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Health Seeking Behavior, Cost of Illness and Quality of Life of Patients with COPD among 35 Years & above Rural Population of Gurugram, Haryana

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Objective: The study undertaken to assess the health seeking behaviour and cost of illness of COPD and the influence of severity of the disease over the cost and the quality of life.

Materials and Methods: The study conducted in 115 patients aged 35 years and above, a rural population of Gurugram, Haryana. Cost of illness (direct and indirect costs) was calculated in Indian rupees from the expenditures of the hospital visits, pharmacotherapy, oxygen therapy, biochemical investigations, diagnostic procedures, physiotherapy and hospitalization due to acute exacerbations by patient interview and review of patient's case history, medical and billing records. Quality of life of patients in Stage III and Stage IV COPD was estimated using St. George's Respiratory Questionnaire (SGRQ) score. Data collected on structured schedule & analyzed.

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Results: Out of the total costs, highest spent on direct medical costs (91.02%), less on indirect (8.98%). Hospitalizations, associated co-morbidity, and length of stay increased the cost. The mean cost incurred by patients with stage II COPD was Rs.3179.62 ± 99.01 per visit to the hospital, stage III was Rs.16414.79 ± 8365.79 and stage IV was Rs.44077.16 ± 15686.21 per visit. As the severity of COPD increased both direct and indirect costs increased, and the quality of life of the life decreased significantly (P<0.05).

Conclusion: Since acute exacerbations are the main cause of hospitalization among COPD patients, strategies to prevent severe exacerbations could be very cost effective and may improve the quality of life.

Keywords: COPD, health behavior, medical cost, quality of life.

I. INTRODUCTION

COPD is the 4th leading cause of death worldwide and predicted to be third by 2030. In India, COPD accounts for 7% of deaths and 3% DALYs loss.^{1, 2} Study was conducted to determine health-seeking behavior & economic burden of COPD cases

and the influence of severity of the disease over the cost of illness and the quality of life of COPD among 35 years & above rural population of Gurugram, Haryana.

II. METHODOLOGY

The study was conducted among field practice area of PHC Garhi Harsaru of Gurugram for one year from Jan 2018 to Dec 2018. Presuming the prevalence of cases about 7% among 35 years & above from previous study³, a sample size of the population was calculated using formula $n = (Z_{1-\alpha/2})^2 p (1-p) / d^2$ where p is prevalence and relative precision of 10% with anticipated non-response 10%. Population of all 14 villages consisting of 7700 households under PHC Garhi Harsaru listed as per 2011 census, and seven villages selected by simple random sampling. Out of these seven villages, 700 households were selected by probability proportion to size (PPS) sampling methods. All the 1434 individuals above 35 years of age found in these households were examined to detect chronic obstructive pulmonary diseases. Case definition was subject suffering from cough with expectoration for three or more months in a year for not less than two years and breathlessness. Spirometry done to confirm the case & severity of the condition (Gold criteria).⁴ A total of 137 cases listed on screening, of which 115 were taken as a confirmed case of COPD as per case definition, spirometry & pulmonary medicine consultant advice.

Cost of illness, which included the direct medical and non-medical, and indirect costs, calculated in Indian Rupees from the expenditures of the hospital visits, pharmacotherapy, oxygen therapy given, laboratory tests, diagnostic procedures, physiotherapy and hospitalization due to acute exacerbations. Quality of life (QOL) of all patients of COPD was assessed using St. George's Respiratory Questionnaire (SGRQ) Ver 2.3 after obtaining the necessary permission from the author.⁵ Data collected on structured schedule and analyzed using SPSS ver 22. Prior ethical clearance was taken from Institutional Ethical Committee.

As per the definitions of the GOLD criteria guidelines according to the severity of the disease taken as:

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Stage I (Mild) - $EV_1/FVC < 70\%$, $FEV_1 \geq 80$

Stage II (Moderate) – $FEV_1/FVC < 70\%$, $50\% \leq FEV_1 < 80\%$ predicted

Stage III (Severe) – $FEV_1/FVC < 70\%$, $30\% \leq FEV_1 < 50\%$ predicted

Stage IV (Very Severe) – $FEV_1/FVC < 70\%$, $FEV_1 < 30\%$ predicted or $FEV_1 < 50\%$ predicted plus chronic respiratory failure and having stable co morbidity.

