COMPARISON THE EFFECTIVENESS OF SITAGLIPTIN VERSUS SULFONYLUREA FOR MANAGEMENT OF PATIENTS WITH TYPE II DIABETES MELLITUS

NAUMAN DAWOOD[1], MIAN SAJJAD[2], ZAFARULLAH LASHARI[3], KAMRAN YOUSAF[4], SOMIA IQTADAR[5]
[1]Senior Registrar, [2,5]Assistant Professor, [3]ICU Consultant, [4]Senior Registrar
King Edward Medical University, Mayo Hospital, Lahore,

ABSTRACT

Background: Type 2 diabetes mellitus (T2DM) is characterized by prolonged hyperinsulinemia, insulin resistance, and progressive hyperglycemia. Current guidelines for treating patients with T2DM are based on glycemic standards. Sitagliptin seems to maintain its positive effects on glycemia and fasting plasma insulin on the long term as compared to sulfonylurea.

Objective: To compare the effectiveness of sitagliptin versus sulfonylurea for management of patients with type II diabetes mellitus

Methods: it was randomized controlled trial. The data was collected in North medical ward, department of medicine Mayo hospital Lahore. The patients were randomly divided into two groups e.g Group A Sitagliptin and group B sulfonylurea. The blood sample were drawn at baseline and after 12 weeks for HbA1c level.

Results: In Sitagliptin group, the mean age of patients was 57.93±13.10years. In sulfonylurea group, the mean age of patients was 63.51±11.23years. There were 35 (50.0%) male and 35 (50.0%) females in Sitagliptin group. There were 31 (44.3%) male and 39 (55.7%) females in sulfonylurea group. There was 1.19±1.00% decrease in HbA1c with sitagliptin and 0.53±0.31% with sulfonylurea. The difference was significant ($p<0.05$). In our trial, effectiveness was achieved in 50 (71.4%) with sitagliptin while in 33 (47.1%) with sulfonylurea. The difference was significant ($p<0.05$).

Conclusion: Thus, Sitagliptin is more effective and control more HbA1c than sulfonylurea for management of T2DM

Key words: Effectiveness, Sitagliptin, Sulfonylurea, Type II Diabetes Mellitus

How to cite this article: Dawood N, Sajjad M, Lashari Z, Yousaf K, Iqtadar S. Comparison the Effectiveness of Sitagliptin Versus Sulfonylurea for Management of Patients with Type II Diabetes Mellitus**.** Pak Postgrad Med J 2023;34(1): 139-141

Correspondence to: *Nauman Dawood,*
Senior Registrar,
King Edward Medical University, Mayo Hospital, Lahore, Pakistan.

Email: *nauman.dawood@gmail.com*

INTRODUCTION

Prolonged hyperinsulinemia, insulin resistance, and increasing hyperglycemia are all characteristics of type 2 diabetes mellitus (T2DM). Diet, exercise, and medication are all used to keep blood sugar levels under control.[1]

However, the progression of the disease, from the early stages of prediabetes to the problems that accompany advanced stages of diabetic mellitus (T2DM), is not the same in every patient. haemoglobin A1c(HbA1c) is highly associated with microvascular consequences, such as nephropathy, retinopathy, and neuropathy [2]

In individuals with kidney disease, glycemic management minimizes the risk and progression of microvascular consequences of diabetes, but this is difficult to achieve. 3 There has been an increased focus on renal function in T2DM treatment options since the development of sodium glucose co-transporter 2 inhibitors (SGLT2 inhibitors), a new class of antihyperglycemic medication having an effect centered on the kidney.[4]

In comparison to sulfonylurea, sitagliptin appears to sustain its beneficial effects on fasting plasma insulin and glycemia over the long run. [5]Glycaemic control and beta cell activity were significantly improved with sitagliptin once daily in individuals with T2DM who had insufficient glycemic control with either glimepiride or glimepiride plus metformin medication. [6]

