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 \(n = \left(\frac{Z_{1-a/2}}{d/2}\right)^2p(1-p)\) 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) |
| ever smoker                   |                  | 88         | 49       |                   |
| Smoking substance among smokers |                 |            |          |                   |
| Cigarette                     |                  | 06         | 06       |                   |
| Bidi                          |                  | 55         | 19       | \(\chi^2=9.79, DF=4, p=0.0441\) |
| Hooka                         |                  | 23         | 16       |                   |
| Mix                           |                  | 04         | 08       |                   |
| