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Elucidating the Effect of *Morus Alba* Leaf Powder on Blood Sugar Levels of Patients with Type II Diabetes Mellitus

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doi: [10.33472/AFJBS.6.12.2024.6511-6517](https://doi.org/10.33472/AFJBS.6.12.2024.6511-6517)**ABSTRACT:**

Introduction: Diabetes mellitus is characterized by altered blood glucose levels; a growing worldwide problem. Management of type II diabetes mellitus involves dietary modifications, physical activity adjustments, pharmacotherapy, herbal therapy, and insulin. Products developed from natural sources is gaining great importance; many natural products have been developed from different parts of plants for curing diabetes mellitus. This study aimed to determine the effect of *Morus alba* leaf powder on the blood sugar levels of Patients with Type II Diabetes Mellitus. **Methods:** It was a randomized control trial; eighty patients diagnosed with type II diabetes mellitus were randomly collected from Fatima Memorial Hospital and were further equally divided into two groups i.e., control group and the experimental group. Control group participants consumed their regular hypoglycemic medications, and participants in the experimental group consumed 500mg *Morus alba* leaf tablet twice a day, 15 minutes before breakfast and dinner, along with their regular hypoglycemic medications. The total duration of the study was 90 days, divided into four equal visits starting from the baseline measurements to the final measurements. **Results:** Fasting blood glucose levels of participants in the control group ranged from 151mg/dl to 146mg/dl, and fasting blood glucose levels of participants in the experimental group ranged from 190mg/dl to 136mg/dl. **Conclusion:** Results of the study concluded that *Morus alba* leaves possess efficacy against fasting high blood sugar levels.

Keywords: Diabetes Mellitus, Fasting Blood Sugar, *Morus alba*

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1. Introduction

Type II diabetes mellitus; is a medical problem associated with altered insulin formation and altered insulin functioning [1], resulting in increased blood sugar levels. It's a non-communicable disease, an epidemic, and a leading cause of increasing mortality rates around the world [2]. Multiple risk factors are responsible for its development and progression, i.e., sedentary lifestyle, eating habits, genetics, obesity, and poor access to health-related facilities.

Once after the onset of diabetes, the patient is disposed to the development of macro and microvascular complications, i.e. in macrovascular complications patient is susceptible to ischemic heart disease, cerebrovascular disease, and peripheral vascular disease, and in microvascular complications patient is susceptible to retinopathy, nephropathy and neuropathy [3]. Conventional diabetes management includes medical nutrition therapy, exercise, weight management, oral glucose-lowering drugs, and insulin injections [4]. Among these all, medical nutrition therapy has been well recognized in managing high blood glucose levels as it aims to maintain normal glucose levels, normal blood pressure to prevent vascular complications and ultimately also focuses on individual nutritive needs to prevent deficiencies and toxicities [5]. Other than these conventional management therapies many medicinal plants are also used in managing hyperglycemia [6] i.e. *Allium cepa* L., *Azadirachta indica* A., *Momordica charantia* L., *Ocimum tenuiflorum* L., Ginseng., *Rehmannia glutinosa*, *Trigonella foenum-graecum* L., *Curcuma longa* L., and *Morus alba* L. are some important plants that have a role in managing high blood glucose levels [7]. Plants having a role in managing blood glucose levels have been used for a long around the world [8]. *Morus alba* is known as white mulberry; its leaves treat high blood glucose due to the presence of 1-deoxynojirimycin (DNJ), gamma-aminobutyric acid (GABA), and flavonoids in its leaves [6]. Mulberry leaf can be used in different forms for treating high blood glucose levels i.e., water extracts, ethanolic and other extracts, and by brewing in hot water. Asian countries usually consume mulberry leaf powder in the form of tea with an aim to manage hyperglycemia and in China, mulberry leaves are brewed in hot water to make tea.

