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# AUGMENTING GLIMEPIRIDE THERAPY WITH VOGLIBOSE OR ACARBOSE: IMPLICATIONS FOR TYPE 2 DIABETES MANAGEMENT

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## Abstract

**Background:** Managing Type 2 Diabetes Mellitus (T2DM) often necessitates a multi-drug approach for adequate glycemic control. This study aimed to compare the efficacy and tolerability of voglibose and acarbose as adjunctive therapies to glimepiride in T2DM patients.

**Methods:** A prospective, open-label, non-randomized, parallel-group study was conducted over six months, involving 64 adult T2DM patients already on a stable dose of glimepiride. Patients were divided into two groups: Group I received voglibose, and Group II received acarbose as an add-on therapy. Primary outcome measures included changes in Hemoglobin A1c (HbA1c), Fasting Blood Sugar (FBS), and Postprandial Blood Sugar (PPBS). Medication adherence was evaluated using the Morisky Medication Adherence Scale.

**Results:** Both groups significantly reduced HbA1c, FBS, and PPBS. The voglibose group exhibited a more pronounced reduction in HbA1c levels at six months, with a p-value of 0.00001. There was no significant difference between the two groups in FBS, PPBS, or medication adherence.

**Conclusion:** Both voglibose and acarbose were effective add-on therapies to glimepiride in improving glycemic control in T2DM patients. However, voglibose showed a slight edge in reducing HbA1c levels. These findings can serve as a basis for future large-scale, randomized studies to validate the comparative efficacy of these two medications.

**Keywords:** Type 2 Diabetes Mellitus, Voglibose, Acarbose, Postprandial Blood Sugar, Medication Adherence.

## INTRODUCTION

Type 2 diabetes mellitus (T2DM) is a chronic condition significantly impacting healthcare systems worldwide. According to the World Health Organization, the number of adults with diabetes was around 422 million in 2014 and is projected to double by 2030[1]. T2DM is about 90% of these cases and is mainly characterized by insulin resistance and pancreatic beta-cell dysfunction [2].

Managing T2DM effectively is challenging, particularly when maintaining stable blood sugar levels to minimize the risk of complications like heart disease and kidney failure[3].

One common approach to controlling blood sugar in T2DM is oral antidiabetic drugs like sulfonylureas, such as glimepiride, which stimulate the body's insulin production[4]. However, the effectiveness of sulfonylureas often diminishes over time, requiring the addition of other medications to maintain reasonable glycemic control[5].

Alpha-glucosidase inhibitors like voglibose and acarbose have shown promise as supplementary treatments. These drugs work by inhibiting enzymes that break down complex carbohydrates in the gut, slowing down glucose absorption and reducing spikes in blood sugar after meals[6]. While both voglibose and acarbose have been effective when added to sulfonylureas like glimepiride, there has not been a thorough comparison of their relative benefits and drawbacks[7].

This lack of comparative data is especially relevant given the different properties of voglibose and acarbose. For example, voglibose acts quickly and has a short duration, potentially offering more dosing flexibility and fewer side effects like stomach discomfort[8]. Conversely, acarbose has a longer-lasting effect but may cause more gastrointestinal issues[9].

Understanding the pros and cons of voglibose versus acarbose when used in combination with glimepiride is crucial for healthcare providers. This knowledge could also contribute to the growing trend of personalized medicine in T2DM treatment, allowing for more tailored therapy plans based on individual patient needs[10].

To fill this research gap, our study aims to directly compare the effectiveness of voglibose and acarbose as additional treatments to glimepiride in T2DM patients.

## MATERIALS AND METHODS

### Study Design and Duration

This study was conducted as a prospective, open-label, non-randomized trial involving parallel groups. Spanning six months, the research aimed to assess the efficacy and tolerability of voglibose and acarbose as adjunct therapies to glimepiride in patients diagnosed with Type 2 Diabetes Mellitus (T2DM).

### Study Participants

A total of 64 adult patients were enrolled in the study. All participants were already on a stable dose of glimepiride but exhibited suboptimal glycemic control, as evidenced by an HbA1c level greater than 7.0%. Informed consent was obtained from each participant before enrollment. Exclusion criteria included pregnancy, severe renal or hepatic dysfunction, and other significant medical conditions.

