Cost Effective Analysis Between Glimipiride and Gliptin Used in Diabetic Patients in Tertiary Care Hospital

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Abstract

Diabetes mellitus is a spectrum of common metabolic disorders arising from various mechanisms all resulting in hyperglycemia. It is a disorder which can lead to coronary artery disease, cerebro-vascular disease, Nephropathy, Diabetic retinopathy, Neuropathy. So, early treatment is necessary to prevent these complications. In this regard, Oral Hypoglycemic drugs are most common type of treatment given for patient. A better cost effective drug can minimize the economic burden on the patients as it is a chronic diseases. The present study was aimed to assess cost effectiveness between glimepride and gliptin that may improve the clinical and economical aspect of patient and increase quality of health in patient. The present study was made to conduct cost effective analysis between glimepride and gliptin. It is a prospective observational study conducted in Basaveshwara Medical College, Hospital and Research Centre and Chitradurga Diabetic Centre for a period of six months. Patients admitted in General medicine above the age of 30 yrs are included. The data was collected from medical records of the patients and documented in suitable designed form. A total of 104 patients were enrolled during the study period, 70 are inpatients and 34 are outpatients. 5 were dropped out from the study. The results reveal that Glimepride has got more efficacy than gliptin. It provided long term Glycemic control than gliptin and also remain less costly compare to gliptin. The one sample student T-test results showed the P value was 0.000*. After follow up glimepride proved to be cost effective drug. Increased health expenditures have led to the need to find out the optimal therapy at the lowest price. This study concluded that Glimepride is more efficacious and cost effective drug than Gliptin. Since diabetes is a chronic disease with long duration, Glimepride might be preferred to Gliptin. It also reveal that glimepride leads to improvements in quality adjusted-life expectancy and is a cost-effective option for the treatment of Type 2 diabetes.

1 Introduction

Diabetes is one of the most common chronic illnesses worldwide with type II diabetes mellitus accounting for approximately 90% of all cases. The burden of type 2 diabetes occurs in the middle or old age and at least 4 percentage of population in there age of 60s have diabetes¹. Persons who are over-weight, have less physical activity, have poor eating habits, or who have a genetic predisposition may be at risk for type 2 diabetes. Since, diabetes

is related to lifestyle changes like Physical inactivity, obesity and poor eating habits run rampant².

Diabetes mellitus is a source of morbidity, mortality and cost of burden to the society. Effective control of diabetes need sustained glycaemic control over many years to lower the risk of macro-microvascular complication in people with type 2 diabetes³. As the diseases progresses, so do the micro and macrovascular complication associated with it, which have a

negative impact on the quality of life of patient and huge economic burden to the health system¹.

Cost effective analysis is one of the tool to define the description and analysis of cost of drug therapy to health care system and society. It is a specialized aspect of health economics which involves the use of economic principles and techniques of analysis to ensure that scarce healthcare resources are used more efficiently. The objective of cost effective analysis is to influence policy formulation and effect decision making, that is to make a person or a group of people change their behavior and persuade them that a new course of action is a "better" one, "better" simply mean in economic terms, it is more efficient⁴. Pharmaco-economic evaluation helps for decision makers to determine whether the cost of extra effectiveness provided by a new drug is worthwhile within the budget available⁵. Cost-effective therapy of diabetes mellitus will not only ensure rational drug use but also reduces the economic burden on patients without missing their medications. Out of treatment because of cost, thereby reducing incidence of therapeutic failure by enhancing economic, clinical and humanistic outcome of therapy⁶.

Indicating that it is a very common condition in India and oral anti diabetic drugs are most common type of treatment given in newly diagnosed cases. In this regard, many drugs are used to treat diabetes. Though many new treatment options are emerging now days, the cost effective and 1st line of treatment includes the usage of biguanides and sulfonylureas⁷. Glimepride are chosen because it is the latest generation sulfonylureas for treating type II diabetes and it has a lower cardiovascular risk than conventional sulfonylureas do⁸. Gliptins are chosen because it is a newly emerged drug that is mostly prescribed after biguanides and sulfonylureas and it also improves metabolic control without causing severe hypoglycemia, it tend to be weight neutral⁹.

As more generic diabetes medications become available, the cost-effectiveness ratio associated with treatment may become more competitive. Exploration into lower cost but effective and safe lifestyle interventions for diabetes treatment is needed¹⁰.

Therefore by considering the above statement, the study was aimed to asses cost effectiveness between glimepride and gliptin that may improve the clinical and economical aspect of patient and increase quality of health in patient.

2 Materials and Methods

The study was an observational study conducted under the supervision of S J M College of pharmacy chitradurga, and ethical committee approved the protocol of the study. Informed consent was obtained from the patients and/or their parent or caretaker.

During 6 months from August 2016 to February 2017. The study carried in subjects treated in following medicine wards and

Chitradurga diabetic centre for type II diabetic patient. Comatose Patients and Pregnant and lactating womens were excluded from the study. The study was approved by the Institutional Ethical Committee of Basaweshwara Medical College Hospital & Research Centre, Chitradurga. Vide number: SJMCP/IEC/04/2016-17.

All patient's demographic details, medication history, therapeutic category, their social activities collected and documented in a suitably designed data collection form. All the enrolled patients was monitored from the date of admission until discharge for any change in the drug therapy.

Statistical analysis of the results was performed by using the SPSS software version 19. Categorical data were analyzed by frequency & Percentage method. Quantitative data was analyzed by central tendency distribution. Significance of difference was calculated using 95% confidence interval, with α level of 0.05.

3 Results

Among the whole 52 patients were treated with Dipeptidyl peptidase-4inhibitor (Gliptin) and next 52 were treated with glimepiride (Table 1).

