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REVIEW ON CO-MORBIDITIES IN DIABETES MELLITUS

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Abstract

Aim and objectives: The aim of this study was to determine cost of illness and cost of utility in the study population and making recommendations to decrease the economic burden of the treatment by following the life style modifications.
Methodology: It is a cross sectional pharmacoepidemiological study. Totally 132 diabetic patients both in-patients and out patients of medical and surgical departments in a secondary level referral hospital were included in this study which was conducted for a period of 6 months. All patients with diabetes type-II, continuing anti diabetic drugs (Metformin, Glibenclamide and Insulin,) for their diabetes management are included and patients who are diagnosed as Diabetic type-I and pregnancy and pediatric patients were excluded. Data was analyzed by Carlson comorbidities Index.
Results: A total of 132 diabetic patients were included, in which male and famales were nearly equal in number. Based upon the comorbid conditions, it was found that the most of the subjects (69%) were suffering with diabetes along with hypertension and 9.9% are having comorbidity of hypertension & acute renal failure along with DM and treatment costs more economic burden to the patients. The average utility of drugs is more for the combination of Metformin+Glibenclamide+Insulin than metformin+glibenclamide.
Conclusion: Finally we concluded that study place is a rural area and most of people are with poor knowledge and having lack of awareness on both disease and treatment. By applying Charlson Co morbidities index we found the patient's economic status by which we found that many of the diabetic patients facing economic burden, especially daily wager are feeling much difficulty to face even therapy cost also. In co morbidities side, we noticed 55% of the study population are having diabetes with hypertension. Although all the patients were provided with education regarding their disease and drugs for improving their quality of life, but it has an influence on very few people.

Keywords: Diabetes, Epidemiology, Antidiabetics, Pharmacoeconomics.

Introduction

Diabetes

Diabetes is a chronic disease. The term "diabetes mellitus" describes a metabolic disorder of multiple aetiologies most common reason considered is when pancreas does not produce insulin and it is characterized by chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action, or both. The effects of diabetes mellitus include long–term damage, dysfunction and failure of various organs (WHO 1999) [1]. There are two main types of diabetes Type 1 diabetes (T1B) usually patients require lifelong insulin injections for survival [2]. Type 2 diabetes (T2B): This is the most common type of diabetes (representing 90% of diabetic cases worldwide).

Type 2 diabetes (Non-insulin-dependent diabetes mellitus (NIDDM).

- It majorly occurs due to insulin resistance which is characterised by hyperglycemia and it develops in adulthood who are at risk of obesity, decreased physical activity and unhealthy diets and can be managed with the help of oral hypoglycemic agents and lifestyle modifications such as diet, exercise etc.
- Patients are at lower risk of micro vascular and macro vascular complications unlike Type 1 diabetes.

Symptoms [2]

- Patients may have no symptoms at all or minimal symptoms such as polyuria,polydipsia, polyphagia, and unexplained weight loss before diagnosing.
- May also experience numbness in extremities, pain in feet (disesthesias), and blurred vision andmay have recurrent and severe infections.
- Patients may present with loss of consciousness or coma but this is less common than in Type-1 diabetes.

Diagnosis [2]

- Diagnosis is made by the presence of classic symptoms of hyperglycemia and an abnormal blood test.
- A plasma glucose concentration >=7 mmol/L (or 126 mg/dL) or >=11.1mmol/L (or 200mg/dL) 2
- In a patient without classic symptoms, diagnosis can also be made by HbA1C test wich is done to approximate metabolic control over previous 2-3 months and to guide treatment decisions. This test can also be used to diagnose type 2 diabetes.
- Some patients are diagnosed through "opportunistic screening" of high risk groups who are
- asymptomatic.
- For example, age >45 years of age, a BMI >25 kg/m2 may, being of certain ethnic group or being hypertensive may prompt a screening test or the patient him/herself requests screening.

Treatment [2]

The main aim of the treatment is to prevent or delay the complication of diabetes. It is also necessary to provide the education regarding the importance of diet, exercise, and foot care.

