European Journal of Molecular & Clinical Medicine

ISSN 2515-8260 Volume 11 Issue 05, 2024

DOI: 10.53555/ejmcm/2024.11.05.16

COMPARISON OF EFFICACY AND SAFETY OF METFORMIN AND VILDAGLIPTIN VERSUS METFORMIN AND GLIMEPIRIDE IN PATIENTS OF TYPE – 2 DIABETES MELLITUS.

Uday Kumar M[1], B. Srilatha[2*]

[1]Assistant professor, Department of Pharmacology, Government Medical College, kama reddy, Telangana
[2*]Assistant professor, Department of Pharmacology, Government Medical College, kama reddy, Telangana

***Corresponding Author:** Dr. B. Srilatha,
*Assistant professor, Department of Pharmacology Government Medical College, Kamar eddy Telangana. Contact no: 8500166544, Mail-id: srila.16@gmail.com

ABSTRACT

Introduction: Diabetes mellitus is a complex chronic metabolic condition defined by persistent hyperglycemia caused by abnormalities in insulin activity and/or secretion. Metformin, the mainstay of diabetic treatment, is frequently made more successful when combined with additional medications like glimepiride or vildagliptin. The current study aimed to compare the efficacy and safety of vildagliptin-metformin combination to glimepiride-metformin combination.

Materials and Methods: The study was a three-month prospective randomized comparative study. This study included 60 patients who met the inclusion criteria and were divided evenly into two groups: Group A (metformin-glimepiride) and Group B (metformin-vildagliptin). Efficacy indicators such as fasting blood glucose, 2-hour postprandial glucose, and HbA1c were measured, and any side effects observed during the study were noted.

Results: The majority of patients in both groups are aged 61 to 70 years. Of the 60 cases, 29 were men and 31 were women. Before starting treatment, the average FBS levels in Groups A and B were 162.13±18.21 mg/dl and 168.24±19.23 mg/dl, respectively. Finally, there was a significant difference in the decrease in FBS levels between the two groups. Before starting therapy, Groups A and B had average PPBS levels of 228.34±23.45 mg/dl and 232.42±24.32 mg/dl, respectively. Finally, the two groups differed significantly in their ability to reduce PPBS levels. Before starting medication, the average hemoglobin A1C levels in Groups A and B were 8.43±1.24 mg/dl and 8.48±0.81 mg/dl, respectively. Finally, there was a substantial difference between the two groups in terms of Hemoglobin A1C level reduction. Hypoglycemia occurred in 37% of Group A patients and 3% of Group B patients, while 10% of Group A patients gained weight.

Conclusion: The combination of vildagliptin and metformin exhibited higher efficacy than the combination of glimepiride and metformin, as well as a better side effect profile with decreased risks of hypoglycemia and weight gain.

Keywords: Diabetes Mellitus; Hemoglobin A1C; Fasting Blood Sugar; Postprandial Blood Sugar, Metformin, Vildagliptin, Glimipride

Introduction:

Diabetes Mellitus is increasing rapidly in its incidence and prevalence, presenting a major challenge to health care worldwide. According to the International Diabetes Federation, approximately 463 million adults aged 20-79 of years were living with diabetes in 2019.This number is expected to increase rise to 700 million by 2045.[1] Diabetes is predicted to be the seventh greatest cause of death