In people with type 2 diabetes, sitagliptin is both effective and safe. When sulfonylureas failed to manage blood sugar, sitagliptin was able to do so. After 12 weeks of treatment with sitagliptin, blood glucose levels improved and body weight fell in individuals whose sulfonylurea dosage was reduced.[7]

Sitagliptin and sulfonylurea are being tested in this trial to see which is better for treating type 2 diabetics. HbA1c levels can be reduced and controlled with sitagliptin rather than sulfonylurea in diabetic patients, according to research. However, there is no evidence of this in the literature. As a result, we intend to carry out this research to gather local evidence and suggest a more effective medication for diabetes patients. Thus, we will be able to prescribe more effective medications in the future instead of less effective ones, which will lead to better outcomes for patients.

METHODS

It was randomized controlled trial. It was conducted in North medical ward in medicine ward Mayo hospital Lahore. The study period was of 6 months.140 Patients were recruited through non-probability consecutive/simple random sampling. Patients between age 35-80 years of either gender presenting with T2DM already taking metformin>1year were included in the study. Patients with history of type 1 diabetes, insulin use within 8 weeks of screening in medical record and patients with renal function impairment inconsistent with the use of metformin (creatinine>1.2mg/dl) or a fasting plasma glucose>270mg/dl were excluded from study.

Demographic details (Age, Sex, BMI, and Duration of diabetes) were noted. Patients were randomly divided in two groups by tossing coin i.e. head for Sitagliptin and tail for sulfonylurea. Then blood sample was obtained by taking 3cc venous blood samples in a disposable syringe under aseptic measures. All samples were sent to the laboratory of the hospital for assessment of HbA1c at baseline. Reports were assessed and levels will be noted. Then patients were followed-up in OPD for 12 weeks. After 12 weeks, blood sample was again obtained for assessment of HbA1c. Reports were assessed and HbA1c was noted. If >0.5% decrease in HbA1c was noted, then effectiveness was labeled (as per operational definition).

All data was entered and analyzed using computerized software i.e., SPSS version 20. Mean ± SD was calculated for quantitative variables like age, duration of T2DM and BMI. Frequency and percentage were calculated for qualitative variables like gender and effectiveness. Data was stratified for age, gender, BMI, duration of T2DM. Both groups for efficacy were compared by using chi-square test. P-value < 0.05 was taken as significant.

RESULTS

In sitagliptin group, the mean age of patients was 57.93±13.10years. In sulfonylurea group, the mean age of patients was 63.51±11.23years. There were 35 (50.0%) male and 35 (50.0%) females in sitagliptin group. There were 31 (44.3%) male and 39 (55.7%) females in sulfonylurea group.

Table 1: Baseline characteristics

	Group	
	Sitagliptin	Sulfonylurea
Age	57.93 ± 13.10	63.51± 11.23
Male	35 (50.0%)	31 (44.3%)
Female	35 (50.0%)	39 (55.7%)
BMI	24.50 ± 3.64	24.02 ± 3.11
Duration	8.89 ± 6.79	11.44 ± 6.61

In sitagliptin group, the mean BMI of patients was 24.50±3.64kg/m^2. In sulfonylurea group, the mean BMI of patients was 24.02±3.11kg/m^2. In sitagliptin group, the mean duration of T2DM was 8.89±6.79years. In sulfonylurea group, the mean duration of T2DM was 11.44±6.61years.

Table 2: Comparison of HbA1c in both groups

HbA1c	Group		p-value
	Sitagliptin	Sulfonylurea	
Baseline	7.98±1.08	8.38±0.89	0.018*
After 12 weeks	6.78±0.63	7.84±0.95	0.001*
Decrease	1.19±1.00	0.53±0.31	0.001*
Effectiveness	50 (71.4%)	33 (47.1%)	0.003*

P-value < 0.05 will be considered as significant.