III. RESULTS

The mean age of the study patients was 52.56 ± 11.78 years, and 55 (47.83 %) patients were in the age group of 35-50 years, followed by 21 (18.20%) in 51-60 years and 39 (33.91%) patients in above 60 years. 71 (61.74%) were males & 44 (38.26%) were females. Out of total 115 cases, 57 (44.8%) patients were suffering from stage I & II COPD followed by 42 (40%) patients with stage III COPD and 16 (15.2%) with stage IV COPD. Existing stable co-morbidities found in 43 patients (40.95%) of which, treated tuberculosis seen in 15 (14.28%) patients. Other co-morbidities like diabetes, hypertension, diabetes and hypertension and ischemic heart disease also accounted 3.0 to 5.71% each.

a) Health seeking behavior

Among all COPD patients, 87.83% seeks immediate medical help in case of any breathing discomfort while 12.7% neglected their ailment & did not take any medical advice. Of these 46.09% preferred allopathic, 42.61 % preferred the Indian system of medicine & 11.30 % preferred naturopathy. 36.52% utilized government system while 6.09% could go to qualified private doctor, 41.74 depended upon quacks & 15.65% chemist store.

b) The economic cost burden of COPD case

Out of the total costs, highest spent on direct medical costs (91.02%) and followed by indirect costs (8.98.%) as depicted in Table 1. Hospitalizations, associated co-morbidity and length of stay increased the cost. The mean cost spent by the patients with stage II COPD was $Rs.3179.62 \pm 99.01$ per visit to the hospital, stage III was $Rs.16414.79 \pm 8365.79$ and stage IV was $Rs.44077.16 \pm 15686.21$ per visit (Table 2). All the patients suffering from stage I & II COPD were treated in the outpatient department. Out of 42 patients with stage III COPD, 29 (32.4%) hospitalized, and 13 (12.4%) treated in the outpatient department. Sixteen patients with stage IV COPD admitted in the inpatient wards of the Pulmonary Medicine Department. The mean length of hospital stay was found to be 9 ± 1.2 days for stage III patients and 11.75 ± 2.5 days for stage IV patients. As the severity of the disease increased both the length of hospital stay as well as cost burden increased as shown in Table 3.

c) Quality of life of patients with stage III and stage IV COPD

The quality of life of inpatients was evaluated by using SGRQ. Out of 115 patients, 45 were inpatients, of which 29 were with stage III COPD and 16 with stage IV COPD. The mean SGRQ QOL score of the 115 patients was found to be 53.96 ± 10.38 . The SGRQ QOL score of the stage III COPD patients was found to be 44.69 ± 9.27 and stage IV patients was 63.24 ± 11.49 . As the severity of the disease increased the quality of life of COPD cases significantly decreased (). Cost of the disease negatively correlated with quality of life. As the quality of life declined the cost of illness increased significantly ($p < 0.05$).

Table 1: Economic cost burden of COPD case

Total Annual expenditure (INR) on COPD	No. of COPD subject (%)	Mean expenditure/head
≤ 10000	31 (26.96%)	Annual direct Cost = Rs. 13,477/- (91.01%)
10001-20000	71 (61.74%)	Annual Indirect cost = Rs. 1,327/- (8.99%)
≥ 20000	13 (11.30%)	Annual total mean cost = Rs. 14, 804 /- (100%)

Table 2: Economic Costs as per the severity of COPD

Cost category	Cost drivers	Stage I & II (n=57) (mean cost in rupees per patient per hospital visit)	Stage III (n=42) (mean cost in rupees per patient per hospital visit)	Stage IV (n=16) (mean cost in rupees per patient per hospital visit)
Direct Medical Cost	Practitioner	200	1776.5	3612.5
	Hospitalization	0	5897.87	19450
	Laboratory investigations	1425	1549.78	1737.81
	Arterial blood gases	350	484.04	743.75
	Diagnostic procedures	375	2147.34	2668.75
	Pulmonary function tests	500	500	500
	Drugs	113.1	658.02	2232.47
	Oxygen therapy	1.78	27.12	70.31
	Nebulisation	42.85	353.19	569.68
	Nursing charges	0	651.38	1181.25

Direct Non-Medical Costs	Physiotherapy	150	1007.44	1771.87
	Nutrition	0	840	1455
	Transportation	20.57	297.36	708.12
	Telephone	4	16.69	28.75
Indirect Costs	Morbidity	0	342.55	1721.37
	Mortality	0	0	0
Total Cost		3179.62	16549.4	43852.16

Table 3: Direct and Indirect Health Care Costs as per severity of COPD

Cost category	Stage I (mean cost in rupees per patient per hospital visit)	Stage II (mean cost in rupees per patient per hospital visit)	Stage III (mean cost in rupees per patient per hospital visit)	Stage IV (mean cost in rupees per patient per hospital visit)
Direct Medical Costs	70.0	1467.85	13061.29	31522.77
Direct Non-Medical Costs	20.0	174.57	2161.49	3963.74
Indirect Costs	10.0	0	342.55	7121.37
Total	100	1642.42	15565.33	42607.88

IV. DISCUSSION

COPD represents a high health-care burden worldwide. The increasing prevalence and life long duration of the illness in those affected translates into increased direct and indirect medical expenditures. The findings of the present study shed light on the comprehensive cost expenditure of patients with COPD. The data obtained from this study demonstrated a strong correlation between the total cost incurred by patients for COPD management and the severity of the disease and which is in concordance with those found in international literature.^{6,7}

