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PHARMACOECONOMIC EVALUATION OF ACUTE EXACERBATIONS OF COPD TREATMENT IN A RURAL TERTIARY CARE HSOPITAL

K. V. Ramanath* and Jaseem K. Sabith

Department of Pharmacy Practice/Clinical Pharmacy, SAC College of Pharmacy, B. G. Nagar, Mandya (dist), Karnataka, India

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Correspondence to Author:

K. V. Ramanath

Department of Pharmacy Practice/Clinical Pharmacy, SAC College of Pharmacy, B. G. Nagar, Mandya (dist), Karnataka, India

ABSTRACT

Background: In India because of growing pressure on the healthcare budget, appropriate justification of current expenditures and future investments in public healthcare are becoming a priority. COPD is a major cause of healthcare burden worldwide and it is the one of leading cause of death with increasing the prevalence.

Objective: To evaluate the pharmacoeconomic impact of acute COPD exacerbations in a rural tertiary care hospital.

Methodology: It is a prospective, observational study conducted in COPD in patients over a period of 9 months. The patients who satisfied the study criteria were enrolled.

Results: Over all 50 were enrolled including 42 male and 8 female COPD patients. 60%of patients stayed over a period of 6-10 days in hospital. 4% of patients had a history of duration of illness >10 years. 64% of patients were farmers and only 4% had a monthly income Rs. >10000. 44% had a history of past smoking and 6% were smokers. 34% of patients had co-morbidities with COPD. Minimum total direct medical cost was Rs. 188.79 and maximum was Rs. 9982.12 with a mean±SD 2510.51±1904.11, in which medicine cost was high (mean 1949.21). Minimum total direct non-medical cost was Rs. 10.00 and maximum was Rs. 700.00 with a mean±SD 154.16±166.56, in which travel expenses was high (mean 84.56). Maximum total direct cost was Rs. 10682.12 and minimum was 268.79 with a mean±SD 2664.67±2030.76.

Conclusion: This study concluded that, major COPD patients were farmers and they had less monthly income and it was not sufficient for the treatment of acute COPD exacerbations.

INTRODUCTION: Pharmacoeconomics can be defined as a branch of health economics which deals with the measurement of both the costs and consequences of therapeutic decision making [1].

Pharmacoeconomics involves the utilization of two major methodologies for health economics analysis: cost analysis and cost outcomes. Cost analysis considers the costs of providing healthcare products or services, but does not consider the outcomes experienced by patients or providers [2].

In India, because of growing pressure on the healthcare budget, appropriate justification of current expenditures and future investments in public healthcare are becoming a priority.

Pharmaco-economic analyses are the one which helps in justifying and minimizing this expenditure [3]. Chronic obstructive pulmonary disease (COPD) is a state characterized by airflow limitation, usually progressive and associated with an abnormal inflammatory response of the lungs to noxious particles or gases that is not fully reversible [4]. Due to sustained worsening of this airflow (acute exacerbations of COPD) normal day to day activities will disturb and which leads to change in the regular medication, will increase the health burden and mortality. Guidelines have been developed by WHO (India) under the WHO-Government of India Biennium (2002-2003) program for the management of acute exacerbations of COPD in India [5].

Globally, COPD by 2020 is expected to rise to the third position as a cause of death and at fifth position as the cause of loss of disability adjusted life years (DALYs) according to the baseline projections made in the Global Burden of Disease Study (GBDS). The largest increase in the tobacco related mortality is estimated to occur in India, China and other Asian countries. Cigarette smoking is the major risk factor for COPD [6]. Roughly Rs. 32,000 is the annual cost of treatment for acute cases of COPD hospitalization [7, 8].

The studies available on the cost analysis of acute exacerbations of COPD treatment are very less [7]. The Cost-of-illness studies showed the economic impact of illness, on society. These costs are generally divided into direct and indirect costs. Direct costs refer to medical care in the form of prevention, diagnostics, treatment and rehabilitation, etc. Indirect costs consist of loss of productivity, which has an effect of society due to days off from work, early retirement, and death caused by the disease [9]. Direct costs are again divided into direct medical costs and nonmedical direct costs.

Direct medical costs include hospital inpatient, physician inpatient, physician outpatient, emergency department outpatient, nursing home care, hospice care, rehabilitation care, specialists and other health professional care, diagnostic tests, prescription drugs and drug sundries, and medical supplies. Direct Nonmedical direct costs include transportation costs to health care providers; relocation expenses; and costs of making changes to one's diet, house, car, or related items.

However, some nonmedical direct costs are generally not included in cost-of-illness studies such as research, training, and capital costs (eg. construction) [12].