by 2030, according to the World Health Organization (WHO). [2,3]. Diabetes may have a significant role in blindness, kidney disease, heart attacks, stroke, and lower limb amputations.
The increasing prevalence of diabetes mellitus is increasing the economic burden of controlling blood glucose levels and treating complications.[4,5] Diabetes mellitus patients also exhibit a more than 3-fold greater risk of cardiovascular disease (CVD) and mortality than non-diabetic subjects.[6]
To achieve good metabolic control in diabetes and keep long term, a combination of changes in lifestyle and pharmacological treatment is necessary. Achieving near-normal glycated hemoglobin significantly, decreases risk of macrovascular and microvascular complications. At present there are different treatments, both oral and injectable, available for the treatment of type 2 diabetes mellitus (T2DM). [7]
The choice of antidiabetic agents is based on efficacy along with drug safety. Metformin has been the most recommended monotherapy for the initial treatment of T2DM. [8-10]. However, majority of patients have advocated combined therapy in the long run to maintain glycemic control. The combined regimens are effective to minimize the dosage of antihyperglycemic agents and thereby their unwanted effects. A combination of glimepiride plus metformin is widely used in Indian clinical settings due to its cost effectiveness and efficacy in improving glycaemic control.[11,12] However, a combination of glimepiride and metformin is frequently associated with side effects such as weight gain and hypoglycemic events.
Vildagliptin is a dipeptidyl peptidase 4 (DPP 4) inhibitor, an oral antidiabetic agent, having moderate efficacy with a good overall safety profile including low risk of hypoglycemia, low risk of edema, lipid neutral effect, and weight neutrality.[13] When vildagliptin was used as add on treatment or initial combination therapy along with metformin, good glycemic control was achieved due to their complementary mechanism of action.[14]
The current study aimed to assess and compare the efficacy and side effects of metformin and vildagliptin and metformin and glimepiride in T2DM patients.

MATERIALS AND METHODS:

This prospective, randomized, and comparative study was done for three months at Government Medical College in Kamareddy, Telangana, following approval from the Institutional Ethics Committee. The study enrolled a total of 60 participants based on inclusion and exclusion criteria

Inclusion criteria: Males and females aged 40-70 years with Type-2 diabetes who are already taking metformin or glimepiride but have uncontrolled blood sugars (FBS >126 mg/dl and PPBS >200 mg/dl, HbA1c >7.0%).
Exclusion criteria include type 1 diabetes, diabetic ketoacidosis, renal or cardiac failure, pregnancy, breastfeeding, and unwillingness to participate.
The 60 patients were separated into two groups, each with 30 patients. Patients in Group A were given glimepiride 1 mg bid and metformin 500 mg bid. Patients in Group B were given vildagliptin 50 mg bid and metformin 500 mg bid. The study lasted three months.
Assessments included overnight fasting plasma glucose (FPG), 2-hour postprandial glucose (2-h PPG), and HbA1c levels till discharge. All adverse events were observed throughout the study.

Statistical analysis: Data were analyzed using SPSS version 23. Results were represented as frequencies, percentages, & mean. Statistical significance between both groups was assessed using independent *t*-test and chisquare test. p values less than 0.05 were considered statistically significant.

RESULTS:

In Age wise distribution of patients is summarized in Table 1 and Figure 1. In Group A, the mean average age was 57.12 years and in Group B, the mean average age was 59.84 years. Maximum number of patients belong to the age group of 61 to 70 years in both the groups as shown in Table 1

ISSN 2515-8260 Volume 11 Issue 05, 2024

TABLE 1: AGE DISTRIBUTION OF CASES BETWEEN THE GROUPS

AGE GROUP	GROUP A (n=30)	GROUP B (n=30)
40-50	8 (27%)	7 (23%)
51-60	9 (30%)	9 (30%)
61-70	13 (43%)	14 (47%)

Among 60 patients, out of 30 patients belonging to Group A, 14 were male, 16 were female. Out of 30 patients belonging to Group B,15 were male, 15 were female as shown in Table 2.