### Grouping of Participants

Participants were divided into two groups for the study:
Group I comprised 32 patients who were administered voglibose in addition to their ongoing glimepiride therapy.
Group II also consisted of 32 patients who were given acarbose as an add-on to their existing glimepiride treatment.

### Outcome Measures

The primary outcomes of interest were:
- Hemoglobin A1c (HbA1c)
- Fasting Blood Sugar (FBS)

- Postprandial Blood Sugar (PPBS)

Medication adherence was evaluated using the Morisky Medication Adherence Scale as a secondary outcome.

### Data Gathering

Data were collected at three distinct time points: at baseline, at the three-month interval, and at the study's conclusion at six months. Blood samples were collected using standard laboratory procedures to measure HbA1c, FBS, and PPBS levels. Medication adherence was assessed at these same intervals using the Morisky Medication Adherence Scale.

### Statistical Methods

Data analysis was performed using SPSS software. Paired t-tests were employed to evaluate the changes within each group for HbA1c, FBS, and PPBS levels. Chi-square tests were used for categorical variables, such as side effects or patient-reported satisfaction levels. A p-value of less than 0.05 was considered statistically significant.

## RESULTS

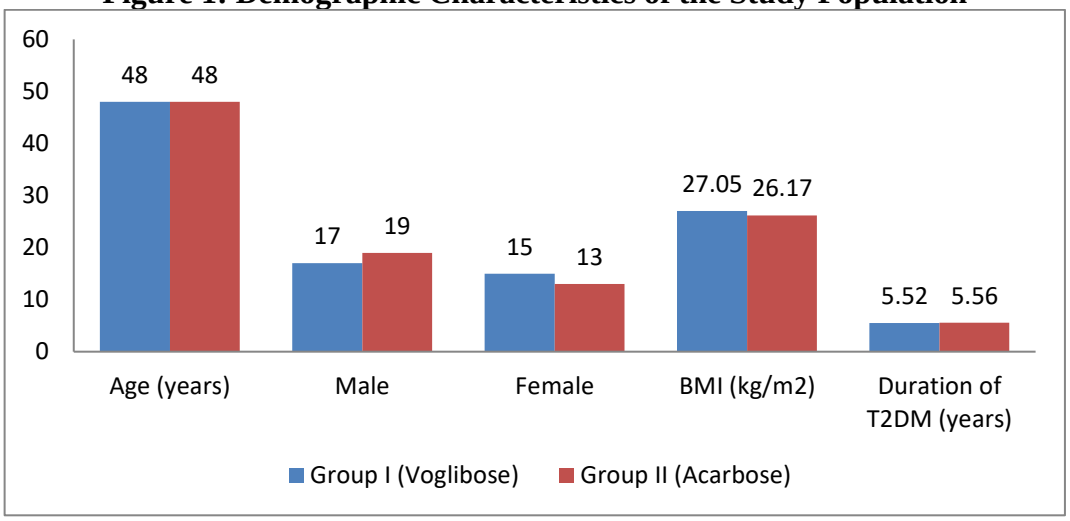
### Demographic Characteristics

The demographic characteristics of the study population are presented in Table 1.

**Table 1: Demographic Characteristics of the Study Population**

| Variable | Group I (Voglibose) | Group II (Acarbose) | p-value |
|---|---|---|---|
| **Age (years)** | 48 ± 7.26 | 48 ± 8.42 | 0.749 |
| **Gender (M/F)** | 17/15 | 19/13 | 0.614 |
| **BMI (kg/m$^2$)** | 27.05 ± 4.89 | 26.17 ± 4.61 | **0.023** |
| **Duration of T2DM (years)** | 5.52 ± 1.46 | 5.56 ± 1.45 | 0.910 |

