www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.03
TPI 2018; 7(10): 730-733

www.thepharmajournal.com
Received: 05-10-2018
Accepted: 23-10-2018

Bineta Singh
Assistant Professor, Department of Pharmacology, Madha Medical College, Thandalam, Tamil Nadu, India

Dr. Hyma Reddi
Assistant Professor, Department of Pharmacology, ICARE Institute of Medical Sciences and Research, Haldia, West Bengal, India

Correspondence
Dr. Hyma Reddi
Assistant Professor, Department of Pharmacology, ICARE Institute of Medical Sciences and Research, Haldia, West Bengal, India

To study safety and efficacy of glimepiride and sitagliptin in type 2 diabetic patients: A comparative study

Bineta Singh and Hyma Reddi

Abstract
Background and objective: Glimepiride and other new sulfonylureas are well tolerated, help the pancreas in extra ways, and control blood sugar levels well. The point of this study was to look at and compare how safe and effective sitagliptin and glimepiride are when used with metformin in people with type 2 diabetes.
Materials and Methods: The study took place at the ICARE Institute of Medical Sciences and Research in Haldia, West Bengal, India, in the Department of Pharmacology. From July 2017 to May 2018, the study was done. After getting permission from the Institutional Ethics Committee, patients who were qualified were chosen by randomisation.
Results: 50 people took part in the study, with twenty-five in each group. Both groups had mean ages of 46 years for the glimepiride group (II) and 44 years for the sitagliptin group (I). There was no difference between the groups in terms of age that was statistically significant. The first group had 25 men and 25 women, and the second group had 24 men and 26 women. The occurrence rate was about the same in both groups, and there was no statistical difference between them.
Conclusions: E This study shows that sitagliptin works just as well as glimepiride at better blood sugar control when taken with metformin. It is also well tolerated and doesn't have any major side effects. When compared to glimepiride, sitagliptin has benefits, such as a lower risk of diabetes.

Keywords: Sitagliptin, metformin, glimepiride, and type 2 diabetes

Introduction
It was predicted that 415 million people would have diabetes mellitus in 2015. This is a very common long-term disease. India was a diabetes centre in 2015, with 69.2 million people living with diabetes. This number is expected to go up to 123.5 million by 2040 [1-3]. For type 2 diabetes mellitus (T2DM) to be well managed, combination treatment is needed to treat both insulin resistance and beta cell dysfunction. Metformin is generally thought to be the best oral treatment for type 2 diabetes. It has been hard to find a replacement drug when metformin isn't working [2-4].
The high incidence rate is a big reason why patients and society have to pay so much for this. Type 2 diabetes is one of the main reasons people get microvascular and macrovascular problems. The goals of the different treatments are to make insulin work better and lower blood sugar levels [3-5]. These methods are especially appealing and should be thought about because they focus on the main problems and preventing symptoms that come with type 2 diabetes. Glycaemic balance, on the other hand, gets worse over time, even though there are many treatments available [4-6].
Controlling blood sugar levels is the main goal of treatment. This is done by keeping HbA1C levels between 6 and 7%. This lowers the risk of microvascular and macrovascular problems and keeps patients from falling too low. Most people with type 2 diabetes need more than one anti-diabetic drug, with or without insulin, because one drug alone may not be enough to keep blood sugar levels under control and can cause a number of problems. Currently available diabetes medicines lower blood sugar levels in a number of different ways [5-7].
In spite of this, their unique pharmacokinetic and pharmacodynamic qualities make it hard to use them and change the dose. The US Food and Drug Administration has approved sitagliptin, a strong, once-daily inhibitor, to help people with type 2 diabetes better control their blood sugar levels when used with food and exercise [6-8]. Even though there are many new medicines available, sulfonylureas are still the most common second-line drugs used with metformin, especially in Indian clinical settings.

Modern sulfonylureas like glimepiride and modified release gliclazide are better than older ones like glipalamide because they are backed by a lot of experience, evidence, and result data [7-9]. The point of this study was to find out how safe and effective glimepiride and sitagliptin are for people with type 2 diabetes.