There are number of studies have been conducted in the developed countries to estimate the cost of care of COPD exacerbations (eg: Sweden studies of 2002, 1996 years, showed 35-45% of the total per capita health-care costs for COPD and mean COPD mean cost $ 141 (Rs. 7357.76), there is considerably less data of the same in the developed countries [10, 11].

Currently, there are very little applications of pharmacoeconomics studies in India. As much as 77% of the health care spending in India is in the private sector, of which about 86% borne out-of-pocket/money. The penetration of insurance schemes in India is very low, estimated at about 10% of the entire population. This signifies the importance of economic considerations in health care.

These pharmacoeconomics can be used in drug therapy evaluation, for selecting the most cost effective drug while preparing the formulary, to take a decision on individual therapy and customize patient's pharmacotherapy. It also helps to evaluate the value of an existing service and to estimate the potential value of implementing a new service [13].

Adichunchanagiri Hospital and Research Centre (AH & RC) is a 750 bedded tertiary care teaching charity hospital situated in the rural area of B.G Nagara of Nagamangala taluk, Karnataka. This consists of four medicine units and no such studies are conducted in this hospital. So the present study was taken first time in our hospital to know the pharmacoeconomic impact of acute COPD exacerbation. This may helps for the physicians to choose the rational therapy, by reducing the cost /economical burden to the patient.

MATERIALS AND METHODS: This was prospective, observational study conducted in, inpatients of rural tertiary care research hospital, (Adichunchanagiri Hospital and Research Center), B.G.Nagara , Karnataka, India for a period of nine months. The institutional ethical clearance was obtained for carrying out this work.

Inclusion Criteria:

- Medicine department inpatients diagnosed with acute exacerbations of COPD
- 30 to 90 years age group patients of both the gender
- Patients with normal liver and kidney functions

Exclusion Criteria:

- Patients with cystic fibrosis, ischemic heart disease, asthma or eosinophilic lung disease
- Patients with an evidence of pneumonia either at presentation or during follow-up
- Patients who are not willing to give the consent form
- Pregnant/lactating women
- Patients with post tubercular lung problems

Source of Data: Patient data relevant to the study was obtained from the following sources

- Patient consent form
- Patient data collection form
- Patient case note/prescription
- Lab reports

A well designed patient data collection form was developed and used for this study after obtaining their consent directly from patient/ care taker. The data collection form was developed by consulting Physicians and staffs of pharmacy practice department. The following information like patient demographic details (name, age, reason for hospitalization, occupation, salary, duration of suffering, smoking history, etc), direct medical costs (drug used, laboratory tests, hospital charges) and direct non-medical costs (travel expense, food, other expenses) was collected from data collection form.

The total direct cost covers direct medical and direct non medical cost by using patient case note/ prescription all medicine costs were noted and day to day follow up while attending the ward rounds. The direct medical cost covers the direct medicine cost, laboratory cost and hospital charges, these were obtained from patient direct enquiry and hospital pharmacy slips, lab reports and lab bills, and hospital charges.

The cost of each medicine was taken from latest editions of tertiary sources, enquiries from hospital pharmacy/community pharmacy and also from medicine strips. From these, unit cost of each medicine was calculated. Since Adichunchanagiri Hospital and Research Center is a charity hospital, the patients admitted to general wards are not charged for bed, nursing and daily routine examination by doctors. But the patients they admitted in ICCU, ICU and special wards are charged for bed, nursing and daily routine examinations. The direct non-medical costs covers sum of expenses like travel expenses, food, and other expenses (supporter expenses) which is directly related to the patient's.

All information relevant to the study was collected at the time of admission to till the day of discharge and the collected data of cost-of-illness was subjected for suitable statistical analysis. A Descriptive statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in Number (%).

RESULTS: A total of 60 patients were approached only 50 patients were consented and participated in the study. The COPD patient's age details were shown in **figure 1**.

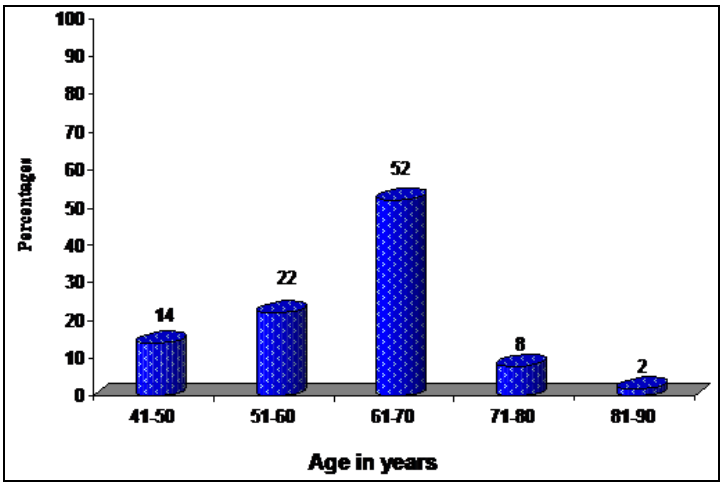

FIGURE 1: AGE WISE DISTRIBUTION

Out of 50 patients 84% (42) patients were male and 16% (8) were female with a mean ± SD of age 64.16 ± 9.92 (**fig. 2**). The patients participated in the study were stayed in hospital mean ± SD value of 8.52 ± 3.66 (**table 1**).