**Figure 1: Demographic Characteristics of the Study Population**



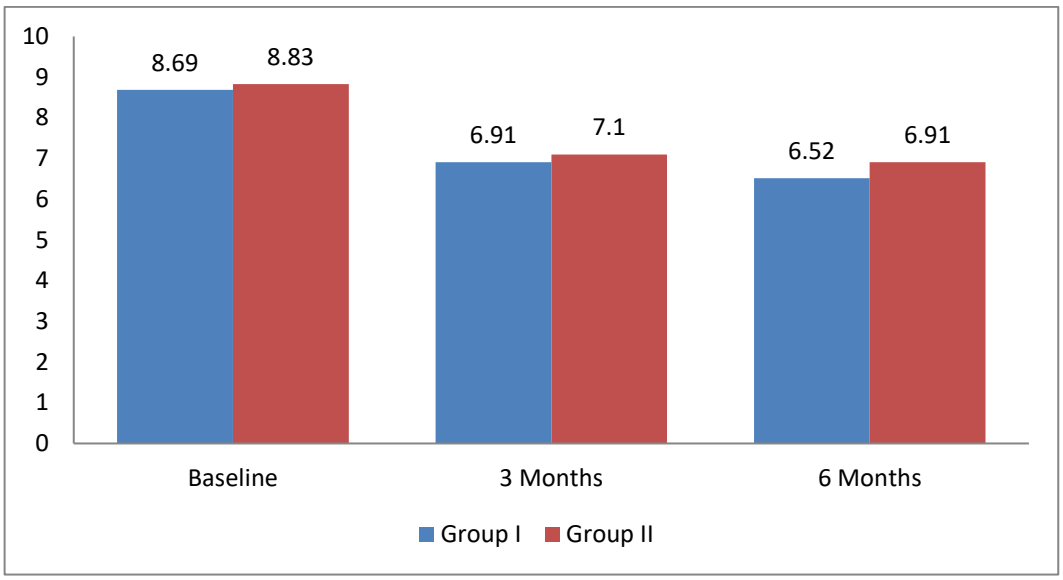

### Glycemic Control Measures

The changes in HbA1c levels for both groups are displayed in Table 2.

**Table 2: Changes in HbA1c Levels (%)**

| Period | Group I (Voglibose) | Group II (Acarbose) | p-value |
|---|---|---|---|
| **Baseline** | 8.69 ± 0.52 | 8.83 ± 0.51 | 0.280 |
| **3 Months** | 6.91 ± 0.42 | 7.10 ± 0.44 | 0.093 |
| **6 Months** | 6.52 ± 0.33 | 6.91 ± 0.22 | **0.00001** |

**Figure 2: Changes in HbA1c Levels (%)**

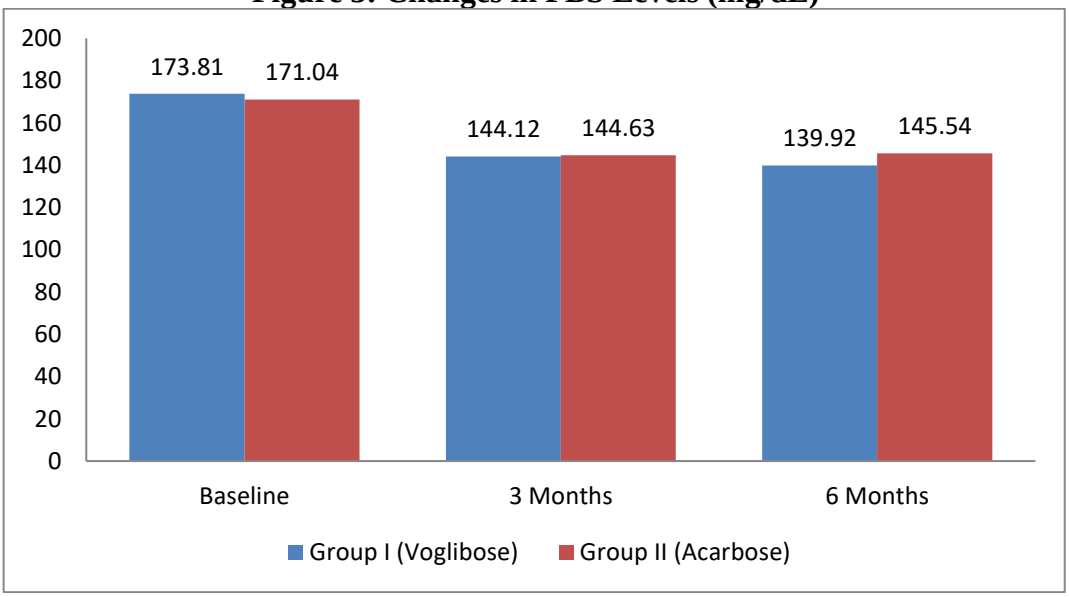



The changes in FBS levels for both groups are shown in Table 3.

