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Original Research Article

Efficacy and safety of remogliflozin etabonate in type 2 diabetes mellitus patients in a tertiary care hospital

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ABSTRACT

Background: Incidence and prevalence of diabetes have been steadily increasing with a raise of global prevalence about 8.5%. The major types of diabetes are differentiated by insulin deficiency versus insulin resistance. SGLT2 inhibitors are a new class of drugs that act by inhibiting glucose reabsorption in the proximal renal tubules. Remogliflozin a prodrug of remogliflozin, which is a potent and selective sodium-glucose co-transporter-2 inhibitor was used for the study. The objective of the study was to evaluate the efficacy and safety of Remogliflozin etabonate in reducing HbA1C and serum glucose in type II diabetics.

Methods: This was a prospective observational study was done for 3 months. HbA1C, FBS and PPBS readings were noted and then the subjects were introduced to Remogliflozin 100 mg twice a day. At the end of 12 weeks HbA1C, FBS and PPBS were noted. The obtained data was analysed for its efficacy and safety.

Results: The study included 22 male subjects and 28 females. Before Remogliflozin was given the mean HbA1C level was 8.23 ± 0.798 , mean FBS was 179 ± 29.79 and PPBS was 299.38 ± 24.21 . Remogliflozin 100 mg was given and the mean HbA1C level was 7.52 ± 0.765 , mean FBS was 166.30 ± 32.13 and mean PPBS was 249.46 ± 18.21 . Post 3 months of Remogliflozin induction a reduction in HbA1C, FBS and PPBS was seen.

Conclusions: This study concludes Remogliflozin etabonate of 100 mg when given twice daily reduced the HbA1C levels, FBS and PPBS levels significantly.

Keywords: Remogliflozin etabonate, Glycated hemoglobin test, Fasting blood glucose, Post prandial blood glucose

INTRODUCTION

Diabetes mellitus (DM) defined as "a set of similar metabolic disorders that have the same phenotype of hyperglycemia".¹ The major types of diabetes are differentiated by insulin deficiency versus insulin resistance.^{1,2} Diabetes mellitus Type 1 (T1DM) caused by deficiency of insulin secretion because of pancreatic β -cell damage whereas Diabetes mellitus Type 2 (T2DM) is because of insulin resistance occurring at the level of liver, muscle (skeletal), and adipose tissue, with various levels of β -cell impairment.² The number Diabetics increased from 108 to 422 million from year 1980 to 2014. Majority Diabetics are living in middle and low income countries,

and 1.6 million human loss was directly attributed to diabetes each year Extra 2.2 million lives lost were attributable to high blood glucose in 2012. Both incidence and prevalence of diabetes have been steadily increasing over the past few decades.³⁻⁴ The global diabetes prevalence among adults >18 years of age was raised from 4.7%- 8.5% from year 1980 to 2014.⁵ Diabetes is considered as a major/leading cause of death globally.⁶ Between 2000- 2016 five percent increase in mortality prematurely from diabetes was seen.³⁻⁴ Diabetes is a known leading cause of MI, kidney failure, blindness, cerebral stroke and amputations of lower limb. 3-4 Complications of Diabetes are classified into Microvascular that is due to involvement of small vessels

and Macrovascular due to larger blood vessels involvement.⁷ SGLT 2 is the recent class of anti-hyperglycaemic agents approved. The SGLT2 inhibitors have a mechanism of decreasing renal glucose reabsorption and reduction of blood glucose without insulin release.⁸ Remogliflozin is administered in prodrug form viz. remogliflozin an immediate release (IR) tablet formulation. The recommended dosage for T2DM patients is 100mg twice daily. RE is rapidly and completely absorbed and available in the plasma within 10 minutes.⁹ This study was undertaken to assess the efficacy and safety of RE in our study setup.

Aim and objective

To evaluate the efficacy and safety of Remogliflozin etabonate in reducing HbA1C and serum glucose in type II diabetics.

METHODS

Study design

Prospective study.

Study setting

The study was conducted in the Department of General Medicine at Basaveshwara Teaching and General Hospital attached to M.R. Medical College Kalaburagi.

Study population

All type II diabetics admitted/ on out-patient basis at Basaveshwara Teaching and General Hospital attached to M.R. Medical College.

Study duration

January 2020 to March 2020.

Inclusion criteria

Aged between 18- 65 years. Glycated haemoglobin >6.5 mg/dl. No co-morbidities (Pneumonia, MI, CVA and UTI).

Exclusion criteria

Above 65 years and below 18. Severe moribund patients. On steroid therapy. Chronic kidney diseases

Sample size

No particular formula was used to define the sample size. Subjects who fulfilled the inclusion criteria were taken into the study. A total of 50 were enrolled for the study.

Study procedure

After obtaining consent from the subject's detailed history and clinical examination was noted using a pre-tested questionnaire. All the subjects were subjected to HbA1C, FBS, PPBS tests and findings noted prior and post induction of Remogliflozin etabonate.

