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# The KAP Study in the Management of Postprandial Hyperglycemia in Type 2 Diabetes-A Physician Based Survey

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## ABSTRACT

To understand Knowledge, Attitude and Practice (KAP) of physicians in the management of postprandial hyperglycaemia in type 2 diabetes. A questionnaire based cross sectional study was carried out with 105 physicians across India. The questionnaire was aimed to understand the management of postprandial hyperglycaemia, glycemic variation and comprehend the role of alpha glucosidase inhibitors from the Indian perspective. About 98% of physicians have reported that postprandial hyperglycaemia is an important factor contributing to glycemic variability. About 72% of physicians consider that voglibose, alone or in combination to other oral hypoglycaemic agents helps in reducing glycemic variability. Almost 88% of physicians consider that mouth dissolving formulation of voglibose will increase the compliance in their patients. Only 55% of physician's have advised their patients to take voglibose during the first bite of meal. Physicians consider postprandial hyperglycaemia as an important contributing factor for glycemic excursions and consider voglibose either alone or in combination with other oral hypoglycaemic drugs would control glycemic variability. Similarly, the mouth dissolving voglibose would be a better option to increase patient compliance with respect to conventional voglibose.

**Keywords:** Postprandial hyperglycaemia, type 2 diabetes, voglibose.

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## INTRODUCTION

Diabetes mellitus, especially type 2 diabetes is a growing concern across the world[1] and more so in India because of very high burden. According to 2015 estimates, there are 69.1 million people with diabetes in India.[2] The adverse impact of diabetes related complications is well known. Chronic uncontrolled hyperglycaemia is a major risk factor for complications in type 2 diabetes patients.[3] There is growing interest in postprandial hyperglycemia and glycemic variability in overall diabetes management because of their contribution in the development of complications.[4,5] Postprandial hyperglycaemia is strongly associated with cardiovascular complications than fasting blood glucose level.[1]Control of postprandial hyperglycemia is important for the achievement of target HbA1c level.[3] Similarly, there is an association between the postprandial metabolic state and atherogenesis in diabetes patients.[6]

Different classes of oral antidiabetic medications including alpha glucosidase inhibitors, GLP-1 based therapy and DPP-4 inhibitors are available to control postprandial hyperglycemia.[3,7]Considering high carbohydrate consumption, alpha glucosidase inhibitors have significant role in the management of diabetes, especially postprandial hyperglycaemia in Indian setting.[8]Voglibose, a commonly used alpha glucosidase inhibitor[9,10]delays the absorption of glucose and reduces postprandial glucose excursions in diabetes patients.[11]It effectively controls postprandial hyperglycemia.[1,9]and glycosylated haemoglobin level.[12]Traditional Indian diets are rich in carbohydrates and have high glucose load resulting in higher risk of postprandial hyperglycemia.[8]Oral disintegrating tablets[13,14] and mouth dissolving tablets[15] of voglibose have been prepared for improving patient compliance because of its convenience. In a clinical study, oral disintegrating tablet of voglibose has shown to improve compliance without difference in safety profile compared to conventional tablet.[16] Physicians perceptions about voglibose mouth dissolving tablets in real life setting in India are largely unknown.

**Objective:**

The objective of this study was to understand Knowledge, Attitude and Practice (KAP) of physicians in the management of postprandial hyperglycemia in type 2 diabetes.

## MATERIALS AND METHOD

In this open label, cross sectional, questionnaire based survey, physicians across India practicing with a significant experience in treating patients with diabetes and willing to participate were enrolled. The questionnaire was designed to understand factors (fasting plasma glucose, postprandial plasma glucose and glycosylated hemoglobin) contributing to glycemic variability, importance of postprandial glucose contributing to glycemic variability, methods used for measuring glycemic variability, ideal drug therapy to manage glycemic

variability, benefits offered by voglibose apart from glycemic control, etc. Importance of glycemic variability in attaining the target glycemic goals was rated on three point scale- extremely important, important, not important. Physicians were asked about their opinion on skipping voglibose due to its time of administration and chances of increase in the compliance with mouth dissolving formulation.

**Statistical analysis:**

Discrete data are summarized using numbers and percentages whereas continuous data are summarized using mean and standard deviation. Statistical analysis was performed on the data obtained from patients using SAS.

## RESULTS AND DISCUSSION

A total of 105 consulting physicians participated in this survey. A total of 87.62% physicians responded that glycemic variability plays an important role in attaining the target glycemic goals (figure 1).