At baseline, the mean HbA1c was 7.98±1.08% with sitagliptin while 8.38±0.89% with sulfonylurea. The difference was significant (p<0.05). After 12 weeks, the mean HbA1c was 6.78±0.63% with sitagliptin while 7.84±0.95% with sulfonylurea. The difference was significant (p<0.05). There was 1.19±1.00% decrease in HbA1c with sitagliptin and 0.53±0.31% with sulfonylurea. The difference was significant (p<0.05). There was significant decrease in HbA1c in both groups from baseline to 12 weeks of treatment (p<0.05) and sitagliptin showed more decrease in HbA1c level.

In our trial, effectiveness was achieved in 50 (71.4%) with sitagliptin while in 33 (47.1%) with sulfonylurea. The difference was significant (p<0.05). We stratified data for age of patients. In patients 40-60years old, effectiveness was achieved in 20 (57.1%) with sitagliptin while in 18 (60.0%) with sulfonylurea. The difference was insignificant (p>0.05). In patients 61-80years old, effectiveness was achieved in 30 (85.7%) with sitagliptin while in 15 (37.5%) with sulfonylurea. The difference was significant (p<0.05). We stratified data for gender of patients. In male patients, effectiveness was achieved in 26 (74.3%) with sitagliptin while in 9 (29.0%) with sulfonylurea. The difference was significant (p<0.05). In female patients, effectiveness was achieved in 24 (68.6%) with sitagliptin while in 24 (61.5%) with sulfonylurea. The difference was insignificant (p>0.05).

We stratified data for BMI of patients. In normal BMI patients, effectiveness was achieved in 20 (55.6%) with sitagliptin while in 23 (51.1%) with sulfonylurea. The difference was insignificant (p>0.05). In overweight patients, effectiveness was achieved in 30 (88.2%) with sitagliptin while in 10 (40.0%) with sulfonylurea. The difference was significant (p<0.05).

We stratified data for duration of T2DM. With duration 1-10years, effectiveness was achieved in 18 (54.5%) with sitagliptin while in 18 (48.6%) with sulfonylurea. The difference was insignificant ($p>0.05$). With duration of 11-20years, effectiveness was achieved in 30 (88.2%) with sitagliptin while in 14 (51.9%) with sulfonylurea. The difference was significant ($p<0.05$). With duration of >20years, effectiveness was achieved in 2 (66.7%) with sitagliptin while in 1 (16.7%) with sulfonylurea. The difference was insignificant ($p>0.05$).

DISCUSSION

In our study, we observed the mean HbA1c was 7.98±1.08% at baseline with sitagliptin which was decreased to 6.78±0.63% ($p<0.05$) after 12 weeks. With sulfonylurea, mean HbA1c was 8.38±0.89% at baseline which was decreased to 7.84±0.95% after 12 weeks ($p<0.05$). The difference was insignificant between both groups at baseline regarding the difference in HbA1c but was significant after 12 weeks ($p<0.05$). There was 1.19±1.00% decrease in HbA1c with sitagliptin and 0.53±0.31% with sulfonylurea. The difference was significant ($p<0.05$). Thus, sitagliptin showed more decrease in HbA1c after 12 weeks of treatment. In our trial, we achieved effectiveness in 50 (71.4%) with sitagliptin while in 33 (47.1%) with sulfonylurea. The difference was significant ($p<0.05$) and sitagliptin showed more effectiveness in controlling HbA1c as compared to sulfonylurea. Sitagliptin has been shown to be more effective than sulfonylureas in reducing A1C levels by more than 0.5 percent, preventing weight gain, and preventing hypoglycemia (35.7 vs. 14.2 percent , respectively).[8]

The effectiveness of sitagliptin over sulfonylurea was observed in another trial to be higher in sitagliptin patients (44.1 percent vs. 16.0 percent) (p 0.001). [9] Another study found that more patients who got treated with sitagliptin (41.1 percent) than those getting treatment with sulfonylurea (16.9 percent) were successful in improving their condition.[10]

