with (Metformin and Dill seeds respectively) significantly showed improved glucose control (fasting blood glucose, random blood glucose, and HbA1c) and reduced MDA levels vs. the control group ($p<0.01$ and $p<0.05$). No statistically important differences were found between the two intervention groups ($p>0.05$). Both showed beneficial effects on glucose and oxidative stress markers. In a randomized control trial examination of Anthem graveolens in type 2 diabetes cases, the results showed that there are notable achievements in glycemic and oxidative stress labels over 90 days from 13 June 2024 to 11 September 2024. The study involved three groups, a control group, a group taking Metformin (1gram daily)

With dill seeds (3 grams per day in powdered or seed form). The group supplemented with dill seeds showed notable reductions in Fasting blood glucose, Random Blood glucose, HbA1c & Malondialdehyde MDA situations as compared to the control group. Precisely, the fasting blood glucose reduced from 146.4 ± 13.4 to $116 - 122$, random blood glucose from 179.2 ± 14.1 to $139 - 147$, HbA1c probabilities dropped from 7.9 ± 0.7 to $6.5 - 6.9$ & MDA situations from 2.22 ± 1.53 to $2.6 - 2.8$. The results attained from the group supplemented with dill seeds were similar to those having Metformin, which also displayed remarkable advancements in all the measured parameters (Fasting blood glucose, random blood glucose, HbA1c, MDA situations) though with slightly lesser reductions. Fasting blood glucose situations dropped from 146.0 ± 13.4 to $111 - 115$, arbitrary blood glucose situations showed a reduction from 179.2 ± 14.1 to $111 - 126$, HbA1c probabilities dropped from 7.9 ± 0.7 to $6.3 - 6.8$ & likewise the MDA situations dropped from 2.2 ± 1.57 to $3.2 - 3.6$. The comparison between the dill seeds and Metformin groups didn't show statistically important differences, suggesting that dill seeds might be a feasible reciprocal treatment in the operation of Diabetes type 2. The overall findings demonstrate that Anthem gravels can remarkably meliorate blood glucose control and oxidative stress labels in type 2 diabetes cases, offering a potential eventuality to be used as a volition to the conventional medicine "Metformin".

Discussion:

The Metformin group demonstrated significant reductions in glycemic indices, reaffirming its efficacy as a well-established treatment for diabetic therapy but Drug tolerability has the biggest influence on the real-world efficacy of any drug, and poor tolerability is inimical to patients' quality of life and compliance to treatment. According to an endocrinology article by Frontiers^[21] A significant number of patients treated with metformin presented with GI adverse effects including diarrhea, nausea, and vomiting, affecting a approx of ~20% of patients, Possible mechanisms that lead to this git related manifestation are an accumulation of amines like serotonin histamine, metformin-induced microbiota changes and OCT1 gene polymorphism. Dill seeds on the other hand are widely recognized as "safe" as a food by the US.FDA.^[18-22].Limitation:

Some factors that may induce bias are that no doubt dill seeds have been widely used for centuries traditionally to treat metabolic diseases like diabetes, there is limited scientific research on their antidiabetic effects and potential interactions, also most of the studies on dill seeds and their role in diabetes modulation have been conducted on

animals or only a few human trial. The long-term use of dill seeds for diabetic modulation is not well investigated which renders its use in clinical practice. Standardization of extracts and information about their dosage may be lacking due to varying amounts of dose used in available studies. Many studies have limited sample sizes, reducing statistical power and generalization. While this study mentions an Ayurvedic-inspired approach, most research neglects to fully incorporate traditional Ayurvedic concepts, theories, and methodologies. All these factors act as barriers and if properly addressed with the help of clinical trials, they can help unlock the full potential of dill seeds as a natural, complementary approach to managing diabetes²⁵⁻²⁷.

Conclusion:

Consumption of dill seeds has demonstrated a constructive impact on glucose metabolism in type 2 diabetics, alleviating the symptoms of diabetes type 2 by lowering the glycemic index. They also exhibit antioxidant properties & diuretic effects, Further research is warranted to elucidate the effect of Anthem Graveolens on other metabolic compounds and clarification of the mechanism underlying its beneficial effects.

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