



Pharmacoeconomic Evaluation of Antidiabetic Agents-Metformin Plus Teneligliptin Versus Metformin Plus Glimepiride-A Prospective Study

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ABSTRACT

Diabetes mellitus is a metabolic-cum-vascular disorder of numerous etiologies described by constant hyperglycemia with aggravations of sugar, fat and protein digestion coming about deformities in insulin emission, insulin activity or both. This issue is every now and again connected with long haul harm, which can prompt disappointment of organs like eyes, kidney, nerves, heart and veins.. In India, diabetes mellitus is influencing 33% of the grown-up populace. It is basically connected with wellbeing trouble just as high financial weight at individual and populace levels. A forthcoming observational investigation was completed in-patients confessed to general medication division of NMCH&RC determined to have diabetes mellitus endorsed with combination treatment of Metformin + Glimepiride and combination treatment of Metformin + Teneligliptin from September 2019 to February 2020. Information was gathered from case sheets of patients and evaluated for their monetary weight dependent on the expense per tablet for long term. Cost viability proportion for the patients with controlled blood glucose level by utilizing a specific medication was determined and likelihood to lessen the diabetes mellitus was assessed. Among 70 in-patients, 38 patients (54.29%) were males and 32 patients (45.71%) were females. Patients are between the age gathering of 41-60 years were more (48.57%). Majority of the patients were conceded with known history of diabetes mellitus (81.43%). A large portion of the patients were endorsed with combination treatment of Metformin + Glimepiride (81.42%) followed with Metformin + Teneligliptin (18.57%). There was a critical positive connection (i.e., p value= 0.5607) between perseverance examples of patients with drug treatment. Likelihood of patients taking combination treatment of Metformin + Glimepiride was 77.19% trailed by patients with combination treatment of Metformin + Teneligliptin. Combination treatment of Metformin + Glimepiride are having more Cost adequacy proportion. This investigation obviously indicated that combination treatment of Metformin + Glimepiride is the most practical treatment among other combination treatment to lessen monetary weight to the patient just as to diminish the entanglements. Pharmacoeconomic assessments can help in creation troublesome decisions judiciously and designate scant assets productively.

Keywords: Diabetes mellitus, Treatment Pharmacoeconomics, Cost effectiveness, Hyperglycaemia

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INTRODUCTION

Diabetes mellitus is a metabolic vascular syndrome of multiple etiologies characterized by chronic hyperglycaemia with disturbance of carbohydrate, fat and protein metabolism resulting defects in insulin secretion, insulin action or both. This disorder is frequently associated with long term damage, which can lead to failure of organs like eyes, kidney, nerves, heart and blood vessels. Type 2 diabetes mellitus, which is more common in elderly age group, is due to insulin resistance along with progressive functional failure of the pancreatic beta cells. According to International Diabetes Federation, 6.6% of the worldwide adult population had diabetes and it is estimated that by 2030, approximately 7.8% of the world wide adult population will have diabetes. In India the prevalence of diabetes has been increasing explosively over the last few years. In 2000 WHO reported that 32 million people was diagnosed with diabetes in India. India is poised to become the diabetic capital of the world with a patient population of 40.9 million in 2019, which is projected to increase to 69.9 million by 2025. The prevalence was 2.1percent in urban population and 1.5 percent in the rural population while in those above 40 years of age, the prevalence was 5 percent in urban and 2.8 percent in rural areas^{1,2}

Pharmacoeconomics defined as the field of study that evaluates the behaviour of individuals, firms and markets relevant to the use of pharmaceutical products, process and programs and which frequently focuses on the costs and consequence of that use. Pharmacoeconomics plays an important role in informing clinical development and market access decisions of new innovative medicines. It mainly works on the health economics which particularly focuses upon the cost and benefits of drug therapy³

Worldwide, diabetes mellitus has been recognized as the greatest challenge for all health care system. People with diabetes mellitus are at increased risk of macrovascular and microvascular complications and are more likely than people without diabetes to have other cardiovascular problems⁴

In addition to the large health burden, there is an enormous financial burden associated with the disease. This is because the treatment of diabetes mellitus requires an investment over many years to ensure disease free years. The economic consequence of this long term therapy often limits the ideals of pharmacological blood glucose control in many countries. Unfortunately, the number of studies that reports this cost is small as few economic analyses relating to management of diabetes mellitus in worldwide. The population and high risk approach to diabetes mellitus also have economic consequences; this may vary in different societies and need to be assessed to ensure appropriate allocation of resources.⁵

In developing countries the expenditure for diabetes mellitus is increased and the burden of this disease is also increasing, so it is important to scientifically evaluate the cost effectiveness of combination therapies. Hence this study was done to evaluate the relative cost effectiveness of the two combination therapies in the management of diabetes mellitus. Therefore, the study is aimed to perform a persistence based pharmacoeconomic evaluation of patient receiving anti-diabetic treatment.