Diabetic Treatments

1) Oral hypoglycemic therapy.

2) Insulin treatment.

3) Diet (combined with exercise)

Pharmacoeconomics [9]

The field of study that evaluates the behaviour of individuals, firms, and markets relevant to the use of pharmaceutical products, services and programs, and which frequently focuses on the costs (inputs) and consequences (outcomes) of that that use.

Thus, pharmacoeconomics (PE) is a subfield of health economics. Operationally, the field of Pharmacoeconomics consists of comparing outcomes (clinical, economic, and humanistic) and costs (resource consumption) of pharmaceutical products, programs and/or services to the next best alternatives from selected perspectives. The aim of this approach is to identify, measure, value, and establish a link between both resource consumption and outcomes so that relative worth of selected pharmaceutical products, programs and/or services can be established.

The basic task of economic evaluation is to identify, measure, value, and compare the costs and consequences of the alternatives being considered [2].

The two distinguishing characteristics [2] of economic evaluation are as follows:

(1) Is there a comparison of two or more alternatives?

(2) Are both costs and consequences of the alternatives examined?

A full economic evaluation encompasses both characteristics, whereas a partial economic evaluation addresses only one.

Cost –Utility Analysis

Cost-utility analysis (CUA) is a method for comparing treatment alternatives and also can compare cost, quality and quantity of patient years that integrates patient preferences and HRQOL.

Cost is measured in dollars, and therapeutic outcome is measured in a quality-adjusted life year (QALY) gained.

Advantages of cost–utility analysis

Cost–utility analysis was developed to address the problem of conventional cost effectiveness analysis, which did not allow decision-makers to compare the value of interventions for different health problems.

Cost–utility analysis can capture the value of improvements in morbidity and mortality.

Cost–utility analysis thus increasingly facilitates the transparency of resource allocation processes.

Disadvantages of cost–utility analysis

- With many healthcare interventions, there are significant concerns about the ability of cost–utility analysis to capture all the valued characteristics.
- It is undoubtedly true that QALYs do not capture differences in the process characteristics of interventions, and there is substantial evidence that patients do attach value to these.
- There is also concern that the descriptive instruments and the utilities they generate are insufficiently sensitive to differences in treatments for milder conditions.
- For chronic conditions, the assumption that the utility of a health state is independent of the time spent in that health state is considered problematic.
- Similarly, that the preceding and subsequent health states do not affect the utility of a specific health state is a strong assumption in the context of chronic conditions, especially conditions where disability accumulates over time.

Cost-of-Illness

Cost-of-illness studies measure the economic burden of a disease or diseases and estimate the maximum amount that could potentially be saved or gained if a disease needs to be eradicated. Numerous cost-of-illness studies have been conducted over the past 30 years. Many of these studies have been instrumental in public health policy debates because they highlight the magnitude of the impact of an illness on society or a part of society and it can help policy makers to decide which diseases need to be addressed first by health care and prevention policy. Additionally, these studies can indicate the diseases for which curing would be valuable in reducing the burden of disease. For specific stakeholders, such as the federal government, cost-of-illness studies can show the financial impact of a disease that has on public programs, such as Medicare and Medicaid.

Cost-of-illness studies are often cited in disease studies that attempt to highlight the importance of studying a particular disease, as well as in cost-effectiveness and cost-benefit studies. Cost-of-illness studies can demonstrate which diseases may require increased allocation of prevention or treatment resources, but they are limited in determining how resources are to be allocated because they do not measure benefits.

Methodology

Study design

It is a Pharmacoepidemiological study involving cohort study design. Stratified convenience sampling with matching for factors such as gender, age is used. All diabetic type 2 patients under medication of Metformin, Glibelcamide and insulin were included. Medial records and patients reports were assessed for data collection.

Data collection and processing

In-patients and out patients of medical and surgical departments in a secondary level referral hospital were included and study was done for a period of 6 months.

Data was collected from patients diagnosed as Diabetic type-II and continuing anti diabetic drugs (Metformin, Glibelcamide, and Insulin and others20) for their diabetes management.

We have collected the data from patients in regular intervals regarding medical history, medication history, and comorbid conditions, drugs used along with the contact details. Data was processed using Microsoft excel.

Inclusion Criteria

1. All in patients and out patients who are diagnosed as Diabetic type-II.
2. Continuing anti diabetic drugs (Metformin, Glibelcamide and Insulin,) for their diabetes management.
3. All patients of above 40 years old.
4. Who visit hospital for their regular check-up of disease.
5. Diabetics with Co-morbidities were also involved in this study.

Exclusion Criteria

1. Patient who are diagnosed as Diabetic type-I.
2. Those who are non-compliant.
3. Those who have communication problems.
4. Patients with pregnancy.
5. Paediatric patients.

6. Patients who are not willing to participate in the study.

Results

Patient's demographic details

A total of 132 diabetic patients are considered, in which males are 63 and females are 69 which are almost equal in number. Patients with Co morbidity by involving co morbidity scale we included all the diabetic patients who are suffering with co morbidities.

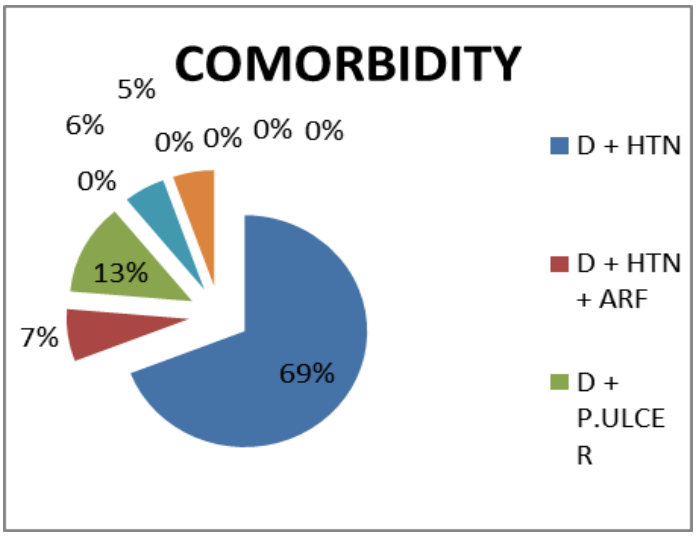

Figure-1: Percentage of co-morbidities in studypopulation.

Cost Analysis for Calendar Year

We calculated cost of therapy according to co-morbidity.No of patients: patients who are suffering from particulardisease. Avg cost of therapy: average cost of entire therapy through one year. Cost of drugs: total expenditure of amount on medicinesfrom all patients. Other hospital cost: laboratory and hospital charges.

Table 1: Cost of illness in different co morbidities.

Disease	No of Pt's	Total Drugs cost	Avg drug cost	Total other hosp cost	Other Avg Hosp Cost	Total cost	COI %	COI
DM	19	22,800	1,200	2888	152	25688	1352	1
DM+HTN	41	63,960	1,560	23370	570	87330	2130	1.57
DM+HTN+P.ULCER	11	52,800	4,800	12540	1140	65340	5940	2.78
DM+ HTN+LEU	3	16,200	5,400	4560	1520	20760	6920	1.16
DM+HTN+CHF	5	30,000	6,000	4650	930	34650	6930	1.0
DM+ HTN+LYM	5	31,000	6,200	7325	1465	38325	7665	1.10
DM+ HTN+CRF	9	1,03,644	11,516	15480	1760	119124	13236	1.72
DM+ HTN+ARF	13	1,69,000	10,090	20475	1575	189475	14575	1.10
DM+ HTN+NEURO	3	49,500	16,500	5265	1755	54765	18255	1.25
DM+HTN+ALF	6	1,03,500	17,250	11880	1980	115380	19230	1.05
DM+ HTN+TUMOR	5	93,000	18,600	12850	2570	105850	21170	1.10
DM+HTN+MLD	4	79,040	19,760	7436	1859	86476	21619	1.02

Average Utility of Drugs

Table 2: Comparison of utility and cost of drugs per number of patients.