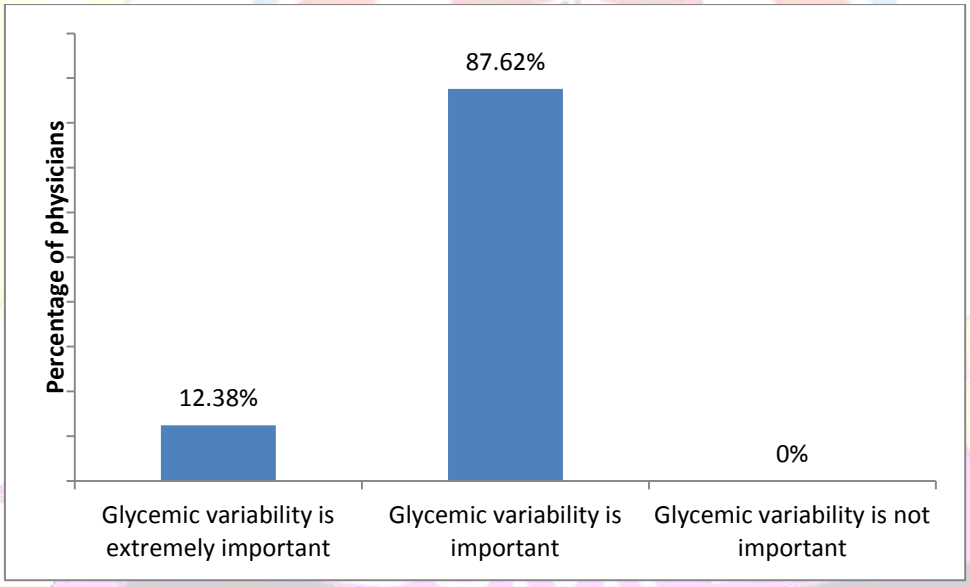


**Figure 1: Importance of glycemic variability in attaining the target glycemic goals**

A total of 98.10% physicians reported that postprandial glucose plays a significant role in contributing to glycemic variability, thereby increasing the risk of diabetes-related complications. A total of 55.24% physicians reported measurement of glycemic variability by continuous glucose monitoring (table 1).

**Table 1: Methods used for measurment of glycemic variability**

| Factor | N(%) |
|---|---|
| Continuous glucose monitoring | 58(55.24%) |
| Glycosylated hemoglobin | 17(16.19%) |
| Ambulatory glucose profile | 16(15.24%) |
| Continuous glucose monitoring, Glycosylated hemoglobin | 5(4.76%) |
| Continuous glucose monitoring, Ambulatory glucose profile | 8(7.62%) |
| Continuous glucose monitoring, Glycosylated hemoglobin, | 1(0.95%) |

Ambulatory glucose profile

A total of 72.32% physicians opined that voglibose alone or in combination with other oral hypoglycaemic agentsis the ideal drug therapy to manage glycemic variability. A total of 40.95% physicians reported weight reduction as a significant benefit in addition to glycemic control for voglibose. A total of 77.14% (included only those who answered one option) physicians prescribe voglibose twice/thrice daily and in that 25.93% prescribe thrice daily (table 2).

**Table 2: Frequency of voglibose administration**

| Factor | N(%) |
|---|---|
| Once daily | 9(8.57%) |
| Twice daily | 60(57.14%) |
| Thrice daily | 21(20.00%) |
| Once daily, Twice daily | 3(2.86%) |
| Twice daily, Thrice daily | 8(7.62%) |
| Once daily, Twice daily, Thrice daily | 4(3.81%) |

According to 80.00%physicians the ideal time to administer voglibose is with meal (figure 2).