MATERIALS AND METHOD

This prospective observational study was conducted for a period of six months from September 2019 to February 2020 in Navodaya Medical College, Hospital & Research Centre (NMCH&RC) Raichur. Permission was obtained from ethical clearance committee before the beginning of study. A total of 156 samples were collected during the study period. In this study data entry form was used to collect the patient demographics, reason for admission, past medical history, vital signs, Body Mass Index, laboratory investigation, socio-economic data, medications prescribed, cost per tablet, monthly cost and annual cost of the drug used in the treatment of diabetes mellitus patients who are undergoing treatment with combination of Metformin plus Glimepiride and combination of Metformin plus Teneligliptin. All the diabetic patients admitted in medical departments of hospital were included in the study. The IP patients with diabetes mellitus from all medical departments were included in the study whereas patients who were not willing to participate were excluded in the study. All the collected data were analyzed and the data will be evaluated using suitable statistics.

Statistical Analysis

The demographic data, disease data and drug data of the patients were analyzed. Data was analyzed using descriptive statistics namely total numbers, percentage, to represent Pharmacoeconomics and medication adherence. Microsoft word and Excel have been used to generate graphs, tables etc. All gathered data were entered into SPSS software for windows, the chi square test were applied for the comparison of data used in the Pharmacoeconomics study.

RESULTS AND DISCUSSION

A total number of 70 case sheets of diabetic patients prescribed with combination therapies of metformin + glimepiride and metformin + teneligliptin were reviewed and analyzed.

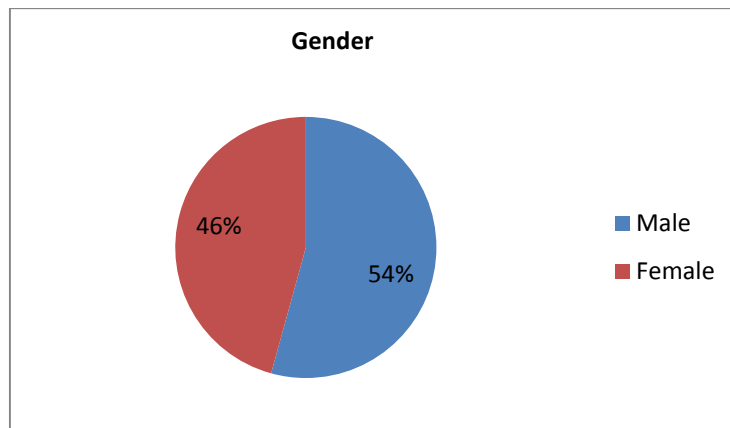


Figure 1: Distribution based on gender (n=70)

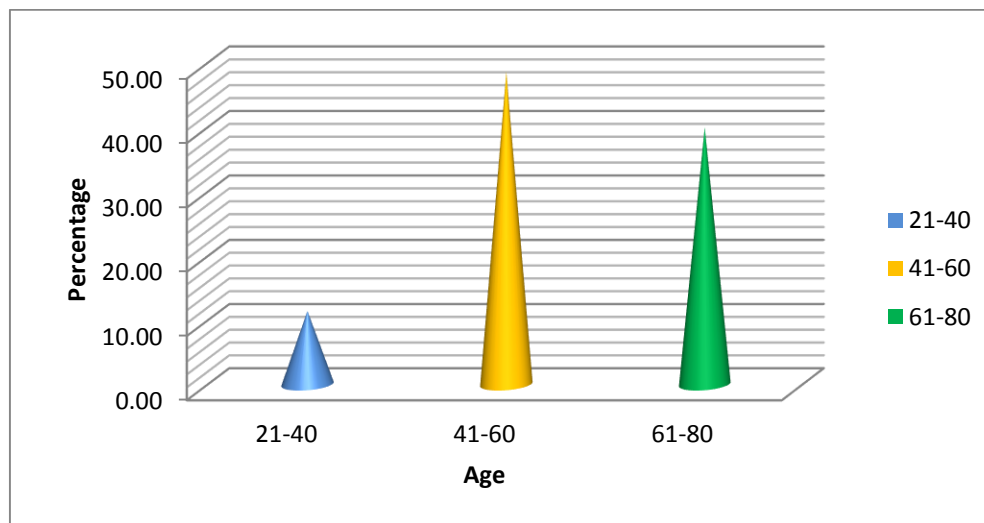


Figure 2: Distribution based on age (n=70)

In figure 1 and figure 2 The data suggest that middle aged adults are at high risk of diabetes due to obesity, HTN, dyslipidemia and normal BMI. Men are more prone to diabetes than women especially below the age of 50.

