International Journal of Community Medicine and Public Health
Rahim N et al. Int J Community Med Public Health. 2024 May;11(5):1802-1805
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20241171

Original Research Article

Comparison of metformin and repaglinide monotherapy in the management of newly diagnosed diabetes mellitus type 2: a prospective study

Nouman Rahim[1], Ahad Munir[2], Qavi Ur Rehman[2], Hassan Ali Durrani[2], Abdul Wahab[2], Ahmed Khalid[2], Fahad Muneer[2], Sumbal Irshad[3], Tayyab Mumtaz Khan[4]*, Jehanzeb Akram[2]

[1]Department of Internal Medicine, Central Park Medical College, Lahore, Pakistan
[2]Department of Internal Medicine, Rahbar Medical and Dental College, Lahore, Pakistan
[3]Department of Internal Medicine, Philadelphia College of Osteopathic Medicine, United States of America
[4]Department of Orthopaedic Surgery, Rawalpindi Medical University, Rawalpindi, Pakistan

Received: 06 March 2024
Accepted: 01 April 2024

***Correspondence:**
Dr. Tayyab Mumtaz Khan,
E-mail: tayyab.mkhan98@gmail.com

ABSTRACT

Background: Diabetes Mellitus Type 2 (DMT2), which is characterized by the raised blood sugar level due to insulin resistance in body cells, has now become global epidemic. This study was aimed to compare the efficacy of metformin and repaglinide monotherapy in patients with newly diagnosed DMT2.
Methods: This randomized comparative prospective study was performed in a tertiary care hospital of Lahore. 108 Patients' enrollment was made via simple random sampling technique and a developed inclusion and exclusion criteria. Patients were divided into metformin and repaglinide groups via lottery method. Self-designed proforma was applied for data collection. Data analysis was done in SPSS version 25.0.
Results: There was no significant difference in the means of pretreatment (p=0.08) and posttreatment (p=0.10) fasting blood sugar levels between two groups, while significant differences between the means of pretreatment and posttreatment fasting blood sugar levels within metformin group (p=0.02) and repaglinide group (p=0.01) were noted. Likewise, there was no significant difference in the means of pretreatment (p=0.07) HbA1C levels of two groups; however, significant difference was observed in the means of posttreatment (p=0.04) HbA1C of two groups. Moreover, significant differences were also seen between the means of pretreatment and posttreatment HbA1C levels in both metformin group (p=0.03) and repaglinide group (p=0.01).
Conclusions: This study suggests that although both metformin and repaglinide are effective in the new-onset T2DM managementz; however, reduction in fasting blood sugar level and HbA1c was more in repaglinide group.

Keywords: Comparison, Diabetes mellitus, Diagnosed, Management, Metformin, Monotherapy, Newly, Repaglinide, Type 2

INTRODUCTION

One of the most prevalent endocrine illnesses is diabetes mellitus (DM), a condition in which the body's lack of insulin or resistance to it results in elevated blood glucose levels. Over 415 million people worldwide are thought to have been impacted by DM, and by the end of 2040, it is expected that this figure will have increased to 642 million. The World Health Organization (WHO) estimates that 10.9 million individuals in Pakistan have diabetes, of whom 9.4 million have a diagnosis while the remaining 3.5 million are undiagnosed. Furthermore, 38

million people in Pakistan suffer from prediabetes, with a higher proportion of female patients. In Pakistan, approximately 120,000 people annually die due to diabetes mellitus associated complications.[1,2]

The main risk factors for cardiovascular disease are abnormalities in glucose levels. Several investigations have found a clear correlation between the abnormal level of glucose and diabetic complications.[3,4] Blood glucose binds to hemoglobin to generate glycated hemoglobin (HbA1c). Given that it represents the average blood glucose level over the previous three months. The American Diabetes Association has advised using HbA1c as a diagnostic tool for type 2 diabetes and to identify people who are at risk of developing the disease in both the diabetic and non-diabetic populations.[5,6] It has been noted that a 0.2% decrease in HbA1c corresponds to a 10% decrease in the incidence of cardiovascular disease development.[7] Moreover, research has indicated that a significant portion of the total glycemic control is contributed by fasting blood glucose.[2,8]