Data collection tools

All the relevant parameters were documented using a structured proforma. The proforma contained the following details- demographic parameters-like age, gender etc, medical illness-fever and other comorbid illness, ill Baseline parameters were checked (Pulse, BP, height, weight, BMI), clinical examination findings.

Operational definitions¹⁰

HbA1C: >6.5 mg/dl, FBS: >126 mg/dl, PPBS: >200 mg/dl

Ethical issues

Ethical clearance was obtained from the Institutional human ethical committee. Informed consent was obtained from each study participant, after explaining the risks and benefits involved in the study and voluntary nature of the participation, in a language participant could understand. Confidentiality of the study participants was maintained throughout the trial conduction and dissemination of the study results.

Data entry and analysis

The collected data was coded, entered into Microsoft excel work sheet and exported to SPSS. Data was analyzed using SPSS version 21. Data is presented as percentage in categories and then presented as tables. Paired t-test was used for test of significance.

RESULTS

A total of 50 subjects were included in the study. The age ranged between 21 to 65 years. Majority of the subjects were between 41 to 60 years. The mean age of the subjects was 49.58 ± 10.05 years. The study consisted of 22 male subjects and 28 females. For all the 50 subjects blood glucose parameters findings were noted before Remogliflozin was given were the mean HbA1C level was 8.23 ± 0.798 , mean fasting blood glucose level was 179 ± 29.79 and post prandial levels was 299.38 ± 24.21 . All the 50 subjects were started on Remogliflozin 100 mg twice a day and after three months the blood glucose parameter levels were noted. The mean HbA1C level was 7.52 ± 0.765 , mean fasting blood glucose was 166.30 ± 32.13 and mean postprandial levels was 249.46 ± 18.21 . Post three months of Remogliflozin induction a reduction in HbA1C, FBS and PPBS was seen (Table 1). Pre remogliflozin and post Remogliflozin was compared to assess the efficacy of Remogliflozin. A highly significant value ($p < 0.001$) was observed in the present study for all the three parameters (pre and post HbA1C, FBS and PPBS respectively)

suggesting the Remoglifozin of 100 mg when given twice daily reduced the HbA1C levels, FBS and PPBS levels significantly. No adverse effects like hypoglycemic events,

fungal infection of genitals and urinary tract infections were observed among the subjects.

Table 1: Distribution of subjects.

	Frequency	Percent	Mean± SD
Age group (in years)			
21-30	4	8	49.58±10.05
31-40	4	8	
41-50	16	32	
51-60	21	42	
>60	5	10	
Sex			
Male	22	44	
Female	28	56	
Pre Remoglifozin			
	Minimum	Maximum	Mean ± SD
HbA1C	6.7	9.7	8.23 ± 0.798
FBS	130	230	179± 29.79
PPBS	247	331	299.38± 24.21
Post Remoglifozin			
	Minimum	Maximum	Mean± SD
HbA1C	6.1	8.9	7.52± 0.765
FBS	103	205	166.30± 32.13
PPBS	222	282	249.46± 18.21

Table 2: Pre Remoglifozin and post Remoglifozin effect on blood glucose parameters.

Blood glucose parameters	Mean	SD	95% CI		P value
			Lower	Upper	
Pre remoglifozin HbA1C* post remoglifozin HbA1C levels	0.7100	0.4282	0.5883	0.8317	<0.001 [#]
Pre remoglifozin FBS* post remoglifozin FBS levels	13.180	9.9954	10.351	16.009	<0.001 [#]
Pre remoglifozin PPBS* post remoglifozin PPBS levels	49.920	9.319	47.271	52.569	<0.001 [#]
# p-value significance: ≤0.05					

DISCUSSION

The mean age of the present study was 49.58± 10.05 years which was consistent with a study done by Mala et al. which showed a mean age of 50.86± 8.76 years.¹¹ Study by Pattanaik consisted of 28 males and 22 females whereas the present study consisted of 22 males and 28 females.¹² Mohan et al in their study suggested HbA1C decrease when above 100 mg a day was given which consistent with the present study were the HbA1c was 7.52 mg/dl which showed efficacy and safety of Remoglifozin for the 12 week study period. Also Mala et al suggested in their study a significant (p<0.001) reduction in HbA1C levels. Mohan et al suggested a reduction of mean FBS by 23.2 mg/dl when 100 mg of Remoglifozin was given twice a day which was near to consistent with the present study i.e 32.13 mg/dl.¹³ Study by Dobbins et al also concluded Remoglifozin has good effect in decreasing FBS.¹⁴ Mala et al in their study showed a reduction of mean PPBS of 17.86

mg/dl which was also seen in the present study i.e 18.21 mg/dl.¹¹

CONCLUSION

Remoglifozin Etabonate therefore can be a contemplate for effective alternate/substitute treatment for control of glycaemia in type II diabetics.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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