Materials and Methods

The study was done at the ICARE Institute of Medical Sciences and Research in Haldia, West Bengal, India, in the pharmacy department. From July 2017 to May 2018, the study was done. After getting permission from the Institutional Ethics Committee, suitable patients were randomly assigned to receive either sitagliptin 100 mg or glimepiride 2 mg every day as extra treatment for 12 weeks. This was done using software for randomisation. To keep track of the study population's age, gender, smoking history, and high blood pressure. Everyone who took part in the study was told to follow a strict diet and work out regularly during the study time.

Inclusion Criteria

- Patients with type 2 DM
- Poor glycemic control on metformin monotherapy
- Patients of both male and female

Exclusion Criteria

- Any history of allergy or hypersensitivity
- Patients with type I DM
- Pregnant
- Uncontrolled diabetes

Results

Each group consisted of 25 participants out of a total of 50 that were enrolled in the experiment. Cohort I of the sitagliptin study had a mean age of 44 years, but cohort II of the glimepiride study had a mean age of 46. When comparing the groups' age distributions, no statistically significant difference was found. There were 25 men and 25 females in Group I, and 24 men and 26 females in Group II.

Table 1: Demographic Data

Sr. No.	Parameters	Sitagliptin	Glimepiride
1.	Age (yrs.)	46.35	47.44
2.	Male	25	25
3.	Females	24	26
4.	BMI	22	28

Table 1 contains the demographic characteristics of the patients, including age, gender distribution (male/female), and body mass index (BMI).

Table 2: Parameters with Sitagliptin and Glimepiride

Sr. No.	Parameters	Sitagliptin Group		Glimepiride Group	
		Baseline	Week 12	Baseline	Week 12
1.	HbA1C (%)	9.13	7.74	8.13	8.89
2.	FBS	171.12	121.13	166.13	122.36
3.	BMI	29.13	26.14	28.69	27.7

Table 2 comprises characteristics detailing the distribution of patients in this trial according to sitagliptin and glimepiride.

Table 3: Side effect profile

Sr. No.	Side effect	Sitagliptin	Glimepiride
1.	Hypoglycaemia	24	26
2.	Diarrhoea	23	27
3.	Vomiting	20	30
4.	Others	21	29

Table 3 presents the distribution of the adverse effect profile among individuals, including hypoglycemia, diarrhoea, and vomiting.

Discussion

Having diabetes mellitus increases the likelihood that you will experience a variety of complications, such as the failure of organs and damage to your blood vessels. The maintenance of blood sugar levels within the normal range is one of the primary objectives of diabetes management treatment. HbA1C is a measurement that indicates how well glucose levels have been regulated over the course of the previous two to three months. It is generally accepted that keeping HbA1C readings between 6% and 7% is sufficient, and it demonstrates that diabetes mellitus is being managed effectively [9-11].

he American Diabetes Association recommends that individuals who have type 2 diabetes seek therapy primarily through the use of metformin and through the implementation of lifestyle modifications. There is a possibility that step 2 therapy will be required if the initial treatment does not adequately manage blood sugar levels. Sulfonylureas, thiazolidinediones, insulin, and possibly even more medications could fall into this category [10-12]. Metformin and thiazolidinediones (TZDs), which are the primary medications used to treat diabetes mellitus, are effective thanks to their ability to reduce insulin resistance. On the other hand, they do not produce any changes in the functioning of beta cells, which is what occurs in those who have type 2 diabetes mellitus. Because of this, there is a need for innovative therapeutic approaches. Targeting the hormone that acts as a mimic for incretin is one of the primary objectives [11-13].

An increase in the amount of sugar in the blood causes the incretin hormone GLP-1 to be produced. It slows down the process of the stomach emptying, enhances the release of insulin, decreases the release of glucagon, and improves the functioning of beta cells. The production of GLP-1 is lower in patients with type 2 diabetes compared to healthy people [12-14]. Following its production, GLP-1 is rapidly degraded by the enzyme known as DPP-4. Therefore, medications such as sitagliptin, which work by inhibiting the DPP-4 enzyme, have the ability to extend the duration of the effects of the GLP-1 hormone. As the levels of glucose in the blood get closer to normal, the production of insulin gradually decreases, and the generation of glucagon completely stops. In this way, a "overshoot" and subsequent hypoglycemia are avoided, both of which are potential side effects of certain other oral hypoglycaemic medications [13-15].