TABLE 2: GENDER DISTRIBUTION OF CASES BETWEEN THE GROUPS

Gender	GROUP A (n=30)	GROUP B (n=30)
Male	14	15
Female	16	15

Average of FBS in Groups A and B before initiation of therapy was 162.13±18.21 mg/dl and 168.24±19.23mg/dl. At the end there was a significant difference between the two groups in decreasing the FBS levels as shown in Table 3

TABLE 3: COMPARISON OF FASTING BLOOD SUGAR LEVELS BETWEEN THE GROUPS

Gender	GROUP A (n=30)	Group B (n=30)	P Value
Baseline	162.13±18.21	168.24±19.23	0.01*
End of 12 weeks	128.5±15.82	120.97±16.45	0.02*

* Significant

Average of PPBS in Groups A and B before initiation of therapy was 228.34±23.45 mg/dl and 232.42±24.32 mg/dl. At the end, there was a significant difference between the two groups in decreasing the PPBS levels as shown in Table 4

TABLE 4: COMPARISON OF POSTPRANDIAL BLOOD SUGAR LEVELS BETWEEN THE GROUPS

Gender	GROUP A (n=30)	Group B (n=30)	P Value
Baseline	228.34±23.45	232.42±24.32	0.02*
End of 12 weeks	181.23±20.12	178.12±22.12	0.04*

* Significant

Average of Hemoglobin A1C in Groups A and B before initiation of therapy was 8.43±1.24 mg/dl and 8.48±0.81mg/dl. At the end, there was a significant difference between the two groups in decreasing the Hemoglobin A1C levels as shown in Table 5

TABLE 5: COMPARISON OF HEMOGLOBIN A1C LEVELS BETWEEN THE GROUPS

Gender	**GROUP A** (n=30)	**Group B** (n=30)	**P Value**
Baseline	8.43±1.24	8.48±0.81	0.04*
End of 12 weeks	7.45±0.71	7.12±0.69	0.03*

* Significant

Hypoglycemia was observed in 37% of Group A patients and 3% of Group B patients and Weight gain was observed in 10% of Group A patients only as shown in Table 6

TABLE 6: COMPARISION OF ADVERSE EFFECTS BETWEEN THE GROUPS

Variable	Group A (n=30)	Group B (n=30)	p value
Hypoglycemia	11 (37%)	1 (3%)	0.002*
Weight gain	3 (10%)	0 (0%)	0.02*

* Significant

DISCUSSION:

In the present study, patients on metformin and vildagliptin combination demonstrated a substantial decrease in mean FBS and PPBS to 120.97±16.45 mg/dl and 178.12±22.12 mg/dl respectively at 12 weeks. The findings are in line with studies by Bosi et al. [15] showing notable drop in FBS and PPBS levels and Pan et al. [16] showing metformin and vildagliptin combination to significantly lower fasting blood glucose (FBG) levels at 24 weeks when compared with metformin placebo.

According to Chatterjee and Chatterjee [17], both the once-daily and twice-daily regimens of metformin and vildagliptin resulted in a significant reduction in FBS from baseline ($P < 0.0001$). Both groups showed a significant drop in PPBS levels ($P < 0.0001$).

Before starting treatment, the baseline mean values of HbA1C were 8.43±1.24 & 7.45±0.71 for patients taking glimepiride and metformin, as well as for patients taking metformin and vildagliptin. After 12 weeks, the average HbA1C was considerably lower in Groups A (7.45±0.71) and Group B (7.12±0.69). According to Matthewes et al. [18], glimepiride is not as successful as vildagliptin when combined with metformin to lower mean HbA1C levels.

There was one occurrence of hypoglycemia with vildagliptin metformin therapy compared to 10 episodes with glimepiride metformin therapy ($P < 0.01$), which was significant. Weight gain was seen in 10 patients taking metformin and glimepiride, whereas there was no weight gain in patients on metformin and vildagliptin. Previous studies (Sarkar et al., Jeon HJ et al.) found no weight increase with vildagliptin metformin treatment.[19,20]

CONCLUSION:

The study found that both metformin-glimepiride and metformin-vildagliptin therapy achieved excellent glycemic control after 3 months of treatment. However, in terms of adverse effect profile, hypoglycemia occurred in 37% of the metformin-glimepiride group and 3% of the metformin-vildagliptin group. Weight gain was exclusively observed in the metformin-glimepiride group. As a

result, metformin-vildagliptin therapy provides an advantage and is an essential treatment choice for good glycemic control while avoiding weight gain and hypoglycemia risks.