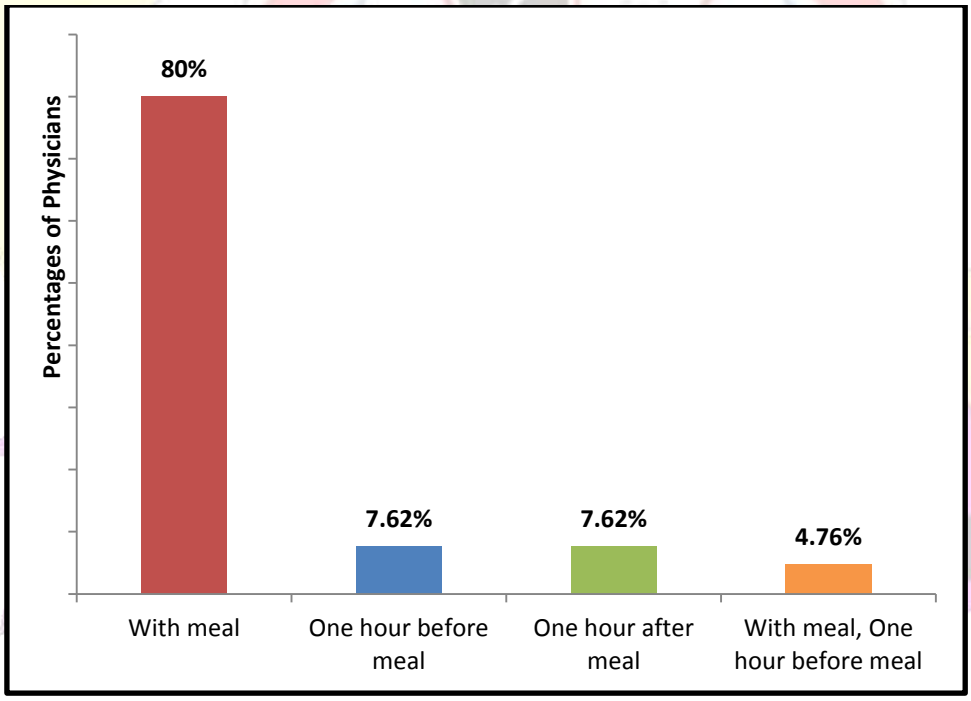


**Figure 2: Ideal time to administer voglibose**

According to 87.62% physicians, mouth dissolving formulation will help to increase the compliance (figure 3).

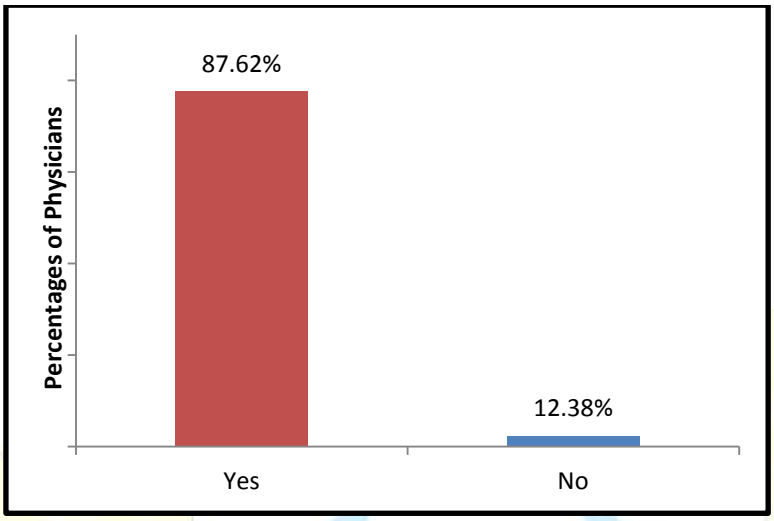


**Figure 3: Will Mouth Dissolving formulation of voglibose increase the compliance?**

A total of 76.19% responded for improving efficacy, they would advise voglibose to be administrated with first bite of the meal. According to 21.90% respondents, the efficacy is better if given 30 minutes before meal (table 5).

**Table 5: Will efficacy of voglibose worsens/improve if it is not taken with meal?**

| Factor | N(%) |
|---|---|
| Betters - 30 minutes before meal | 10(9.52%) |
| Betters 30 minutes after meal | 4(3.81%) |
| With first bite of the meal | 58(55.24%) |
| Worsens - 30 minutes before meal, administer with first bite of meal | 2(1.90%) |
| Betters - 30 minutes before meal, administer first bite of meal | 13(12.38%) |
| Worsens - 30 minutes after meal, administer with first bite of meal | 3(2.86%) |
| Betters 30 minutes after meal, administer with first bite of meal | 3(2.86%) |
| Worsens - 30 minutes before meal, worsens - 30 minutes after meal, administer with first bite of meal | 1(0.95%) |