The present study had demonstrated a positive relation between the presence of co-morbidities and an increase in the cost of illness. This is in consistent with the report given by Mary Geitona et al. which stated that there was a significant correlation between associated co-morbidities and increased cost.⁸

a) Health seeking behavior

In the present study, among all COPD patients, 87.83% seeks immediate medical help in case of any breathing discomfort while 12.7% neglected their ailment. Similar findings were reported by Grover et al. from their study.⁹ The cost of illness was found to be higher for patients in stages III and IV COPD as these patients were treated with more number of drugs both initially, during follow-up and also had more number of hospital visits due to frequent acute exacerbations, leading to greater use of diagnostic procedures which had also contributed to higher cost of illness.

The data obtained from the present study had shed light to the cost variables that contributed to the total cost of illness at different stages of COPD. In stage II COPD, biochemical investigations were the most important cost variable. In stage III & IV, costs of

hospitalization, diagnostic procedures, physician and drugs were the most important cost variables. This was due to increase in length of hospital stay and antibiotic usage in severe stages of COPD. A similar report given by Daniel E Hilleman et al.¹⁰

The increase in severity of the disease has a dramatic negative impact on the quality of life of the patients, a significant decrease with an increase in SGRQ score. A multi centre 2-year follow up study by Claudio F Donner demonstrated that repeated exacerbations resulted in a permanent negative impact on health status.¹¹

Patients with COPD experience poor physical functioning and live with distressing symptoms that require frequent hospitalization due to disease progression. They develop inability to work and may become socially isolated and often depressed. The current study had shown that the cost of illness increased as the quality of life of patients decreased. Quality of life worsened with severity of disease and with exacerbations resulting in more hospitalization and increased cost of treatment.^{12,13} The focused on the decrease in health-related quality of life with an increase in cost of therapy in COPD.

b) Cost of illness of COPD

In the present study the direct cost was found to be 91% of the total cost. Majority of the amount was spent for hospitalization, laboratory investigations, diagnostic procedures, drugs and practitioner. This is in concordant with other studies.^{6,13}

On an average a patient spent around 15379.1 Rupees per visit to the hospital. The highest being spent for hospitalization (36.2%) followed by diagnostic procedures (9.8%), laboratory investigations (9.87%), for practitioner (9.21%), morbidity (8%), drugs (4.4%) and the rest accounted for 23.5% (Table 2). Out of the total

costs, highest was on direct medical costs (81.2%) followed by indirect costs to 8.98%. The mean amount spent by patients with stage II COPD Rs.3179.62 \pm 99.01 per patient per visit, stage III Rs.16414.79 \pm 8365.79 and stage IV Rs.44077.16 \pm 15686.21 per patient per visit. The patients with stage IV spent nearly 13 times more than stage II and 2.3 times than stage III patients. In stage II a patient spent around 3179 rupees per hospital visit; the highest was spent for laboratory investigations, followed by pulmonary function tests, diagnostic procedures, arterial blood gases, practitioner charges and the rest of the cost drivers accounting to 330 rupees. In stage III a patient spent around Rs.16549 per hospital visit; the highest was spent for hospitalization (Rs.5897). Similarly in stage IV a patient spent around Rs.43852; the highest was spent for hospitalization (Rs.19450). As the disease severity increased, the amount for the illness also increased. The severity of disease highly correlated with cost of illness. Findings are concordant with their separate studies reported by Kallaru et al and Patel et al.¹⁴⁻¹⁶

c) *Quality of life of patients with stage III and stage IV COPD*

The quality of life of inpatients was evaluated by using SGRQ. The mean SGRQ QOL score of the 115 patients was found to be 53.96 \pm 10.38. The SGRQ QOL score of the stage III COPD patients was found to be 44.69 \pm 9.27 and stage IV patients was 63.24 \pm 11.49. As the severity of the disease increased the quality of life of COPD patients significantly decreased. Cost of the disease negatively correlated with quality of life. Quality of life was similarly found to be severely impaired in COPD patients by various studies.¹⁷⁻¹⁹

V. CONCLUSION

The study demonstrated that the total cost of illness of COPD patients increased with severity of disease. The Quality of life of the patients decreased with increase in severity of the disease. The drivers of the total cost were found to be hospitalizations and length of stay. Since acute exacerbations are the main cause of hospitalization among COPD patients, strategies to prevent severe exacerbations could be very cost effective and improve the quality of life. By developing strategies to improve patients' awareness on nicotine replacement therapy, adherence to drug therapy and opting for physical rehabilitation, the direct medical and indirect costs can be reduced which in turn will lower the burden of cost of illness of COPD.

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