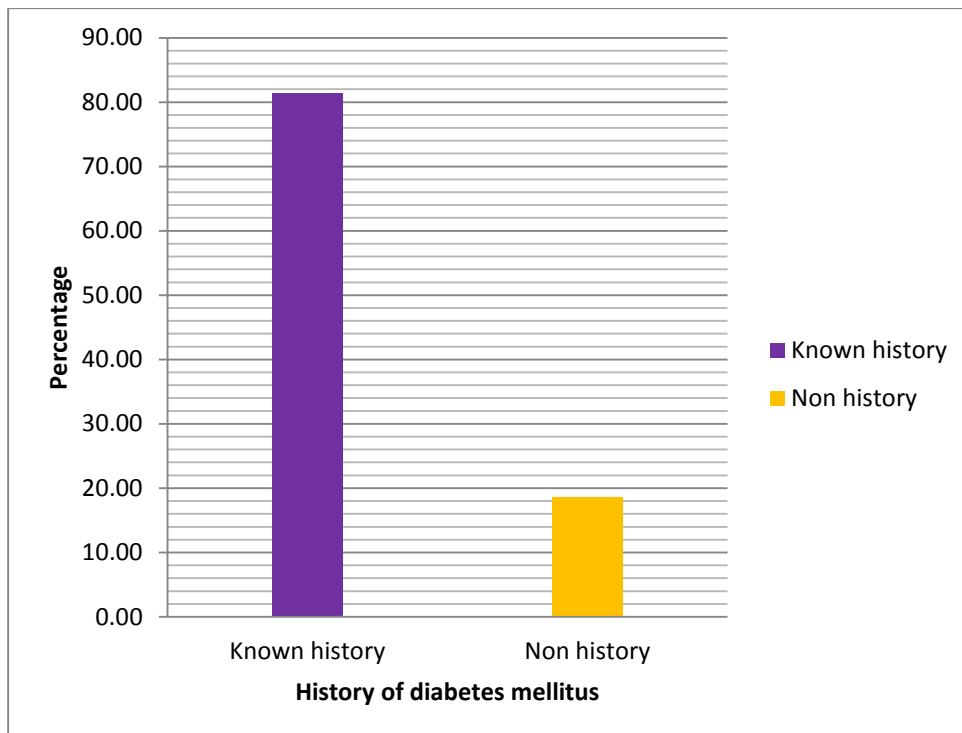


Figure 3: Distribution based on history of diabetes mellitus (n=70)

Figure. 3 shows the known history 57(81.43%) and unknown history 13(18.57%) of diabetes mellitus. Most of the known history patients were already on treatment. Because diabetes is the number one health related problem all around the globe.

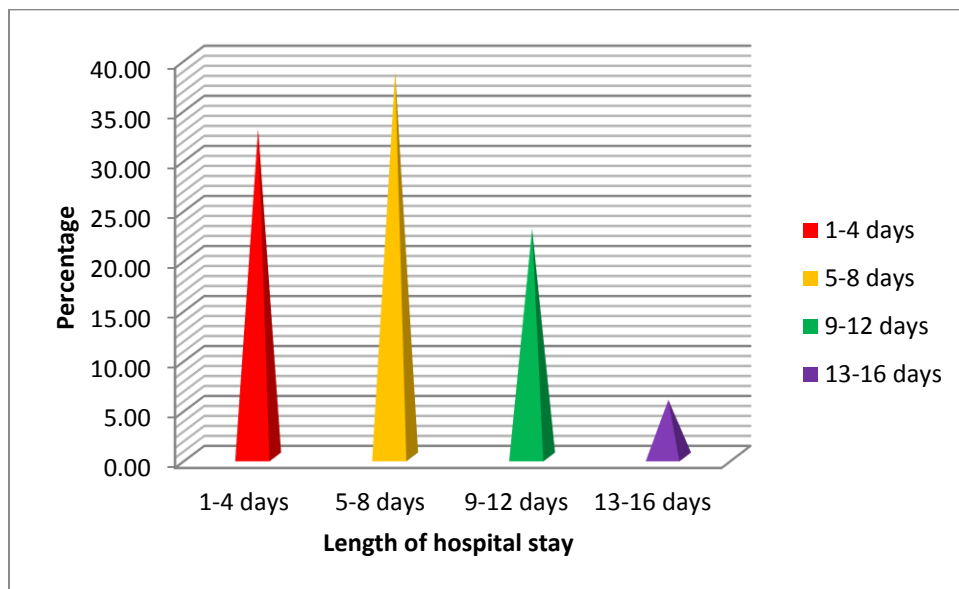


Figure 4: Distribution based on duration of hospital stay (n=70)