A study was conducted to investigate the potential benefits of mulberry 1-deoxynojirimycin (DNJ) against high blood glucose levels to prevent diabetes mellitus. Results showed that the oral administration of 0.8 and 1.2 g of DNJ-enriched powder significantly suppressed the rise in postprandial blood glucose levels and insulin secretion. This indicated the physiological impact of mulberry DNJ and provided insight into the effective dosage and efficacy of DNJ in humans. Based on these findings, the researchers suggest that the newly developed DNJ-enriched powder can be used as a dietary supplement to prevent diabetes mellitus [9].

A study was conducted to investigate the effects of mulberry leaf powder supplementation on individuals with non-insulin-dependent diabetes mellitus (NIDDM). 200 non-insulin dependent diabetes mellitus (NIDDM) subjects aged between 30 to 60 years were randomly selected from private and government health centers in Tirupati. 120 NIDDM subjects were purposively chosen, with 60 assigned to the control group and 60 to the experimental group. Individuals in the experimental group received mulberry leaf powder supplementation for 60 days. Their findings indicated that mulberry leaf powder supplementation had a positive impact on controlling blood sugar levels in the experimental group compared to the control group. Results suggested that mulberry leaf powder supplementation may be effective in managing blood sugar levels in individuals with NIDDM. However, it's important to note that this study provides preliminary evidence, and further research is needed to validate the findings to explore the long-term effects of mulberry leaf powder supplementation in the management of diabetes mellitus [10].

2. Materials and Methods

Study design of this study was open label randomized controlled trial. After getting approval from Institutional Review Board (IRB) 80 patients with type II diabetes mellitus were collected from Fatima Memorial Hospital Diabetic Outpatient Department in Lahore. Patients were collected on the basis of inclusion criteria i.e. individuals with Type II diabetes mellitus, individuals with <60 years of age, and individuals on oral hypoglycemic drugs were included

in the study. Individuals with Type 1 diabetes mellitus, individuals with Type II diabetics on insulin treatment, individuals with chronic diseases (cancer, liver, kidney, heart, lungs, etc.), and Pregnant & Lactating mothers were excluded from the study. After explaining the objectives of the study and ensuring the confidentiality of the information, the subjects provided informed written consent. After obtaining consent, a systematic sampling technique was used for randomization. Individuals afterwards were categorized equally into two groups i.e. control group and experimental group; they were then directed further to the three stages of study:

Phase I: Baseline Assessment

In this phase patients baseline assessment of fasting blood glucose was done to mention their current readings as fasting blood glucose measurement is an important marker to check an abnormality in blood sugar levels [11]. According to American Diabetic Association [12], individuals with Fasting plasma glucose (FPG) between 100mg/dl-125mg/dl are categorized as pre-diabetics, and people with Fasting plasma glucose ≥ 126 mg/dl are categorized as diabetics.

Phase II: intervention

After checking fasting glucose levels, individuals in control group followed their regular regimes and individuals in experimental group were asked to take 500mg of *Morus alba* leaf tablets twice a day, 15 minutes before breakfast and dinner for the total period of ninety days along with their regular medication.

Phase III- Analysis & Interpretation

In this phase analysis was done; total study was of 90 days and was equally divided into 4 blood sugar assessment visits. Afterwards obtained results were then subjected to statistical analysis to check the level of significance according to Friedman Test.

3. Results

Mean value of fasting blood glucose (FBG) values of patients in control group at visit 1 was 151mg/dl, at visit 2 was 150mg/dl, at visit 3 was 148mg/dl, and at visit 4 was 146 mg/dl. Mean value of fasting blood glucose values of patients in experimental group at visit 1 was 190mg/dl, at visit 2 was 144mg/dl, at visit 3 was 140mg/dl, and at visit 4 was 136mg/dl. Mean and standard deviation of fasting glucose levels of both groups are showed in Table 1.