**Table 3: Changes in FBS Levels (mg/dL)**

| Period | Group I (Voglibose) | Group II (Acarbose) | p-value |
|---|---|---|---|
| **Baseline** | 173.81 ± 20.91 | 171.04 ± 23.20 | 0.617 |
| **3 Months** | 144.12 ± 16.16 | 144.63 ± 14.31 | 0.893 |
| **6 Months** | 139.92 ± 23.28 | 145.54 ± 23.05 | 0.335 |

**Figure 3: Changes in FBS Levels (mg/dL)**

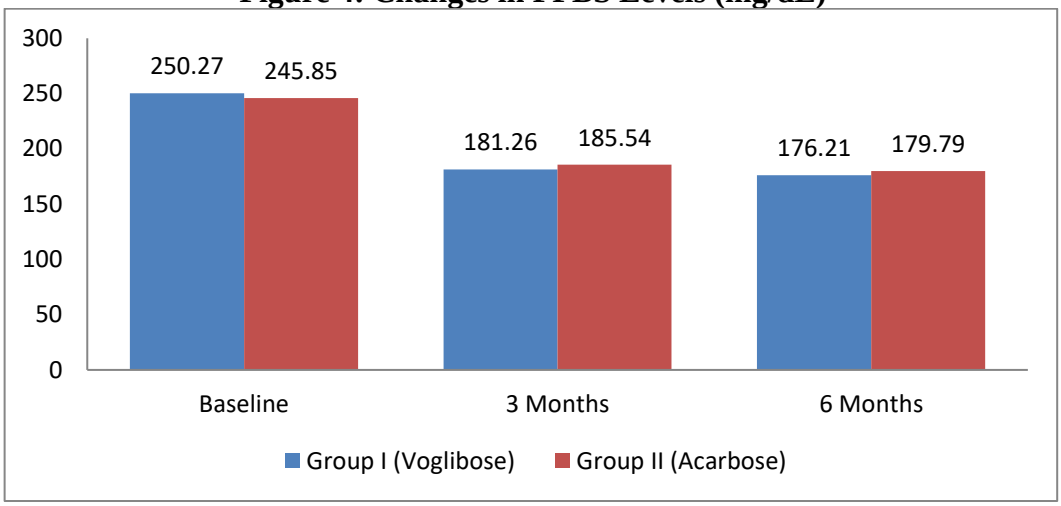



The changes in PPBS levels for both groups are summarized in Table 4.

**Table 4: Changes in PPBS Levels (mg/dL)**

| Period | Group I (Voglibose) | Group II (Acarbose) | p-value |
|---|---|---|---|
| **Baseline** | 250.27 ± 25.65 | 245.85 ± 22.45 | 0.465 |
| **3 Months** | 181.26 ± 19.05 | 185.54 ± 19.11 | 0.373 |
| **6 Months** | 176.21 ± 15.98 | 179.79 ± 15.34 | 0.364 |

