

A STUDY OF DAPAGLIFLOZIN ON POST PRANDIAL BLOOD SUGAR CONTROL

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ABSTRACT

Introduction: Diabetes mellitus is now a leading cause of morbidity and mortality. SGLTR 2 inhibitors reduce proximal tubular glucose reabsorption and increases urinary glucose excretion. Dapagliflozin is selected as the drug in this study for the treatment of control of PPG in TYPE 2 DM patients to see the effect without changing the base line medication. **Objectives:** To observe the effect of Dapagliflozin on post prandial blood glucose in Type2 DM. **Materials and Methods:** APPROVAL: Prior permission was obtained from Institutional Ethical Committee before study was undertaken in the Department of Medicine of NRI Institute Of Medical Sciences, Sangivalasa, Visakhapatnam) on 100 patients admitted during January 2020 to December 2020. **Inclusion Criteria:** The study will include Type 2 DM patient of >15 yr age having elevated FPG/ normal FPG with increasing PPG attended to this NRIIMS during study period. **Exclusion criteria** (1) Pregnancy (2) Inflammatory bowel disease, IBS (3) Chronic Kidney Disease (4) Acute or chronic disease which may cause tissue hypoxia (4) Hepatic failure. **Results and Conclusion:** Dapagliflozin monotherapy is useful in the early stage Type2 DM with elevated post prandial plasma glucose. PPG results before and after therapy was of average 230 mg/dl and 130 mg/dl respectively after 24 wks. Patient on Biguanides when PPG is uncontrolled, adding Dapagliflozin significantly reduced PPG in patients. Before and after therapy with Dapagliflozin were on average 240 mg/dl and 156mg/dl respectively after 24 weeks. Patient on insulin therapy with increasing PPG, adding Dapagliflozin decreased PPG effectively. Before and after therapy with Dapagliflozin were 220 mg/dl and 160 mg/dl respectively after 24 weeks.

INTRODUCTION

Diabetes mellitus is now a leading cause of morbidity and mortality. Type2 DM characterized by three Pathophysiological features 1) Impaired insulin secretion 2) Peripheral insulin resistance 3) Excessive Hepatic glucose production.^[1] Type 2 DM patient are often hyper insulinemic but degree of hyperinsulinemia is inappropriately low for the glucose concentration. Clinically these patients demonstrate virtually absent 1st phase insulin and c-peptide response.^[2,3,4] to i.v glucose, a reduced 2nd phase response and marked flattening of glucose insulin secretion dose response curve.^[5] These patient also demonstrated abnormal temporal pattern of insulin secretion i.e. basal insulin secretion is greater and post prandial insulin secretion is attenuated.^[2] Post prandial hyperglycemia (PPHG) is primarily due to decreased 1st phase insulin secretion. As insulin injection is not always convenient by the people, oral anti diabetic drug is preferred. But there are insulin secretagogues which stimulate insulin and produce hypoglycemia.^[1] Sodium glucose co transporter 2 inhibitors are devoid of this side effect. Sodium glucose co transporter2 inhibitors reduce proximal

tubular glucose reabsorption and increases urinary glucose excretion. They significantly lower the HbA1c level in severe hyperglycemic Type 2 DM patients..It has been established that it is PPHG and not FPG which is the marker of cardiovascular disorder associated with diabetes with normal FPG.So controlling PPHG is imperative. Dapagliflozin is selected as the drug of choice in this study for the treatment of control of increasing PPG in TYPE 2 DM patients with rice as the staple diet to see the effect without changing the base line medication.

AIMS AND OBJECTIVES

To observe the effect of Dapagliflozin on post prandial blood glucose levels in Type2 DM.

MATERIALS AND METHODS

Approval: Prior permission was obtained from Institutional Review Board / Institutional Ethical Committee before study was undertaken in the Department of Medicine of NRI Institute Of Medical Sciences, Sangivalasa, Visakhapatnam (Andhra Pradesh, INDIA) on 100 patients admitted during the year January

2020 to December 2020. Diagnosis is based on doing FPG, HbA1C, 2hr OGTT. Baseline medications should not be changed.

Only those cases having increased postprandial hyperglycemia were considered with Dapagliflozin OD.BD.TDS doses.

Follow up of each case for 6 months.

Study group

Inclusion criteria

The study included Type 2 DM patient of >15 yr age having elevated FPG and normal FPG with increasing PPG attended to this NRIIMS during study period.

Exclusion Criteria

- Pregnancy
- Irritable bowel syndrome, inflammatory bowel disease
- Chronic Kidney Disease

- Acute or chronic disease which may cause tissue hypoxia such as:
- Hepatic insufficiency
- Acute alcohol intoxication, alcoholism.

