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Original Research Article

An epidemiological study of chronic obstructive pulmonary disease among 35 years and above rural population of Gurugram, Haryana

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ABSTRACT

Background: COPD is 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. Study was conducted to Find the prevalence & determinants of COPD among 35 years & above rural population of Gurugram, Haryana and also determine health seeking behavior & economic burden of COPD cases.
Methods: The study was conducted among field practice area of PHC Garhi Harsaru for one year. A total of 1434 individuals 35 years and above of age found in 700 households among were selected by probability proportion to size (PPS) sampling methods. 115 cases detected as cases were matched with equal number of controls matching and Data analyzed.
Results: Prevalence of COPD was 8.02 % among 35 years & above age group. Smoking, passive smoking, biomass fuel smoke exposure, occupational exposure to dust/smoke/gas /chemical vapors at work, frequent respiratory infections, family history of COPD were found important determinants of COPD ($P<0.05$). Physical activity and body mass index were not found significant contributor on multivariate logistic regression analysis. Among all COPD patients 87.83% seeks immediate medical help in case of any breathing discomfort. Annual economic burden on COPD case was found to be Rs 14804/-.
Conclusions: Smoking, exposure to smoke/dusty /chemical vapors and family history of COPD are main determinant of COPD. Public health planners should concentrate to mitigate these causes.

Keywords: COPD, Spirometry, Risk factors, Health seeking behavior, Economic burden

INTRODUCTION

Chronic obstructive pulmonary diseases (COPD) is a global health concern and is a major cause of chronic morbidity & mortality. It is 4th leading cause of death worldwide and predicted to be third by 2030.WHO leads the global alliance against chronic respiratory diseases (GARD) towards a common goal of reducing global burden of Chronic respiratory diseases.[1,2] In India, COPD accounts for 7% of deaths and 3% DALYs loss.[3] Study was conducted to delineate risk factors of COPD and estimate the economic burden on the community.

METHODS

The study was conducted among field practice area of PHC Garhi Harsaru of Gurugram for one year from January 2018 to December 2018. Presuming the prevalence of cases about 7% among 35 years & above form previous study, a sample size of population was

calculated using formula n= $(Z_{1-a/2})^2 p (1-p)/d^2$ where p is prevalence and relative precision of 10% with anticipated non-response 10%.[2] Population of all 14 villages consisting of 7700 household under PHC Garhi Harsaru was listed as per 2011 census and 7 villages were selected by simple random sampling. 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 household 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 2 years and breathlessness. Spirometry was done to confirm the case & severity of condition (Gold criteria).[4] A total of 137 cases were listed on screening, of which 115 were taken as confirmed case of COPD as per case definition, spirometry and pulmonary medicine consultant advice. All 115 cases detected were matched with equal number of controls matching the two for age (±2 yrs) and sex. Data were collected on structured scheduled and analyzed using SPSS ver 22. Factors which were found statistically significantly associated were further analyzed using multivariate logistic regression analysis. Prior ethical clearance was taken from Institutional Ethical Committee.

RESULTS

Prevalence of COPD

Out of total population sampled 1434 individuals above 35 years & above, 115 had confirmed cases of COPD giving prevalence of 8.02% among 35 years and above age group.

Risk factors of COPD

Following factors were found significantly associated with COPD ($p<0.05$) as shown Table 1.

Table 1: Association of risk factors with COPD (n=115).