## DISCUSSION:

Diabetes mellitus is associated with several complications like nephropathy, neuropathy, retinopathy, cardiovascular disease, and stroke.[17] Glycemic variability i.e. postprandial excursions and hypoglycaemic episodes play an important role in the increased risks of complications.[18]Postptandial hyperglycaemia and glycemic variability both are implicated in the macrovascular complications. Glycemic variability may be more harmful compared to chronic hyperglycaemia because oxidative stress can be activated by fluctuation of blood glucose on the either side.[19] It is possible to have differences in the glucose profile of two patients despite similar values of mean glucose or HbA1c level. Number and duration of glucose excursions may differ between patients[20] and significance of such glycemic variability is being recognized in the management of diabetes mellitus because of its close association with oxidative stress and endothelial dysfunction[4]Therefore, the goal of glycemic control in diabetes patients is to achieve normoglycemia without hypoglycaemia which

reduces the risk of complications.[21]Minimizing glycemic variability and postprandial hyperglycaemia is a valuable strategy in the management of diabetes,[21] both the components i.e. Glycemic Variation and Postprandial hyperglycaemia along with HbA1c, fasting blood glucose and quality of life comprise the five arms/components of glycemic pentad. In this cross sectional survey, opinions of physicians were taken to understand importance of glycemic variability, prescribing pattern of voglibose and potential benefits of oral dissolving tablet of voglibose. In our study, importance of controlling glycemic variability was very well accepted by all physicians. All survey physicians mentioned that glycemic variability is important or extremely important in attaining the target glycemic goals.

Having understood the importance of glycemic variability, it is important to measure the variations and employ measures to minimize it. There are challenges in measuring glycemic variability.[5]Traditionally, HbA1c is the most commonly used method for monitoring of glycemic control.[22] Postprandial hyperglycaemia and glycemic variability can be observed even in patients with well-controlled diabetes.[22]Several other methods including mean amplitude of glycemic excursions (MAGE) estimated by continuous glucose monitoring systems (CGMS), self-monitored blood glucose (SMBG) and the mean of daily differences (MODD) are available for measuring glycemic variability.[19]

In diabetes management, voglibose has been demonstrated to be effective and well tolerated as monotherapy[23]as well as combination therapy.[6,11,24-28] Alpha glucosidase inhibitors such as voglibose are considered preferential options for control of postprandial hyperglycemia.[3]These agents primarily target postprandial hyperglycaemia, because of the delay in carbohydrate absorption in the small intestine.[29,30]It effectively controls glycosylated hemoglobin[9] and postprandial hyperglycemia.[12,13]Apart from glycemic control[31] weight reduction is an important benefit of alpha glucosidase inhibitors.[12,24,29]Reduction in postprandial blood glucose fluctuation, is a differential advantage of voglibose therapy.[32]Additionally, increase in GLP-1 levels[33]and pleiotropic effects[34]of voglibose may provide cardio protective effects. It has also shown to have favorable effect on blood lipid parameters.[18,35]In our study, reduction in other oral antidiabetic medicine dose, weight reduction and cardiovascular benefits were the most commonly reported benefits with voglibose therapy. Usually voglibose is administered as 0.2 mg three times a day, before each meal.[10,13]The dose may be increased to 0.3 mg, in case of poor response.[13]In our study, 71.43% physicians reported using it twice daily whereas 31.43% use it thrice daily. According to most physicians, the ideal time to administer voglibose is along with meal. According to 45.71% physicians, patients skip voglibose dose due to its time of administration which adversely affects glycemic control.

With advanced technology, researchers are continuously trying to improvise the drug delivery systems for improvement of compliance.[36] One of the tested approaches is to develop oral disintegrating tablets[12,13]and mouth dissolving tablets of voglibose.[15]Mouth dissolving formulation of voglibose offer convenience to the patient as it can be taken without water.[15]Improved compliance could result in improved glycemic control. These benefits were well perceived by physicians in this survey. Most of the physicians in this study said that mouth dissolving formulation of voglibose will increase the compliance of patients. Close to two third physicians mentioned that they would advise voglibose with first bite of the mealfor improving its efficacy. Considering these advantages, voglibose mouth dissolving tablet in addition to other antidiabetic agents could be an attractive option in the management of type 2 diabetes patients for reducing postprandial hyperglycaemia and glycemic variability.

Overall, the survey provides significant insights about the practice patterns of consulting physicians in managing postprandial hyperglycaemia. Convenience sampling, cross sectional design and objective evaluation are some of the limitations of this survey. Although, care was taken to include physicians from different regions of India to obtain comprehensive results, limited sample size of physicians may restrict generalization of findings to practice across India.

## CONCLUSION

Management of postprandial hyperglycaemia is a challenging due to the complex and multifactorial variables. Compliance to antidiabetic therapy is an important factor in contributing to glycemic variability and is associated with the risk of diabetes-related complications. Voglibose containing therapy is considered ideal for control of glycemic variability by large number of physicians. Mouth dissolving formulation of voglibose has potential to improve compliance of patients. Apart from glycemic control, reduction of other oral antidiabetic drug dose and weight reduction are the important benefits of voglibose therapy.

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