There are different types of anti-hyperglycemic medicines with complimentary modes of action, as well as a number of fixed-ratio and fixed-dose combinations of injectable medications. Patients with newly diagnosed type 2 diabetes mellitus (T2DM) should follow the Comprehensive Diabetes Management Algorithm of the American Association of Clinical Endocrinology (AACE) and should start with monotherapy after the lifestyle change if the initial HbA1c value is less than 7.[9]

Among all anti-diabetic drugs, metformin prevents the liver from absorbing glucose. Additionally, it raises peripheral glucose consumption and absorption. The UK Prospective Diabetes Study (UKPDS) found that obese individuals receiving metformin as monotherapy for newly diagnosed type 2 diabetes had favorable outcomes. It considerably lowered the risk of diabetes-related outcomes in addition to lowering their HbA1c levels. Metformin is advised as the first-line anti-hyperglycemic medication for type 2 diabetes mellitus because of its effective blood-glucose-lowering capacity, notable effects on body weight, and cardiovascular protectiveness.[10,11]

Another anti-hyperglycemic family containing benzoic acid in its composition is meglitinide.[12] Within this class, repaglinide is the most widely used medication. By inducing the rapid-acting release of insulin, it lowers blood glucose levels. According to a prior study, the repaglinide is effectively implicated in enhancing insulin secretion in the early phase. Additionally, it controls blood glucose levels after meals.[13] Studies have shown that in individuals with type 2 diabetes mellitus, metformin and repaglinide are equally effective at regulating blood glucose levels and cardiovascular risk factors.[14,15]

Studies contrasting the impact of these two drugs on glycemic control in patients with type 2 diabetes mellitus of recent onset are scarce in Lahore Pakistan. Therefore, the purpose of this study was to determine whether repaglinide may be used as a first line of treatment for individuals with newly diagnosed T2DM in place of metformin.

METHODS

This randomized comparative prospective study was conducted in the Diabetic Clinic of a tertiary care hospital of Lahore, among 108 patients who were recently diagnosed with T2DM for 1 year from February 2023 to January 2024. For the recruitment of patients, simple random sampling and an established inclusion and exclusion criteria were applied. Patients with age above 35 years and newly diagnosed type 2 diabetes mellitus and who had no other known diseases such as liver disease, kidney disease, heart disease, or joint disease, were enrolled in the study. Whereas, those who had an age below 35 years, any co-morbid or any psychiatric disease, and who were on multiple antidiabetic drugs, were excluded. From the all patients before the data collection, informed consent was obtained. Data was acquired via a self-structured proforma. This proforma had two components. First component was about the socio-demographic characteristics of the study population such as age (years) and gender (female and male). Second component was regarding fasting blood sugar (FBS) levels and HbA1c values at pre-treatment and post-treatment with metformin and repaglinide monotherapies with the interval of 3 months. Doses were adjusted according to their FBS. Patients were divided into two group like group A and group B via lottery method. Group A was prescribed with metformin while repaglinide to group B. Data analysis was done via Statistical Package for the Social Sciences (SPSS) version 25 (Armonk, NY: IBM Corp.) by the action of the inferential and descriptive statistics. Nominal variables' frequency and percentage were estimated, whereas, numerical variables' means were measured. Independent t-test and paired t-test were applied to evaluate the variation in means of study variables. The p-value less than 0.05 was set as statistically significant.

RESULTS

All participants stayed enrolled till the completion of the study.

Table 1 shows the sociodemographic characteristics and biochemical values of patients at the start of the study in both groups.

Table 2 presents that there was no significant difference in the means of pretreatment and posttreatment fasting blood sugar levels between two groups, whereas significant differences between the means of pretreatment and posttreatment fasting blood sugar levels in the both groups were observed.

Table 1: Sociodemographic and clinical features of the study population.

Parameters	Metformin (n=57) (%)	Repaglinide (n=51) (%)
Mean of age in years (±SD)	50.88 (8.23)	52.78 (7.55)
Females (%)	28 (25.92)	18 (16.67%)
Males (%)	29 (26.8)	33 (30.55)
Mean of fasting blood sugar level mg/dl (±SD)	138.58 (8.80)	145.30 (9.04)
Mean of HbA1C level in % (±SD)	7.69 (0.40)	7.80 (0.59)

Table 2: Pre-treatment and post-treatment comparison of fasting blood sugar levels.

Parameters	Metformin group	Repaglinide group	P
Pre-treatment (Mean±SD)	138.58 (8.80)	145.30 (9.04)	0.08
Post-treatment (Mean±SD)	118.60 (7.50)	120.76 (8.10)	
Paired t-test (p value)	0.02	0.01	0.10

Table 3: Pre-treatment and post-treatment comparison of hba1c levels.