Factor	Category	COPD cases	Controls	Statistical value
Smoking	Non smoker	27	66	OR 4.39 (2.49-7.75) p≤0.0001
	ever smoker	88	49	
Smoking substance among smokers	Cigarette	06	06	χ2=9.79, DF=4, p=0.0441
	Bidi	55	19	
	Hooka	23	16	
	Mix	04	08	
Average no. of bidi/cigarette/hooka per day among smokers	1-5	03	09	χ2=17.6177, DF=4, p=0.0041
	06-10	12	11	
	11-15	15	05	
	16-20	17	04	
	21+	18	03	
Passive smoking at home upto 18 years age (yrs of exposure)	0-4	02	02	χ2=9.8569, DF=4, p=0.0429
	5-9	03	08	
	10-14	23	14	
	15-18	76	67	
Passive smoking at home after 18 years age (yrs of exposure)	0-4	08	15	χ2=9.9495 DF=4, p=0.0413
	5-9	17	13	
	10-19	09	08	
	20+	52	34	
Passive smoking at work place (yrs of exposure)	0-4	11	04	χ2=9.9677 DF=4, p=0.0462
	5-9	16	10	
	10-19	17	14	
	20+	30	25	
Biomass fuel smoke exposure	Not exposed	08	24	OR=3.53, (CI 1.51-8.23); χ^2=9.9677 DF=4, p=0.0462
	Exposed	107	91	
Type of biomass fuel used among exposed	Wood	10	18	χ^2=5.1974 DF=4, p=0.26
	Agriculture- crop residue	14	12	
	Animal dung	22	20	
	Mix	61	41	

Continued.

Factor	Category	COPD cases	Controls	Statistical value
Average exposure hours per day to biomass fuel among exposed	-1 hrs/day	5	16	χ^2=9.9772, DF=4, p=0.0444
	1-2 hrs/day	7	4	
	2-3hrs/day	19	17	
	3-4 hrs/day	23	13	
	4 hrs+	53	41	
Occupational exposure job dusty conditions	Not exposed	41	59	OR=1.9, (CI 1.12-3.23) χ2=5.7323 DF=1, p=0.166
	Exposed	74	56	
Time spent in dusty job exposure among exposed	Upto 5 yrs	09	17	χ2=10.4084 DF=4, p=0.0341
	06-10 yrs	11	07	
	11-15yrs	08	03	
	16-20 yrs	14	15	
	20 yrs+	32	14	
Occupation where exposure to gas/smoke/chemical vapors	Not exposed	91	102	OR=2.07, (CI 1.0-4.3) χ2=3.8972 DF=1, p=0.0483
	Exposed	24	13	
Time spend on job exposure to gas/smoke/chemical vapors	Upto 5 yrs	01	03	χ2=11.0197 DF=4, p=0.0263
	6-10 yrs	02	05	
	11-15yrs	06	03	
	16-20yrs	05	01	
	20 yrs+	10	01	
Frequent respiratory infection	Negative	72	86	OR=1.77 (CI 1.01-3.12) χ2=3.9627 DF=1, p=0.0465
	Positive	43	29	
Family history of COPD	Negative	86	99	OR=2.09 (CI 1.01-4.10) χ2=4.6691 DF=1, p=0.0307
	Positive	29	16	
Physical activity	Light	44	27	χ2=6.1505 DF=2, p=0.04617
	Moderate	58	63	
	Heavy	13	25	
Body mass index	Underweight	37	23	χ2=6.3945, DF=2 p=0.0408
	Normal range	48	66	
	Overweight	30	26	

Table 2: Multivariate logistic regression analysis of risk factors associated with COPD.

Factor		Adjusted Odds Ratio with CI	P value
Smoking tobacco	Yes	3.95 (1.33-7.72)	0.001
	No	Reference	
Biomass fuel smoke	Yes	4.80 (1.63-14.18)	0.005
Occupation dust exposure	Yes	2.80 (0.92-4.52)	0.004
	No	Reference	
Occupation exposure to gas/smoke/chemical vapors	Yes	2.78 (0.8-3.53)	0.001
	No	Reference	
Frequent resp infection	Yes	1.76(0.91-3.83)	0.001
	No	Reference	
Physical activity	light	1.5 (0.67-3.66)	0.77
	Moderate /heavy	Reference	
Body mass index	Over weight	1.2 (0.41-3.08)	0.74
	Normal weight	Reference	
Family history of COPD	Yes	2.68 (0.95-4.56)	0.001
	No	Reference	

Table3: Economic cost burden of COPD case.