**Figure 4: Changes in PPBS Levels (mg/dL)**

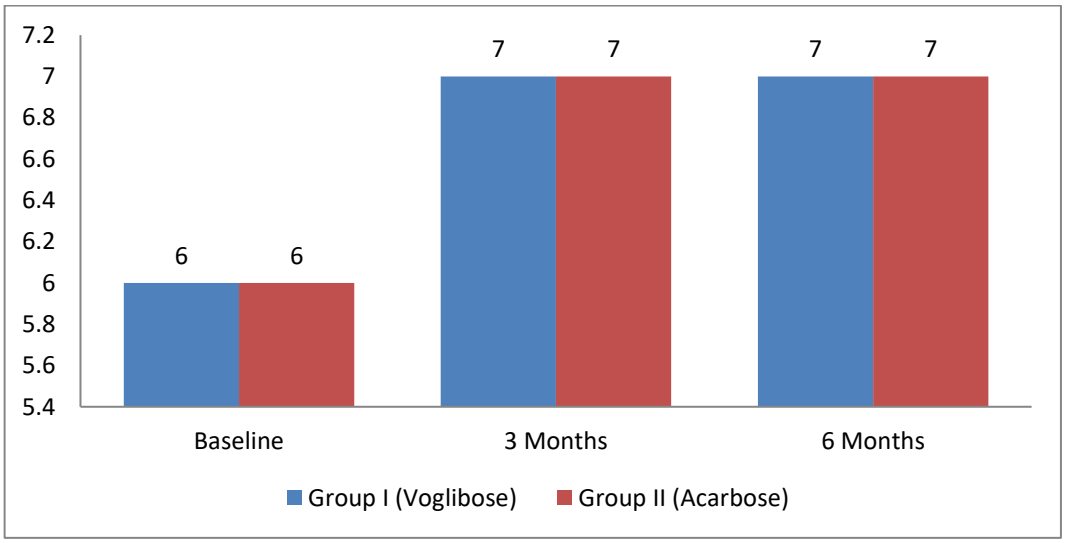



**Morisky Medication Adherence Scale**

The Morisky Medication Adherence Scale for both groups are summarized in Table 5

**Table 5: Morisky Medication Adherence Scale**

| Period | Group I (Voglibose) | Group II (Acarbose) | p-value |
|---|---|---|---|
| **Baseline** | 6 ± 1.34 | 6 ± 1.20 | 0.645 |
| **3 Months** | 7 ± 0.90 | 7 ± 1.90 | 0.558 |
| **6 Months** | 7 ± 0.94 | 7 ± 1.03 | 0.903 |




## DISCUSSION

Our study aimed to compare the efficacy and tolerability of voglibose and acarbose as add-on therapies to glimepiride in patients with T2DM. The results indicate that both voglibose and acarbose effectively improve glycemic control, as evidenced by the significant reduction in HbA1c, FBS, and PPBS levels over the 6-month study period. However, voglibose appears to have a slight edge in terms of HbA1c reduction, which is a critical marker for long-term glycemic control[11].

The demographic characteristics of both groups were comparable, ruling out age, gender, and duration of T2DM as confounding factors. The BMI was slightly lower in the acarbose group, but the difference was statistically significant (p=0.023), potentially influencing the results[12].

The HbA1c levels showed a more significant reduction in the voglibose group at the 6-month mark (p=0.00001), suggesting better long-term glycemic control than acarbose. This finding is consistent

with previous studies highlighting voglibose's rapid onset and shorter duration of action as potential advantages[13],[14].

FBS and PPBS levels improved in both groups but did not show a statistically significant difference between the two drugs. This suggests that both drugs are equally effective in controlling fasting and postprandial blood sugar levels[15],[16]. No significant difference in medication adherence was observed between the two groups at any time. The comparable rates of medication adherence for acarbose and voglibose suggest that patients for long-term therapy equally accept both drugs.

One of the limitations of our study is the relatively short duration of 6 months. Long-term studies are needed to confirm the sustainability of the observed effects. Another potential pitfall is the lack of data on side effects, particularly gastrointestinal issues, reported in previous acarbose studies [17].

Given the slight advantage of voglibose in reducing HbA1c levels, future research could focus on the mechanisms underlying this difference. It would also be beneficial to explore the impact of these drugs on other comorbid conditions commonly associated with T2DM, such as cardiovascular diseases.

## CONCLUSIONS

In conclusion, voglibose and acarbose are effective add-on therapies to glimepiride for T2DM management. However, voglibose may offer better long-term glycemic control, as indicated by a more significant reduction in HbA1c levels. These findings should be interpreted cautiously due to the study's limitations, including its short duration and lack of side effect data. Further long-term studies are recommended to validate these results.

## CONFLICT OF INTEREST

The authors declare no conflict of interest concerning this article's research, authorship, and publication.

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This research received no specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

## ABBREVIATIONS

T2DM - Type 2 Diabetes Mellitus
HbA1c - Hemoglobin A1c
FBS - Fasting Blood Sugar
PPBS - Postprandial Blood Sugar
BMI - Body Mass Index
SPSS - Statistical Package for the Social Sciences
M/F - Male/Female
$kg/m^2$ - kilograms per square meter
mg/dL - milligrams per deciliter
p-value - Probability Value

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