Parameters	Metformin group	Repaglinide group	P
Pre-treatment (Mean±SD)	7.69 (0.40)	7.80 (0.59)	0.07
Post-treatment (Mean±SD)	7.19 (0.90)	6.80 (0.70)	
Paired t-test (p value)	0.03	0.01	0.04

Table 3 manifests that there was no significant difference in the means of pretreatment HbA1C levels of two groups; whereas significant difference was observed in the means of posttreatment HbA1C of two groups. Furthermore, significant differences were also seen between the means of pretreatment and posttreatment HbA1C levels in both groups.

DISCUSSION

This study has provided significant information about the impact of metformin and repaglinide monotherapy in the patients with newly diagnosed diabetes mellitus type 2 in the diabetic clinic of a tertiary care hospital of Lahore, Pakistan.

According to the UKPDS, individuals with diabetes mellitus who maintain adequate glycemic control are less likely to experience micro- and macrovascular problems. The most effective laboratory test to assess glycemic management is HbA1c.[10,16] Postprandial hyperglycemia and fasting both lead to various changes in HbA1c levels. Nonetheless, research has indicated that a significant portion of the total glycemic control is contributed by fasting blood glucose. Moreover, in terms of the prevalence of diabetes, fasting hyperglycemia occurs more frequently than postprandial hyperglycemia. Consequently, we assessed the HbA1c and fasting blood glucose levels in individuals with newly diagnosed type 2 diabetes in order to compare the effectiveness of metformin and repaglinide.[17]

For patients with newly diagnosed type 2 diabetes mellitus, metformin is the only recommended oral anti-diabetic medication as the first line of treatment, according to nearly all international guidelines based on evidence-based medicine. Because over 20% of people experience stomach problems and contraindications when taking first-line pharmacological therapy includes metformin and other anti-hyperglycemic medications. In line with earlier research, our study demonstrated that metformin and repaglinide both had a comparable anti-hyperglycemic impact.[14,15]

First, the difference in the means of pretreatment and posttreatment fasting blood sugar levels between the groups and within the same group was assessed. There was no significant difference in the means of pretreatment (p=0.08) and posttreatment (p=0.10) fasting blood sugar levels between two groups, whereas significant differences between the means of pretreatment and posttreatment fasting blood sugar levels in the both metformin (p=0.02) and repaglinide (p=0.01) were observed. Similar results were noted by a study that conducted in China.[3] Another Pakistani study has also supported our study findings.[17]

Then, the difference in the means of pretreatment and posttreatment HbA1c levels between the groups and within the same group was evaluated. It was also viewed that no significant difference in the means of pretreatment (0.07) HbA1C levels between the two groups, while significant difference was spotted in the means of posttreatment (0.04) HbA1C between the two groups. Moreover, significant differences were also seen between the means of pretreatment and posttreatment HbA1C levels in both metformin group (p=0.03) and repaglinide group (0.01). In literature, various studies have also endorsed these findings of current study.[14,15,18]

In view of the above, current study suggests that repaglinide is a good alternative in the patients with newly diagnosed diabetes mellitus type 2 and especially in those patients, who do not tolerate metformin.

The study has some limitations such as is small sample size, short duration follow-up, and single-centered oriented study. Because of these limitations current study results could be biased. So, new researches with large

sample size, of longer duration follow-up, and in multiple-centered oriented are required.