Figure 4 illustrate duration of hospital stay of patients. It was found that 38.57% of the patients stayed for 5-8 days. It may be due to complete the course of antibiotics. 32.86% of the patients stayed for 1-4 days, 22.86% and 5.71% of the patients stayed for 9-12 days and 13-16 days respectively which may be associated with other diseases and treatments.

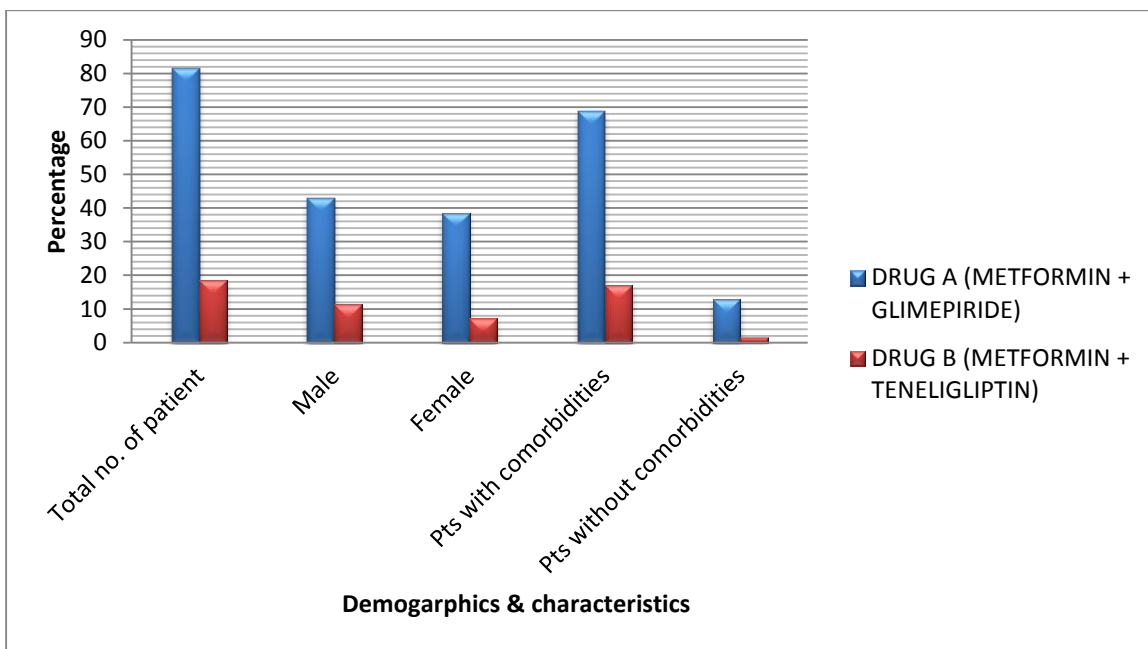


Figure 5: Distribution based on demographics & characteristics of patient by which antidiabetic drugs prescribed (n=70)

Figure 5 show demographics and characteristics of patients by class of drug prescribed at enrolment. Out of 70 subjects 57 (81.42%) patients were taking metformin + glimepiride and 13 (18.57%) patients were metformin + teneligliptin respectively. According to gender classification 30 (42.85%) of male patients and 27 (38.57%) of female patients were taking metformin + glimepiride and 8 (11.42%) of male patients and 5 (7.14%) of female patients were taking metformin + teneligliptin respectively. Patients in accordance with comorbidities, out of 70 patients 48 (68.57%) were taking metformin + glimepiride and 12 (17.14%) were taking metformin + teneligliptin respectively. 9 (12.85%) patients without comorbidities were taking metformin + glimepiride and 1 (1.42%) were taking metformin + teneligliptin. This data suggest that majority of patients were taking metformin + glimepiride; which may due to the faster action, lesser side effect and low cost.