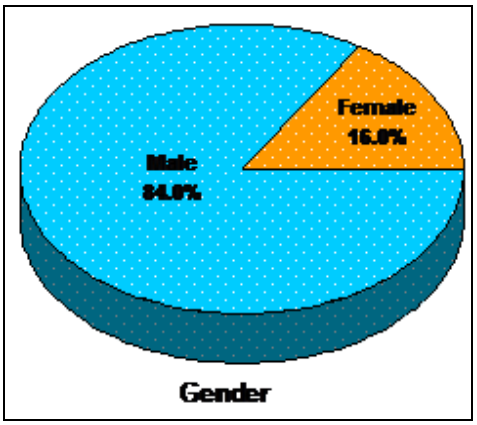

FIGURE 2: GENDER WISE DISTRIBUTION

TABLE 1: DETAILS ON DISTRIBUTION OF NUMBER OF DAY'S PATIENT STAYED IN HOSPITAL AND DURATION OF SEVERITY OF ILLNESS

Hospital stay (in days)	Number of patients	%
1-5 days	11	22.0
6-10 days	30	60.0
11-15 days	6	12.0
>15 days	3	6.0
Total	50	100.0
Duration of illness	**Number of patients**	**%**
< 1 years	6	12.0
2-5 years	26	52.0
6-10 years	14	28.0
>10 years	2	4.0
Total	50	100.0

Most of the patients (64%) enrolled in this study were farmers and monthly income was less (**fig. 3**).

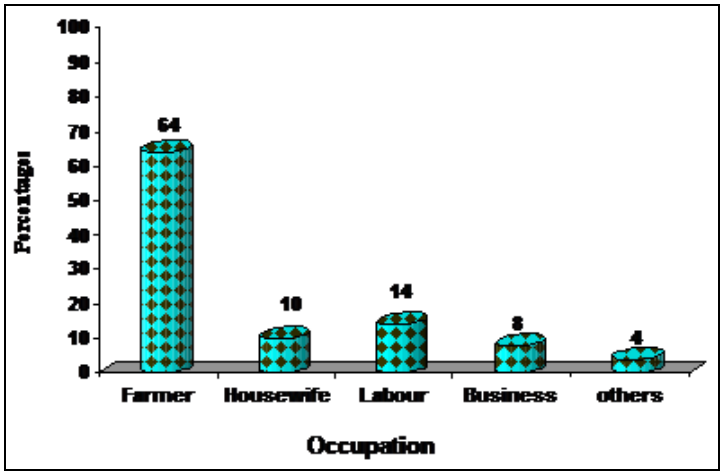

FIGURE 3: PATIENT'S OCCUPATION

Only 4% had a monthly income Rs > 10000. 88% of patients had a history of past smoking and 12% were current smokers. 44% of patients had a history of alcoholic usage and 8% were still using alcohol (**Table 2**).

TABLE 2: DETAIL ON DISTRIBUTION OF COPD PATIENTS MONTHLY INCOME , ALCOHOL, SMOKING STATUS

Monthly Income (Rs)	Number of patients	%
Nil*	6	12.0
<1000	1	2.0
1001-2000	21	42.0
2001-5000	18	36.0
5001-10000	2	4.0
>10000	2	4.0
Total	**50**	**100.0**
Alcohol	**Number of patients**	**%**
No	24	48.0
Past	22	44.0
Yes	4	8.0
Total	**50**	**100.0**
Smoking	**Number of patients**	**%**
Past smoker	44	88.0
Smoker	6	12.0
Total	**50**	**100.0**

The total direct cost is the sum of the direct medical cost and direct non-medical cost. Direct medical cost involves the total medicine cost, lab test charges and hospital charges. Direct non-medical cost involves the travel expenses, food expenses and other expenses directly related to the patient.

Direct medical cost minimum, maximum, mean and SD was Rs. 188.79, 9982.12, 2510.51 and 1904.11 respectively in which medicine cost was found to be more. Direct non-medical cost minimum, maximum, mean and SD was Rs. 10.00, 700.00, 154.16 and 166.56 respectively in which travel expense was found to be more followed by food expense. The mean total direct cost was Rs. 2664.67 with SD of 2030.76 (**Table 3**).

