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To compare the Beta cell function in subjects with type 2 diabetes mellitus taking sulphonylureas versus DPP4 Inhibitors either used alone or in combination with other oral hypoglycemic agents (OHA)

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Abstract

Background: To compare the Beta cell function in subjects with Type 2 Diabetes Mellitus taking Sulphonylureas versus DPP4 Inhibitors either used alone or in combination with other oral hypoglycemic agents (OHA)

Methods: The study was conducted in Department of Internal Medicine, Shri Mahant Indiresh Hospital, Dehradun. It is situated in foothills of Himalayas, catering the population both from the hill areas and the plains of Uttarakhand and nearby states.

Results- Sulphonylureas were associated with significant reduction of FBS as compared to DPP-4 inhibitors (136.42±51.51 versus 162.97±53.47, p<0.05). DPP 4 inhibitors were associated with significantly reduction of PPBS (186.90±59.06 versus 220.60±61.17, p< 0.05) as well as HbA1C (7.63±1.63 versus 8.46±2.55, p <0.05) as compared to SU.

Conclusion: DPP-4 Inhibitors had potent effect in decreasing post prandial blood sugar and HbA1c and preserving beta cell function.

Keywords: DPP 4 inhibitors, Sulphonylureas, Type-2 DM

Introduction

Diabetes Mellitus is probably the oldest disease known to mankind and have been described in ancient literature as Madhumeh (Rain of sugar). Over the years, a mechanism of this disease has been delineated and the armamentarium for managing the disease has been enriched. Despite recent advances in the management, the incidence and prevalence continue to rise. According to 2016 data from the World Health Organization (WHO) an estimated 422 million adults are living with diabetes. Diabetes currently affects more than 62 million Indians, which is more than 7.2% of the adult population.[1-3]Metformin has conventionally been used as the lifestyle drug after due lifestyle changes and the changes in the physical activity. The American Diabetes Association (ADA) and the European Association for the study of Diabetes (EASD) recommend metformin as the first line drug. ADA recommends the use of various drugs for its second line usage. [4]

Sulphonyl urea (SU) has been conventionally chosen for long time as the treatment of T2DM after metformin. Although, its function tends to decline with time, they have remained a preferred class especially in the developing countries due to their low cost, and potent efficacy to reduce blood sugar and Glycosylated Hemoglobin type A1C (HbA1C) levels. The risk of significant hypoglycemia has also been markedly reduced with the advent of newer generation non-Sulphur containing sulphonylurea.[5]

Material and methods

Study Area: The study was conducted in Department of Internal Medicine, Shri Mahant Indiresh Hospital, Dehradun. It is situated in foothills of Himalayas, catering the population both from the hill areas and the plains of Uttarakhand and nearby states.

Study Population

Study included 200 subjects suffering from Type 2 Diabetes Mellitus attending Inpatient department (IPD) and Outpatient department (OPD) who satisfy the Inclusion and Exclusion criteria of the study and another 50 healthy control who have come for executive Health Checkup not suffering from T2DM in Department of Medicine.

Study Design

Study was conducted as a Cross sectional observational analysis and included 2 groups.

Group A included type 2 diabetes patients on sulphonylureas either alone or in combination but not on DPP 4 inhibitors.

Group B included type 2 diabetes patients on DPP 4 inhibitors either alone or in combination but not on sulphonylureas.

Study Duration

The study was conducted from December 2017 - May 2019.

Inclusion Criteria

- Patients having Type 2 Diabetes Mellitus
- Age > 18 years
- Age <75 years

Exclusion Criteria

- Age < 18 years
- Age >75 years
- Secondary Diabetes Mellitus
- Juvenile Diabetes Mellitus
- Type 1 Diabetes Mellitus
- Gestational Diabetes Mellitus.

Statistical Analysis

The quantitative data was represented as their mean ± SD (Standard Deviation). The t-test was used for analysing normally distributed quantitative data. Categorical data was analyzed by using chi-square test. The significance threshold of p-value was set at <0.05. All analysis was carried out by using Statistical Package for the Social Sciences (SPSS) software version 21.

Results

Table 1: Distribution of study participants according to sex in three groups.

Variable	Group A	Group B	P-VALUE
Male: Female	54:46	60:40	>0.05
Age	57.38±10.44	58.12±10.23	>0.05
Duration of Diabetes (years)	8.04±4.08	9.59±4.08	>0.05

FBS (mg/dl)	136.42±51.51	162.97±53.47	>0.05
PPBS (mg/dl)	220.60±61.17	186.90±59.06	>0.05
HbA1C (%)	8.46±2.55	7.63±1.63	>0.05

Both groups were comparable.

Table 2: Comparison of glycaemic control among Group A and Group B

Variable	Group A	Group B	p Value*
	Mean ± SD	Mean ± SD	
FBS	136.42±51.51	162.97±53.47	<0.05
PPBS	220.60±61.17	186.90±59.06	<0.05
HbA1C	8.46±2.55	7.63±1.63	<0.05

*Independent sample T Test

Table 2 shows that mean FBS was found to be higher in group B as compared to group A. Mean PPBS was found to be higher for group A as compared to group B. Mean HbA1C was found to be higher for group A as compared to group B. All the three findings were found to be statistically significant.

Discussion

It was observed that the glycemic control was better in subjects taking DPP4 inhibitors as compared to SU. Although SU are potent blood sugar lowering agents, their judicious use are limited by their potential to cause hypoglycemia. Owing to these minor and major hypoglycemic episodes, there is a tendency to skip/ adjust the dosage of their own, this may be the likely reason for a relatively poor glycemic control in this subgroup.

DPP4 inhibitors offer a significant blood sugar and HbA1C control (0.71.4%). The present study showed that the treatment of patients with DPP4 inhibitors was associated with smaller change in the HbA1C levels as compared to SU, suggesting that DPP4 inhibitors offer better glycemic durability due to their beneficial effects on the preservation of beta cell numbers and beta cell function.

Conclusion

Sulphonylureas had potent effect in decreasing fasting blood sugar and insulin resistance. DPP-4 inhibitors had potent effect in decreasing post-prandial blood sugar and HbA1c and preserving beta cell mass.

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