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

Smoking

Smoking was found statistically associated with COPD. Data was analyzed regarding types of smoking, age of starting smoking and average consumption of smoking substance

Passive smoking

Passive smoking was analyzed regarding up to what age one stayed in same house with someone else smoked till he attained the age of 18 yrs, how many yrs he stayed in house after 18 yrs age and how many years subject worked at a place where someone else smoked. All three variables were significantly found associated with COPD.

Biomass fuel smoke exposure

Biomass fuel smoke exposure was found highly significantly associated with COPD including average exposure in terms of hours per day considering entire life of subject. Tobacco chewing was not found significantly associated with COPD.

Occupation exposure to dust/smoke/gas/chemical vapours

Occupation exposure to dust/smoke/gas /chemical vapors was found statistically associated with COPD including time or span of such exposure

Frequent respiratory infections

History of frequent respiratory infections was found to be significantly associated with COPD

Other factors found significantly associated with COPD were Family history of COPD. Alcohol consumption were not found significantly associated with COPD during univariate analysis. Physical activity and body mass index (BMI) were associated with COPD on univariate analysis but found insignificant determinants on multivariate logistic analysis (Table 2).

Heath 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 seek any medical help. Of these 46.09% preferred allopathic, 42.61 % preferred Indian system of medicine & 11.30 % preferred naturopathy. 36.52% utilized Government health system while 6.09% could go to private qualified doctor, 41.74 depended upon quacks & 15.65% chemist store.

Economic burden of COPD

In the study it was found that COPD hurt an individual economically both directly (cost of medication, investigations, diet etc.) & indirectly (loss of man-hours).Annual economic burden on individual was found to be Rs 14804/-as depicted in Table 3.

DISCUSSION

In the present study**,** prevalence of COPD among 35 year and above age was found as 8.02% which to concordant with other reports.[2] Smoking had significant association with COPD more early the age starting smoking more chances to develop COPD. Number or quantity of smoking used by subjects on average per day was also found associated with smoking. Similar results were reported by Shahab et al and Thakkar at al in their separate studies.[5,6] A study commissioned by ICMR estimated that smokers have three times more risk to develop COPD than their nonsmokers.[3] In our study, it was observed that passive smoking both at home and at work place and the more time spent in such exposure more chances of developing COPD. Similar conclusions were drawn by study carried by Hagstad et al in North Sweden and Earnest et al in their separate studies.[7,8]

Exposure to biomass fuel smoke as well to occupational exposure of dusty environment, gases, chemical vapours; more the exposure per day more the chances of developing COPD. These findings were concordant with Agarwal et al in Indian study and a study done by Johnson et al.[9,10] In present study, the subjects ever exposed to biological dust had three times more risk of COPD as reported by Matheson et al.[11] Jaen et al reported that chronic cough & COPD was two times more prevalent in subjects with lifelong occupational exposure and those who were exposed for more than 15 years had lower lung functional values.[12]

Positive family history of COPD, Frequent respiratory infections were found significantly associated with COPD in our study similar to results reported by Mathew et al from their study carried out at Aurangabad, Maharashtra.[13] Similar findings reported by Garg et al from their study in Delhi.[14] Beherns et al reported that incidence of COPD more among obese and underweight

subjects similar to findings of our study.[15] Similar results were found by Gupta et al from their study carried out in Lucknow.[16]

Health seeking behavior in our study was supported by similar study carried out by Grover et alin Rural Haryana and urban Chandigarh.[17] Direct medical cost was Rs. 12488/- and indirect Rs. 1641/- annually incurred by COPD case was assessed in their study done in South India by Kalluru et al that almost similar to our study with expected regional difference.[18] Patel et al reported mean direct cost as Rs.2942/- per hospital event incurred by COPD case.[19]

CONCLUSION

COPD is an important public health problem likely to be increased further is effective interventions are not scaled up. Smoking, exposure to smoke/dusty / chemical vapors & family history of COPD are main determinants of COPD. Public health planners should concentrate to mitigate these causes.

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