Table 1: Persistence pattern based on demographics & characteristics of patient by which Antidiabetic drugs prescribed (n=70)

Sl. No.	Characteristics	Drug A	Drug B	P Value
1	Total no. of patient	57(81.42%)	13(18.57%)	
2	Male	30(42.85%)	8(11.42%)	0.5607
3	Female	27(38.57%)	5(7.14%)	
4	Patients with comorbidities	48(68.57%)	12(17.14%)	0.4515
5	Patients without comorbidities	9(12.85%)	1(1.42%)	

Table 1 shows the statistical analysis for the class of drugs prescribed to the patient. The data shows the comparison between the combination therapy of metformin + glimepiride and

combination therapy of metformin + teneligliptin. The 'p' values were found out determine the significance. There is no significance difference found in the study. The same result was stated in a study done by Tandon T et al⁶.

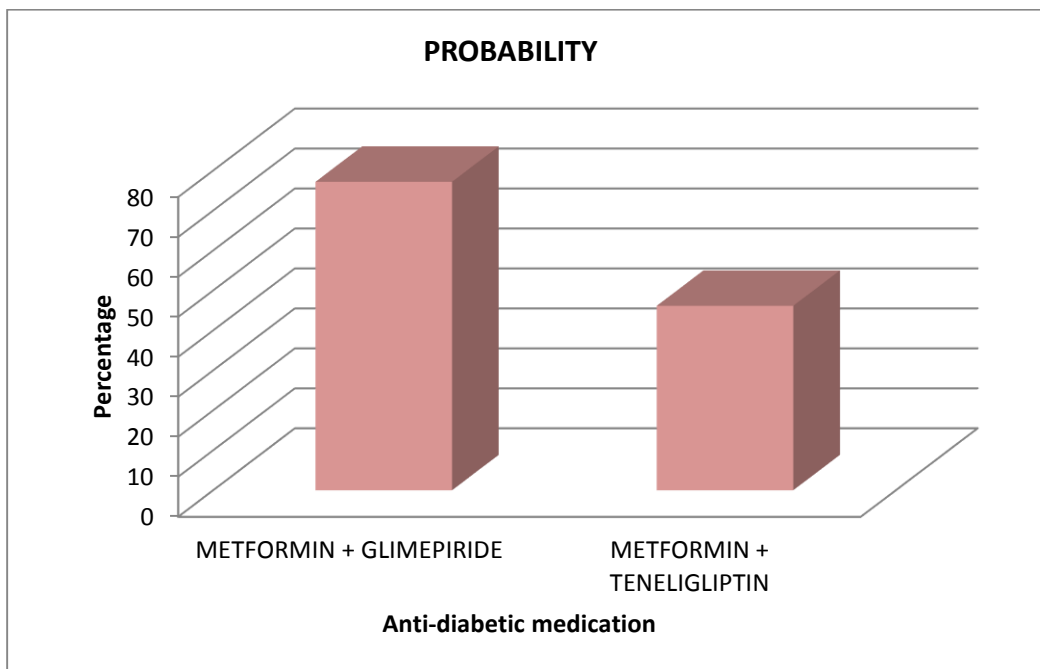


Figure 6: Cost effectiveness of anti-diabetic medication

From Figure 6 we can see that a total of 81.42% of patients were taking metformin + glimepiride tablets in which 77.19% of patients were probably controlled after this medication and the C/E ratio is 15.6 and 12.17 % of the patients were controlled their diabetes condition after taking metformin + teneligliptin tablets in which 46.15% of patients were probably controlled after this medication and the cost effective ratio is 3.8. This data suggests that probability of controlling the diabetes in patients can be achieved by using metformin + glimepiride and its costs less. So, we can clearly say that the patient can have metformin + glimepiride as their cost effective therapy. Cost effectiveness is the ratio of probability of patients controlled with the drug with its cost per tablet.

$$C/E = \frac{\text{Clinical outcome (percentage of patients with controlled blood glucose level)}}{\text{Cost of the drug per tablet}}$$

DISCUSSION

The study reveals that majority of patients were treated with combination therapy of Metformin + Glimepiride. Metformin when combined with Glimepiride showed better control for both HbA1c and RBS. Thus this combination may serve a potential role in achieving desired goals for controlling diabetes. Anti-diabetic drugs used to treat diabetes mellitus have different CER. Combination therapies of Metformin + Glimepiride have more probability to reduce diabetes

mellitus in most of the patients and they have more CER than other combination therapy. Thus the combination therapy Metformin + Glimepiride is the cost effective therapy for adequate control of diabetes mellitus.

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