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To compare the Insulin Resistance in subjects with Type 2 Diabetes Mellitus taking Sulphonylureas versus DPP4 Inhibitors either used alone or in combination with other oral hypoglycaemic agents (OHA)

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Abstract

Background: To compare the Insulin Resistance in subjects with Type 2 Diabetes Mellitus taking Sulphonylureas versus DPP4 Inhibitors either used alone or in combination with other oral hypoglycaemic 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: Sulphonylureaas were associated with significant reduction of HOMA-IR as compared to DPP-4 inhibitors (15.81±11.63 versus 27.47±18.88, p <0.05), whereas DPP 4 inhibitors were associated with significant improvement in HOMA-B as compared to SU (203.94±66.84 versus 137.85± 98.16, p<0.05). However, there was no significant difference in reducing waist to hip ratio between SU and DPP4 inhibitors (0.86 ± 0.07 versus 0.87 ± 0.06, p>0.05).

Conclusion: Sulphonylurea had potent effect in insulin resistance. There was no significant effect in reducing waist to hip ratio between SU and DPP4 inhibitors.

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

Introduction

The primary concern in the management of Type 2 Diabetes Mellitus is the Glycaemic control, Insulin Resistance, and the preservation of Beta cell mass. The American Diabetes Association and the European Association for the study of Diabetes recommend metformin as the first line drug. The rapid evolution of diabetes pharmacotherapy and the availability of Oral Hypoglycemic agents (OHAs) for the treatment of T2DM have made the choice of second line agents after metformin a difficult task. American Diabetes Association (ADA) has been clear on the add on to metformin which includes Sulphonylureas (SU), Dipeptidyl Peptidase 4 (DPP4) Inhibitor, Thiazolidinediones, Sodium Glucose Co Transporter 2 (SGLT2) Inhibitors.

Many patients on metformin therapy alone fail to achieve optimal glycaemic control, and the relative merits of second line drugs sulphonylurea and DPP4 Inhibitors have been debated. [1-3]

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

i) Patients having Type 2 Diabetes Mellitus
ii) Age > 18 years
iii) Age <75 years

Exclusion Criteria

i) Age < 18 years
ii) Age >75 years
iii) Secondary Diabetes Mellitus
iv) Juvenile Diabetes Mellitus
v) Type 1 Diabetes Mellitus
vi) 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
HOMA IR	15.81± 11.63	27.47±18.88	>0.05
HOMA B	137.85±98.16	203.94±66.84	>0.05
WHR	0.86±0.07	0.87±0.06	>0.05

Both groups were comparable.

Table 2: Comparison of insulin resistance among Group A and Group B.

Variable	Group A	Group B	p Value*
	Mean ± SD	Mean ± SD	
HOMA IR	15.81±11.63	27.47±18.88	<0.05
HOMA B	137.85±98.16	203.94±66.84	<0.05
WHR	0.86 ± 0.07	0.87 ± 0.06	>0.05

*Independent sample T Test

Table 2 shows that mean HOMA IR levels was higher in group B as compared to group A and this difference was found to be statistically significant. Mean HOMA B levels was higher in group B as compared to group A and this difference was found to be statistically significant. No significant difference in mean WHR among group A and group B.

Discussion

As the primary pharmacological effects of SUs are the stimulation of insulin secretion by β cells, the significant glucose-lowering effect that can be observed during the early phase of the treatment eventually fades or even disappears with long-term treatment. This so-called monotherapy failure with SUs has been linked to continuous loss of functional islet β cells and impaired β-cell function during the progression of T2DM [4]. In our study HOMA-B was found to be higher in DPP4 inhibitors as compared to SU group. Our results are in accordance with Xiafei Lyu, kang chen. The effect of DPP4i on beta cell function are consistent both as monotherapy and also with add on therapy. [5]

DPP-4 inhibitors have demonstrated long term improvement of beta-cell function both in the fasting and postprandial statuses. [6] It may restore beta cell function and survival in isolated human islets through glucagon-like peptide (GLP)-1 stabilization[7]. It also exert an anti-inflammatory effect[8,9], which may alleviate the loss of beta-cell function.[10] It may also protect pancreatic beta-cells by elongating the telomere length. [11,12 However], there is a lack of evidence in humans to demonstrate the durable effects of DPP-4 inhibitors on beta-cell function after cessation of therapy in patients with T2DM

Conclusion

Sulphonylurea had potent effect in insulin resistance. There was no significant effect in reducing waist to hip ratio between SU and DPP4 inhibitors.

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