Despite the fact that the difference between the two groups was not statistically significant, the individuals in our research who took sitagliptin experienced a greater reduction in their HbA1C levels than those who took glimepiride. Additional studies yielded outcomes that were comparable. Similarly, individuals who used sitagliptin were able to achieve their desired HbA1C level. Despite the fact that FBS levels decreased in both groups, there was no statistically significant difference between the two pairs of individuals [16-18].

The results were comparable to those that had been discovered by earlier investigations. When taken without food, sitagliptin contributed to a reduction in blood sugar levels of 63.9 mg/dl. Comparing the group that took sitagliptin to the average level, the fasting blood sugar (FBS) level reduced by fifty milligrams per decilitre [19-21]. It decreased by 42 mg/dl in the group that was taking glimepiride. During the course of our research, the body mass index (BMI) of patients who were on sitagliptin and glimepiride decreased. On the other hand, the drop in the sitagliptin group was statistically more significant than the drop in the glimepiride group. The group that took sitagliptin experienced a much higher reduction in weight than the group that took glimepiride [22-24].

Conclusion

Blood sugar levels were significantly lower in type 2 diabetics treated with glimepiride/metformin compared to those treated with sitagliptin/metformin. There was a lot of enthusiasm for both glimepiride and sitagliptin. The risk of hypoglycemia was minimal, and there were no significant weight differences between the groups. For type 2 diabetics on metformin, glimepiride is an excellent alternative due to its many advantages, including its efficacy, safety, lack of effects on weight or the pancreas, and other advantages. In this trial, sitagliptin was found to be just as effective as glimepiride in regulating blood sugar when added to metformin. There are no serious adverse effects, and it is also widely used.