Table no 1: Fasting Blood Glucose of diabetic patients in Control and Experimental Group

Fasting Blood Glucose of diabetic patients in the Control and Experimental Group		
Group of patients	Mean \pm Standard Deviation	p-value
Control group (Visit 1)	151 \pm 11.99	0.0001*
Control group (Visit 2)	150 \pm 12.15	
Control group (Visit 3)	148 \pm 12.60	
Control group (Visit 4)	146 \pm 14.94	
Experimental group (Visit 1)	150 \pm 14.13	0.0001*
Experimental group (Visit 2)	144 \pm 13.88	
Experimental group (Visit 3)	140 \pm 13.88	
Experimental group (Visit 4)	136 \pm 12.46	

P<0.05* statistically significant

4. Discussion

Andallu *et al.* 2001 conducted a study on male diabetics aged 40-60 years to determine the effect of 1000mg of *Morus alba* leaves along with 5mg of glibenclamide for the period of thirty days. End results of this study showed that consumption of *Morus alba* leaf tablet for the period of thirty days had a significant effect on fasting blood glucose values [13]. The results of this study were in accordance to the results of our study but the quantity of dose and total duration of dose consumption was different.

A study was conducted to determine the effect of mulberry leaf powder on glucose control of patients with type 2 diabetes mellitus. This randomized controlled trial study involved 36 patients with type 2 diabetes who were divided into mulberry leaf powder group and placebo group. Study found that the patients in mulberry leaf powder group experienced a significant decline in fasting blood glucose levels compared to the placebo group after 12 weeks of intervention [14]. Results of this study were in accordance to the results of our current study in which after taking 500mg of *Morus alba* leaf tablet for 90 days; caused a significant reduction in the fasting blood glucose level of patients in experimental group.

Another study conducted on Streptozotocin-induced diabetic rats to determine the anti-diabetic effect of *Morus alba* leaf polysaccharide. To conduct the study, leaves were first plucked and were washed and were grounded into fine particles. Subjects were orally administered with *Morus alba* 50-200mg/kg body weight for 5 weeks. After administration of the mentioned dosage study concluded that mulberry leaf polysaccharide effectively reduced elevated fasting blood glucose, total cholesterol, triglycerides and increased body weight. Study reported that in rats mulberry leaf polysaccharide had enhanced pancreatic beta cell regeneration, enhanced insulin secretion and also reduced liver fat buildup [15].

A study was carried out to assess the potential of mulberry leaves in mitigating oxidative stress in diabetic rats. Researchers administered dried mulberry leaf powder to both normal and streptozocin-induced diabetic rats for 8 weeks. Their study provided evidence that mulberry leaves possess a beneficial impact on oxidative stress in diabetic rats. Bioactive components present in mulberry leaves i.e., antioxidants, vitamins, flavonoids, and moracins contribute to their antioxidant properties. Mulberry leaf supplementation resulted in reduction of lipid peroxidation levels, increase in the activity of hepatic antioxidant enzymes, and restoration of serum antioxidant vitamin levels. Results of the study supported the potential of mulberry leaves as a natural therapeutic agent approach to combat oxidative stress in diabetes [16].

Recent preclinical studies have shown promising results, indicating that mulberry may serve as an effective therapeutic agent for Diabetes Mellitus. The active components in mulberry, including polyhydroxylated alkaloids, flavonoids, and polysaccharides, have been identified to contribute to its pharmacological effects on diabetes mellitus, such as regulating glucose absorption, insulin production/secretion, and exerting anti-oxidative and anti-inflammatory activities. Overall, mulberry holds promise as a natural and traditional approach to combat diabetes [17].

5. Conclusion

This study investigated the impact of *Morus alba* leaf powder on the blood sugar levels of patients with type II Diabetes Mellitus. *Morus alba* leaf tablets have brought a significant reduction in fasting blood glucose levels of the participants; consumption of 500mg of *Morus alba* leaf tablet twice a day for 90 days leads to the decline in fasting blood glucose level of

subjects in experimental group ranging from 190mg/dl to 136mg/dl. The findings suggested that *Morus alba* leaf is effective in reducing fasting blood glucose levels in patients with type II diabetes mellitus. However, additional studies are required to confirm these findings and establish the ideal dosage and long-term effects of *Morus alba* leaf consumption for the treatment of diabetes.

Conflict of Interest:

The authors declare no conflict of interest.

6. References

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