RESULTS

Table 1: Age and Sex Distribution.

Age(years)	Male	Female	Total
30 – 44	10	06	16
45 – 59	45	15	60
> 60	14	10	24
Total	69	31	100

Total 100 cases of Type 2 diabetes mellitus with various age group cases were enrolled in this study. Among the patients 69 cases were males (69%) and 31 cases were females (31%). Majority of the patients belong to 45 – 59 years (60%).

Table 2: Effect on plasma glucose levels 24 wks before and after Dapagliflozin 10 mg administration without changing the base line treatment.

Sex and number of patients	2hr PPPG (mg/dl) before Dapagliflozin therapy	2hr PPPG(mg/dl) after Dapagliflozin therapy
Male (n = 69)	242	159
Female (n = 31)	239	154
Total (n = 100)	240	156.7

This study included total 100 cases of Type2 DM and was designed to evaluate the effects on 2hr PPG level. Before Dapagliflozin therapy the mean PPPG was 240 mg/dl and after treatment (10mg, OD)it was decreased to

156mg% at the end of 24weeks.The study showed that Dapagliflozin significantly reduced the post prandial plasma glucose level at the end of 24 wks. ($p<0.0001$).

Table 3: Dapagliflozin administration as an adjunct to Biguanide.

Sex and no. of patients	Plasma glucose level (mg/dl) during Biguanide therapy		Plasma glucose level(mg/dl) after Biguanide+Dapagliflozin therapy	
	FPG	2hr PPPG	FPG	2hr PPPG
Male (n=69)	171.07	235.9	104.9	166.7
Female (n=31)	153.8	214.9	105.9	152.6

This study included total 100 cases of Type2 DM and was designed to evaluate the effects on 2hr PPG level. The average 2hr PPG in patients who are taking only metformin is 220 mg/dl. After starting therapy with Dapagliflozin 10 mg the PPG values reduced to 160 mg/dl which is statistically significant.

DISCUSSION

Post prandial plasma glucose contributes more to overall hyperglycemia in early stages of Type 2 DM. It is a direct and independent risk factor for cardiovascular complications. So controlling post prandial plasma glucose is imperative. Dapagliflozin is selected as the drug of choice in this study because Dapagliflozin effectively reduces PPG level without the disadvantages like additional burden on beta cell, hypoglycemia, weight

gain and less side effects like abdominal discomfort, diarrhea and flatulence.^[6,7]

In my study total 100 cases of type 2 DM are taken with various age group, majority of the people were between 45 – 59 yrs (60%). As per National Diabetes Statistics, the majority of diabetes population is in the age group 40 - 59 years (Table – 1).

This study included total 100 cases of Type 2 DM was designed to evaluate the effects on 2hr PPG level. Before Dapagliflozin therapy the mean PPPG 240mg/dl and after, it was decreased to 156mg/dl at the end of 24weeks. The study showed that Dapagliflozin significantly reduced the post prandial plasma glucose at the end of 24wk. ($p<0.0001$) (Table – 2). In the present study, benefits of combination therapy of Biguanide + Dapagliflozin was shown. Total 100 cases were taken

with Biguanide alone having mean 2hrPPPG-235.9mg/dl in male and 214.9mg/dl in female. After adding Dapagliflozin (dose 10mg, OD), 2hr PPG was reduced to 166.78mg/dl in male and 152.7mg/dl in female (Table – 3). So Dapagliflozin significantly decreased post prandial plasma glucose level as an adjunct to Biguanide. The result suggested that the combined use of this sodium glucose cotransporter 2 inhibitor and Biguanides was effective in controlling plasma glucose in Type2 DM patients.

In a study by Menghui Luo et al,^[8] Dapagliflozin reduced both FPG PPG and HbA1C to less than 7% in patients with type 2 DM on insulin and OHAs.

In a study by Seung Hwan Lee,^[9] Dapagliflozin reduced blood glucose levels and Hba1c after 12 weeks of treatment.

CONCLUSION

- Dapagliflozin monotherapy is useful in the early stage Type2 DM with elevated post prandial plasma glucose. PPG results before and after therapy was of average 230 mg/dl and 130 mg/dl respectively after 24 wks.
- Patient on Biguanides when PPG is uncontrolled, adding Dapagliflozin significantly reduced PPG in patients. Before and after therapy with Dapagliflozin were on average 240 mg/dl and 156mg/dl respectively after 24 weeks.
- Patient on insulin therapy with increasing PPG, adding Dapagliflozin decreased PPG effectively. Before and after therapy with Dapagliflozin were 220 mg/dl and 160 mg/dl respectively after 24 weeks.
- Dapagliflozin proved to be a promising drug in reducing post prandial blood glucose levels.

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