In a recent study conducted by the Japanese diabetic specialists, 60% of the participants were given Sulfonylurea per oral for treatment of T2DM. Hypoglycemia is more likely when using sulfonylureas because of their ability to boost insulin secretion without increasing blood glucose levels. In contrast, sitagliptin, a DPP-4 inhibitor, stabilizes the DPP-4 substrates GLP-1 and glucose-dependent insulinotropic polypeptide, both incretin hormones that stimulate beta cell insulin production in a glucose-dependent manner.[11] While the efficacy of sitagliptin and sulfonylureas were found to be comparable, their hypoglycemic AEs differed. 9 Both agents have unique ways of interacting with their surroundings.[11,12]Treatment with sulfonylureas, which raise insulin levels, may contribute to the weight gain associated with the drug's use.[13]

CONCLUSION

Thus, Sitagliptin is more effective and control more HbA1c than sulfonylurea for management of T2DM. Now we have got the local evidence and found Sitagliptin to be more effective. Now we are able to recommend the Sitagliptin to be prescribed in diabetic patients.

REFERENCES

1. Onitilo AA, Stankowski RV, Berg RL, Engel JM, Glurich I, Williams GM, et al. Type 2 diabetes mellitus, glycemic control, and cancer risk. Eur J Canc Prevent 2014;23(2):134-140.
2. Stolar M. Glycemic control and complications in type 2 diabetes mellitus. Am J Med 2010;123(3):S3-S11.
3. Bailey RA, Wang Y, Zhu V, Rupnow MF. Chronic kidney disease in US adults with type 2 diabetes: an updated national estimate of prevalence based on Kidney Disease: Improving Global Outcomes (KDIGO) staging. BMC Res Notes 2014;7(1):1.
4. Barnett AH, Mithal A, Manassie J, Jones R, Rattunde H, Woerle HJ, et al. Efficacy and safety of empagliflozin added to existing antidiabetes treatment in patients with type 2 diabetes and chronic kidney disease: a randomised, double-blind, placebo-controlled trial. Lancet Diab Endocrinol 2014;2(5):369-384.
5. Derosa G, D'Angelo A, Maffioli P. Sitagliptin in type 2 diabetes mellitus: Efficacy after five years of therapy. Pharmacol Res 2015;100:127-134.
6. Vilsbøll T, Rosenstock J, Yki-Järvinen H, Cefalu W, Chen Y, Luo E, et al. Efficacy and safety of sitagliptin when added to insulin therapy in patients with type 2 diabetes. Diab Obesity Metab 2010;12(2):167-177.
7. Kubota A, Maeda H, Kanamori A, Matoba K, Jin Y, Minagawa F, et al. Efficacy and safety of sitagliptin monotherapy and combination therapy in Japanese type 2 diabetes patients. J Diab Invest 2012;3(6):503-509.
8. Ferreira JCA, Marre M, Barzilai N, Guo H, Golm GT, Sisk CM, et al. Efficacy and safety of sitagliptin versus glipizide in patients with type 2 diabetes and moderate-to-severe chronic renal insufficiency. Diab Care 2013;36(5):1067-1073.
9. Shankar R, Xu L, Golm G, O'Neill E, Goldstein B, Kaufman K, et al. A comparison of glycaemic effects of sitagliptin and sulfonylureas in elderly patients with type 2 diabetes mellitus. Int J Clin Pract 2015;69(6):626-631.
10. Ommen ES, Xu L, O'Neill EA, Goldstein BJ, Kaufman KD, Engel SS. Comparison of treatment with sitagliptin or sulfonylurea in patients with type 2 diabetes mellitus and mild renal impairment: a post hoc analysis of clinical trials. Diab Therap 2015;6(1):29-40.
11. Herman G, Stein P, Thornberry N, Wagner J. Dipeptidyl peptidase-4 inhibitors for the treatment of type 2 diabetes: focus on sitagliptin. Clinical Pharmacology & Therapeutics 2007;81(5):761-767.
12. Panten U, Schwanstecher M, Schwanstecher C. Sulfonylurea receptors and mechanism of sulfonylurea action. Experimental and clinical endocrinology & diabetes 1996;104(01):1-9.
13. Barnett AH. Complementing insulin therapy to achieve glycemic control. Advances in therapy 2013;30:557-576.