Drugs	Number of pts	Avg utility	Avg cost
M + Gli	93	0.7	7036
Met+Glib+Ins	39	0.8	10665

Comparison of Co morbidity with Age Group

Table 3: CCI in Co morbidity.

S.NO	Disease	No: of Pts	Avg age	Avg CCI
1.	DM	19	41-55	3
2.	DM+HTN	41	46-59	4
3.	DM+HTN+P,ULCER	11	45-65	5
4.	DM+HTN+CHF	7	56-70	5
5.	DM+HTN+ALF	13	52-79	6
6.	DM+HTN+MLD	4	60-82	9
7.	DM+HTN+ARF	13	50-70	5
8.	DM+HTN+CRF	9	56-80	7
9.	DM+HTN+LEU	3	58-70	6
10.	DM+HTN+LYM	5	62-80	6
11.	DM+HTN+TUMOR	5	59-77	11
12.	DM+HTN+NEU	9	63-89	7

Table 4: All Patient Data Showing With Chalrson Co morbidity Index.

Age group	Number	Avg utility	CCI
41-50	36	0.8	5.0
51-60	40	0.7	6.3
61-70	46	0.6	7.0
71-80	7	0.5	6.7
>80	3	0.5	6.0

Comparison of utility with Chalrson Co-morbidity index

Through this average utility of drugs with scoring of Charlson co-morbidity index of every individual for years of disease was explained.

Table 4: CCI for years of disease.

Suffering from years	Numbers	Avg utility	CCI
1-2	23	5	6
2-5	33	5.2	6.01
5-10	38	6.7	7.06
10-20	24	7.9	8.0
Above 20	14	8.8	9.01

Discussion

In this study, a total of 132 diabetic patients were included out of which male and females are nearby equal in number and adults are higher than the geriatric patients. In our study, higher number of patients are having the comorbidity of hypertension and other comorbidities include peptic ulcer, congestive cardiac failure, acute renal failure, chronic renal failure, leukemia, lymphoma, other tumors, nephropathy, acute liver disease, moderate liver disease.

Diabetes mellitus is lifelong threatening condition which causes the economic burden in subjects with low socio- economic status. However, some government hospitals are helping the patients from poor economic background by providing health care to all of them without charging money for consultation and providing all the useful medicine.

By this study, we had analyzed cost per individual patients according to their disease status with cost of therapy per year. Finally we concluded that diabetic with co morbidities are facing more economic burden per year wise when compared with subjects having only diabetes. Average utility of therapy: comparison of utility and cost for number of patients was analyzed and its seems like combination therapy of Metformin + Glibenclamide was most popularly consumed when compared with other combinations. Insulin is advised to very few patients and other oral antidiabetics were given in combinations based on patient disease condition. Cost of hospitalization with co morbidities: In total 132 study subjects, 60% of patients are hospitalized with comorbidities and facing economic burden for hospitalization, travelling and other

costs like cost of diagnosis. In our study many of the participants are daily wagers, they will loosen their economic source if they get struck with hospitalization.

Basically study place is rural area with most of the subjects are with poor knowledge about disease and its complications. In our study it was identified that, many of the patients are facing economic burden, even sometimes they are not able to consume sufficient quantity of medications due to the high costs.

Conclusion

The costs for patients with comorbidities were substantially higher when compared to the patients without comorbidities and the cost was found to increase progressively with increase in number of complications. Therefore, the burden of this disease was significant for patients as well as their families, so the health policy makers should emphasize on the initiatives to prevent the disease prevalence. Proper care and counselling should be provided continuously to the patients with diabetes to manage the disease effectively and to prevent the devastating complications. Lastly we recommend that more economic studies should be done which play an important role in applying the frame work for resources allocation in diabetes prevention and control.

Conflict of Interest

Authors are declared No Conflict of Interest

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Not Applicable

Author Contribution

All Authors Contributed equally

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Not Applicable

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