REFERENCES:

1. Nam Han Cho (chair), David Whiting (deputy chair). International Diabetes Federation. Sixth edition, 2013. Online version of IDF Diabetes Atlas: www.idf.org/diabetesatlas.
2. Mathers CD, Loncar D. Projections of global mortality and burden of disease from 2002 to 2030. PLoS medicine. 2006 Nov 28;3(11):e442.
3. World Health Organization. World Health Organization Diabetes Fact Sheet. WHO: Geneva, Switzerland. 2011.
4. Chen L, Magliano DJ, Zimmet PZ. The worldwide epidemiology of type 2 diabetes mellitus: present and future perspectives. Nat Rev Endocrinol. 2012;8: 228-36.
5. Ginter E, Simko V. Diabetes type 2 pandemic in 21st century. Bratisl Lek Listy. 2010;111: 134-7.
6. Fox CS, Coady S, Sorlie PD, D'Agostino RB Sr, Pencina MJ, Vasan RS, et al. Increasing cardiovascular disease burden due to diabetes mellitus:the Framingham Heart Study. Circulation 2007;115: 1544-50.
7. Marín-Peñalver JJ, Martín-Timón I, Sevillano-Collantes C, Cañizo-Gómez FJ del. Update on the treatment of type 2 diabetes mellitus. World J Diabetes. 2016;7(17):354.
8. Punthakee Z, Goldenberg R, Katz P. Definition, Classification and Diagnosis of Diabetes, Prediabetes and Metabolic Syndrome. Can J Diabetes [Internet]. 2018;42:S10–5. Available from: https://doi.org/10.1016/j.jcjd.2017.10.003
9. Ndisang JF, Vannacci A, Rastogi S. Insulin Resistance, Type 1 and Type 2 Diabetes, and Related Complications 2017. J Diabetes Res. 2017;2017:10–2.
10. Olokoba AB, Obateru OA, Olokoba LB. Type 2 diabetes mellitus: A review of current trends. Oman Med J. 2012;27(4):269–73.
11. Sami W, Ansari T, Butt NS, Rashid M, Hamid A. Effect Of Diet Counseling On Type 2 Diabetes Mellitus. Int J Sci Technol Res. 2015;4(8):112–8.
12. Wu Y, Ding Y, Tanaka Y, Zhang W. Risk factors contributing to type 2 diabetes and recent advances in the treatment and prevention. Int J Med Sci. 2014;11(11):1185–200.
13. Kaneto H. Pathophysiology of type 2 diabetes mellitus. Nihon Rinsho. 2015;73(12):2003–7
14. Kampmann U. Gestational diabetes: A clinical update. World J Diabetes. 2015;6(8):1065
15. Bosi E, Camisasca RP, Collober C, Rochotte E, Garber AJ. Effects of vildagliptin on glucose control over 24 weeks in patients with Type 2 diabetes inadequately controlled with metformin. Diabetes Care 2007;30:890-5.
16. Pan C, Xing X, Han P, Zheng S, Ma J, Liu J, *et al*. Efficacy and tolerability of vildagliptin as add-on therapy to metformin in Chinese patients with Type 2 diabetes mellitus. Diabetes Obes Metab. 2012;14:737-44.
17. Chatterjee S, Chatterjee S. Glycemic effects of vildagliptin and metformin combination therapy in Indian patients with Type 2 diabetes: An observational study. J Diabetes 2014;6:237-42.
18. Matthewes DR, Dejager S, Ahren B, GFonseca V, Ferrannini E, Cuturier A, *et al*. Vildagliptin add-on to metformin produces similar efficacy and reduced hypoglycaemic risk compared with glimeperide, with no weight gain: Results from a 2-year study. Horm Metab Res 2009;41:368-73
19. Gillett MJ. International expect committee report on the role of the assay in the diagnosis care 2009; 32(7):1327-1334.
20. Diabetes Care "January 2010" Diabetes care. 33 S3. 2009