TABLE 3: DETAILS ON DISTRIBUTION OF COST ANALYSIS OF COPD PATIENTS

Cost analysis	Minimum	Maximum	Mean	SD
Medicine cost	128.79	5202.12	1949.21	1192.89
Lab test charges	0.00	1930.00	316.00	392.14
Hospital charges	0.00	2850.00	272.00	532.72
Total direct medical cost (Med Cost +Hosp Cost + Lab Cost)	**188.79**	**9982.12**	**2510.51**	**1904.11**
Travel expenses	10.00	500.00	84.56	78.86
Food	0.00	600.00	69.60	119.20
Other Expenses	0.00	0.00	0.00	0.00
Total direct non-medical expenses (Trav Exp + Food + Other Exp)	**10.00**	**700.00**	**154.16**	**166.56**
Total direct cost	**268.79**	**10682.12**	**2664.67**	**2030.76**

DISCUSSION AND CONCLUSION: There were very few articles which concentrated on cost-of-illness studies on COPD patients. The study was conducted in a rural and charitable research hospital. The prevalence of COPD was high in this rural area and maximum enrolled patients were formers. The economic status of these patients was poor. This study reveals that patient's cost-of-illness in acute exacerbations of COPD is the sum of total direct medical and total direct non medical cost.

Direct Medical Cost: Direct medical cost is the sum of direct medicine cost, lab test charges and hospital charges. 10% of the patients had hospital charge Rs. >5000, when compared with the other cost-of-illness study, the total direct medical cost was less in this study since it was carried out in a rural charitable research hospital. Patients in ICU/ICCU were charged for physician consultation, nursing, medicines, oxygen and bed while patients in general wards were charged only for oxygen and medicines. Among the 50 patients enrolled 68% were admitted in general wards. 20% of the patients had total direct medical cost Rs. <1000 in this the patients who stayed in wards were charged nominally for lab investigations.

70% of patients had direct medical cost in between Rs. 1000-5000. In total direct medical cost, medicine cost was more, because the patients were treated with antibiotics during their exacerbations. In some patients the total direct medical cost was high because of co-morbidities. The lab charges for patients in ICU/ICCU were more than other patients since ICU/ICCU patients undergo hematological, urinary, blood sugar level analysis. All COPD patients were advised for chest X-ray as an investigation for disease management.

Direct non-Medical Cost: Direct non-medical cost is the sum of travel expenses and food expenses of the patient and patient care taker. In total 62% of the patients had direct non-medical cost Rs. <100, 32% had direct non-medical cost in between Rs. 101-500 and only 6% patients had a direct non-medical cost Rs. >500., the direct non-medical cost is less when compared with other cost-of-illness study, since this study was carried out in a rural, charitable, service oriented hospital. The means of transport used by patients were auto riksha, bus and car, in which most of the patients used auto riksha. So, when compared to other studies, travel expenses were less in this study. In general wards, food was provided free for the patients. Patients near to the hospital locality had food from their home. No other particular charges were found here.

Total Direct Cost of the Patient: Total direct cost of the patient is the sum of total direct medical cost and total direct non-medical cost. Only 2% of the patients had direct cost Rs. >10000 and 14% patient had direct cost Rs. <1000. Since, it was a tertiary care hospital running by a charity organization, the lion part of the treatment cost had been paid by hospital organization itself. This kind of financial assistance helped in the minimization of the overall treatment cost of the patients enrolled in this study. Maximum number of patients (44%) had a total direct cost in between Rs. 2001-5000, 30% and 10% had total direct cost in between Rs. 1001-2000 and Rs. 5001-10000 respectively.

Cost Analysis (Total cost): This study calculated the cost-of-illness of patients, from the day of admission to the day of discharge, with acute exacerbations of COPD. The study showed that a minimum cost of Rs. 268.79 and a maximum cost of 10682.12 were needed for the treatment of acute exacerbations of COPD with a mean cost of Rs. 2664.67 and SD 2030.76. The least cost was for the food expenses with a mean of 69.60 and SD 119.20.

This study concluded that, major COPD patients were farmers and they had less monthly income and it was not sufficient for the treatment of acute COPD exacerbations. Smoking and alcohol intake also one of the major economic burdens and precipitating factors for these patients. Cost-of-illness analysis of acute exacerbations of COPD emphasizes a minimum cost of Rs. 268.79 and a maximum cost of Rs. 10682.12 were needed for the treatment of acute exacerbations of COPD with a mean cost of Rs. 2664.67 ± 2030.76.

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