Conflict of Interest

None

Funding Support

Nil

References

1. Bugos C, Austin M, Atherton T, Viereck C. Longterm treatment of type 2 diabetes mellitus with glimepiride is weight neutral: A metaanalysis. Diabetes Res Clin Pract. 2000;50 Suppl 1:S47.
2. Holstein A, Plaschke A, Egberts EH. Lower incidence of severe hypoglycaemia in patients with type 2 diabetes treated with glimepiride versus glibenclamide. Diabetes Metab Res Rev. 2001;17:467-473.
3. Nakamura I, Oyama J, Komoda H, Shiraki A, Sakamoto Y, Taguchi I. Possible effects of glimepiride beyond glycemic control in patients with type 2 diabetes: A preliminary report. Cardiovasc Diabetol. 2014;13:15.
4. Müller G, Satoh Y, Geisen K. Extrapancreatic effects of sulfonylureas - A comparison between glimepiride and conventional sulfonylureas. Diabetes Res Clin Pract. 1995;28 Suppl:S115-S137.
5. Moon JS, Ha KS, Yoon JS, Lee HW, Lee HC, Won KC. The effect of glargine versus glimepiride on pancreatic β-cell function in patients with type 2 diabetes uncontrolled on metformin monotherapy: Openlabel, randomized, controlled study. Acta Diabetol. 2014;51:277-285.
6. Abrahamson MJ. Should sulfonylureas remain an acceptable first-line addon to metformin therapy in patients with type 2 diabetes? Yes, they continue to serve us well! Diabetes Care. 2015;38:1669.
7. Makkar BM, Gupta D, Gainda A. Clinical trials to clinical practice: Role of sulfonylureas in today's practice. Medicine Update. New Delhi, India: Jaypee Brothers Medical Publishers PVT LTD; c2013. p. 3938.
8. Thacker H, Shah S, Chadha M, Kovil R, Chawla M, Gupta S. Management of type 2 diabetes in Western India: Attitudes and practices among physicians leading the forefront of diabetes care. New Orleans, Louisiana, USA: ADA; c2016.
9. Mocanu MM, Maddock HL, Baxter GF, Lawrence CL, Standen NB, Yellon DM. Glimepiride, a novel sulfonylurea, does not abolish myocardial protection afforded by either ischemic preconditioning or diazoxide. Circulation. 2001;103:3111-3116.
10. Monami M, Genovese S, Mannucci E. Cardiovascular safety of sulfonylureas: A metaanalysis of randomized clinical trials. Diabetes Obes Metab. 2013;15:938-953.
11. van Dalem J, Brouwers MC, Stehouwer CD, Krings A, Leufkens HG, Driessen JH, *et al*. Risk of hypoglycaemia in users of sulphonylureas compared with metformin in relation to renal function and sulphonylurea metabolite group: Population based cohort study. BMJ. 2016;354:i3625.
12. Schrijnders D, Wever R, Kleefstra N, Houweling ST, van Hateren KJ, de Bock GH. Addition of sulphonylurea to metformin does not relevantly change body weight: A prospective observational cohort study (ZODIAC39). Diabetes Obes Metab. 2016;18:973-979.
13. George J. Starting with low dose sulfonylurea and metformin in early stage type 2 diabetes mellitus. Indian J Endocrinol Metab. 2015;19:309.
14. Briscoe VJ, Griffith ML, Davis SN. The role of glimepiride in the treatment of type 2 diabetes mellitus. Expert Opin Drug Metab Toxicol. 2010;6:225-235.
15. Geisen K, Végh A, Krause E, Papp JG. Cardiovascular effects of conventional sulfonylureas and glimepiride. Horm Metab Res. 1996;28:496-507.
16. Klepzig H, Kober G, Matter C, Luus H, Schneider H, Boedeker KH. Sulfonylureas and ischaemic preconditioning; a double-blind, placebo-controlled evaluation of glimepiride and glibenclamide. Eur Heart J. 1999;20:439-446.
17. Varvaki Rados D, Catani Pinto L, Reck Remonti L, Bauermann Leitão C, Gross JL. The association between sulfonylurea use and all-cause and cardiovascular mortality: A metaanalysis with trial sequential analysis of randomized clinical trials. PLoS Med. 2016;13:e1001992.
18. Bermúdez-Pirela VJ, Cano C, Medina MT, Souki A, Lemus MA, Leal EM. Metformin plus low-dose glimepiride significantly improves homeostasis model assessment for insulin resistance (HOMA (IR)) and beta-cell function (HOMA (betacell)) without hyperinsulinemia in patients with type 2 diabetes mellitus. Am J Ther. 2007;14:194-202.
19. Srivastava S, Saxena GN, Keshwani P, Gupta R.

Comparing the efficacy and safety profile of sitagliptin versus glimepiride in patients of type 2 diabetes mellitus inadequately controlled with metformin alone. J Assoc Physicians India. 2012;60:27-30.
20. Kumar S, Pathak AK, Saikia D, Kumar A. Efficacy, safety and treatment satisfaction of glimepiride vs. Sitagliptin in combination with metformin in type 2 diabetes mellitus. J Clin Diagn Res. 2015;9:FC07-FC10.
21. Amate JM, Lopez-Cuadrado T, Almendro N, Bouza C, Saz-Parkinson Z, Rivas-Ruiz R, *et al*. Effectiveness and safety of glimepiride and iDPP4, associated with metformin in second line pharmacotherapy of type 2 diabetes mellitus: Systematic review and metaanalysis. Int J Clin Pract. 2015;69:292-304.
22. Mamza J, Mehta R, Donnelly R, Idris I. Important differences in the durability of glycaemic response among second-line treatment options when added to metformin in type 2 diabetes: A retrospective cohort study. Ann Med. 2016;48:224-234.
23. Zhang Y, McCoy RG, Mason JE, Smith SA, Shah ND, Denton BT. Second-line agents for glycemic control for type 2 diabetes: Are newer agents better? Diabetes Care. 2014;37:1338-1345.
24. Gallwitz B, Rosenstock J, Rauch T, Bhattacharya S, Patel S, von Eynatten M. 2-year efficacy and safety of linagliptin compared with glimepiride in patients with type 2 diabetes inadequately controlled on metformin: A randomised, double-blind, noninferiority trial. Lancet. 2012;380:475-483.