CONCLUSION

This study results indicates that although both metformin and repaglinide reduce fasting blood sugar and HbA1c significantly; however, reduction in both FBS and HbA1c was higher in repaglinide group. Moreover, the difference in the reduction in FBS between two groups was insignificant while it was significant in HbA1c between the two groups. Therefore, repaglinide can be used as alternative to metformin as monotherapy in the patients with new-onset diabetes mellitus type 2.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Sadeeqa S, Fatima M, Latif S, Afzal H, Nazir SU, Saeed H. Prevelance of metformin-induced gastrointestinal problems. Acta Poloniae Pharmaceutica-Drug Res. 2019;76(6):1073-7.
2. Akhtar S, Khan Z, Rafiq M, Khan A. Prevalence of type II diabetes in District Dir Lower in Pakistan. Pak J Medi Sci. 2016;32(3):622.
3. Ma J, Liu LY, Wu PH, Liao Y, Tao T, Liu W. Comparison of metformin and repaglinide monotherapy in the treatment of new onset type 2 diabetes mellitus in China. J Diab Res. 2014;2014.
4. Inzucchi SE, Bergenstal RM, Buse JB, Diamant M, Ferrannini E, Nauck M, et al. Management of hyperglycemia in type 2 diabetes, 2015: a patient-centered approach: update to a position statement of the American Diabetes Association and the European Association for the Study of Diabetes. Diabetes Care. 2015;38(1):140-9.
5. Wei F, Chang B, Yang X, Wang Y, Chen L, Li WD. Serum uric acid levels were dynamically coupled with hemoglobin A1c in the development of type 2 diabetes. Sci Rep. 2016;6(1):28549.
6. Bai XU, Tan JB, Feng NI, Sun JP, Zhang KY, Li LI, et al. Association between serum uric acid and prevalence of type 2 diabetes diagnosed using HbA1c criteria among Chinese adults in Qingdao, China. Biomed Environm Sci. 2015;28(12):884-93.
7. Ghari Arab A, Zahedi M, Kazemi Nejad V, Sanagoo A, Azimi M. Correlation between hemoglobin a1c and serum lipid profile in type 2 diabetic patients referred to the diabetes clinic in Gorgan, Iran. J Clin Basic Res. 2018;2(1):26-31.
8. Care D. Standards of medical care in diabetes 2019. Diabetes Care. 2019;42(Suppl 1):S124-38.
9. Tamez-Pérez HE, Proskauer-Peña SL, Hernández-Coria MI, Garber AJ. AACE comprehensive diabetes management algorithm 2013 endocrine practice/in response. Endoc Pract. 2013;19(4):736.
10. UK Prospective Diabetes Study (UKPDS) Group. Effect of intensive blood-glucose control with metformin on complications in overweight patients with type 2 diabetes (UKPDS 34). Lancet. 1998;352(9131):854-65.
11. Scarpello JH, Howlett HC. Metformin therapy and clinical uses. Diab Vasc Dis Res. 2008;5(3):157-67.
12. American Diabetes Association. Diagnosis and classification of diabetes mellitus. Diabetes care. 2014 Jan 1;37(Supplement_1):S81-90.
13. Li Y, Xu L, Shen J, Ran J, Zhang Y, Wang M, Yan L, Cheng H, Fu Z. Effects of short-term therapy with different insulin secretagogues on glucose metabolism, lipid parameters and oxidative stress in newly diagnosed type 2 diabetes mellitus. Diab Res Clin Pract. 2010;88(1):42-7.
14. Derosa G, Mugellini A, Ciccarelli L, Crescenzi G, Fogari R. Comparison of glycaemic control and cardiovascular risk profile in patients with type 2 diabetes during treatment with either repaglinide or metformin. Diab Res Clin Pract. 2003;60(3):161-9.
15. Monnier L, Lapinski H, Colette C. Contributions of fasting and postprandial plasma glucose increments to the overall diurnal hyperglycemia of type 2 diabetic patients: variations with increasing levels of HbA1c. Diab Care. 2003;26(3):881-5.
16. Skyler JS, Bergenstal R, Bonow RO, Buse J, Deedwania P, Gale EA, et al. Intensive glycemic control and the prevention of cardiovascular events: implications of the ACCORD, ADVANCE, and VA diabetes trials: a position statement of the American Diabetes Association and a scientific statement of the American College of Cardiology Foundation and the American Heart Association. Circulation. 2009;119(2):351-7.
17. Younas A, Riaz J, Chughtai T, Maqsood H, Younus S, Qasim M, et al. Comparison of metformin and repaglinide monotherapy in the treatment of new-onset type 2 diabetes mellitus. Cureus. 2021;13(1).
18. Fang FS, Gong YP, Li CL, Li J, Tian H, Huang W, et al. Comparison of repaglinide and metformin monotherapy as an initial therapy in Chinese patients with newly diagnosed type 2 diabetes mellitus. Euro J Endocrinol. 2014;170(6):901-8.

Cite this article as: Rahim N, Munir A, Rehman QU, Durrani HA, Wahab A, Khalid A, et al. Comparison of metformin and repaglinide monotherapy in the management of newly diagnosed diabetes mellitus type 2: a prospective study. Int J Community Med Public Health 2024;11:1802-5.