Table 1: Data of drug treatment

Drugs	Freq.	%age
Dipeptidyl peptidase-4 inhibitor : Gliptin	52	50
Sulfonyl urea: Glimiperide	52	50
Total	104	100%

3.1 Distribution of patients according to gender

In that 104 patients, 70 are inpatients and 34 are outpatients. Among the whole 51 were males and 53 were females. This study showed that female patients are more prone to diabetes than male patients. The result are shown in table 2.

Table2: Distribution of patients according to gender

Gender	Frequency	Percent
Female	53	51.0
Male	51	49.0
Total	104	100.0

3.2 Distribution of patients according on age groups

In the study, based on the age patients were divided into 5 groups. Out of 104 patients, 11 were below 30 years, followed by 13 patients were in 31-40 years, 26 patients were in 41-50 years, 35 patients were in 51-60 years, 19 patients were in 61-70 years. The results are shown in table 3.

Table 3: Distribution of patients according on age groups

Age groups	Frequency	Percent
Below 30 year	11	10.6
31-40 years	13	12.5
41-50 years	26	25.0
51-60 years	35	33.7
61-70 years	19	18.3
Total	104	100.0

3.3 Distribution based on drug treatment

a) Cost comparison of Gliptin versus Glimipride by ICER and ACER (Table 4)

$$ICER = \frac{\text{Cost of gliptin (Rs)} - \text{Cost of glimepride (Rs)}}{\text{Effect of gliptin} - \text{Effect of glimepride}}$$

Where, Effect of gliptin & glimepride are in blood glucose in month 3

$$ICER = \frac{44.96 - 8.32}{115.4 - 140}$$

$$ICER = 0.148$$

$$ACER = \frac{\text{Cost of gliptin (Rs)} - \text{Cost of glimepride (Rs)}}{\text{Effect of blood glucose of gliptin \& glimepride}}$$

$$ACER = \frac{44.96 - 8.32}{265.9}$$

$$ACER = 0.200$$

3.4 Efficacy comparison, Gliptin versus Glimipride

In that 104 patients, 70 are inpatients and 34 are outpatients. Among the whole 52 patients were treated with Dipeptidyl peptidase-4 inhibitor (Gliptin) and next 52 were treated with Sulfonyl urea (Glimipride) and the blood glucose level is checked for 3 months. The results are shown in Table 5.

Table 4: Cost comparison of Gliptin versus Glimipride

Drugs	No. of patients (N)	T- value	df	P- value	Mean± SD	Mean difference
Gliptin	52	9174.6	51	0.000 (HS)	44.96±0.035	44.96
Glimipride	52	23.4	51	0.000 (HS)	8.326±2.56	8.326

Table 5: Efficacy comparison, Gliptin versus Glimipride

Drugs	No. of patients (N)	(month-1 blood glucose)	(month - 2 blood glucose)	(month - 3 blood glucose)
Gliptin	52	184.6±101.7	140.4±79.3	120.1±78.8
Glimipride	52	199.93±100.8	155.4±59.9	145.8±57.9

4 Discussion

The present study was the first of its kind to be conducted in the "price sensitive" Indian health-care setting. Though study was not powered for the difference in average cost of treatments, The findings from this study should encourage further conduct of similar analyses and increase the knowledge regarding pharmacoeconomics in India¹¹.

In the present study 104 patients were enrolled among which 52 patients were treated with glimepride and 52 patients with gliptin and found that long term Glycemic control was better achieved with Glimepride. Since diabetes is a chronic disease with long duration Glimepride might be preferred to Gliptin. Hence,

Glimepride is more efficacious and cost effective drug when compared to Gliptin, P-value is 0.000, got the significant

result with our study. A similar study was conducted by Remya R⁷ *et al.*, on cost efficacy of glibenclamide versus metformin in newly diagnosed patients with type II diabetes mellitus in which the result found was to be glibenclamide as the drug with less adverse effects and more patient compliance and cost effective drug and the results proved that: glibenclamide has got more efficacy when compared to metformin. It resulted with long term glycemic control will be better than metformin⁴.

A similar study was conducted by Kwon C¹². *et al.*, cost-effectiveness analysis of pharmacological treatment pathways for type 2 diabetes drugs in which in which Metformin and DPP-4 inhibitors was cost-effective as the second-line therapy in comparison with metformin and sulfonylureas from the health care payer perspective. The results were not sensitive to changes in the parameters used in the study. More studies

assessing the cost-effectiveness of alternative type 2 diabetes treatment pathways are needed.

5 Conclusion

The present study showed in the era of rising medical costs, the science focuses on 'value for money'. To overcome the cost and consequences of drug treatment there is a need to develop cost based study to society. Pharmacoeconomics is that science that relates patients, society and economy, to drug therapy. Clinical pharmacist involvement in pharmacoeconomic has positive impact in creating awareness about the health expenditures. Greater understanding about the expenditure and a change in attitude and practice would in turn results in a better therapeutic outcome. The prescription audit can be an eye opener for the prescribers. This study can help to provide feedback to the prescribers, thereby increasing the awareness and improve patient care by reducing health expenditure that may improve the clinical and economical aspect of patient and increase quality of health in patient. Due to increase in economic burden of treatment, it is essential for various government and non government organizations to compare various cost consequences.

6 Future scope

The study should be done with more number of sample size as well as for more time period to get results of with more statistical power. Conduction of Study for longer duration of time provides better results.outpatients can be involved for the betterment of the study.The study should also extend to community set up.

7 Conflict of Interest

Nil

8 Author's contributions

AJG carried participated in data collection and drafted the manuscript. AS and BDR reviewed the manuscript.

All authors read and approved the final manuscript.

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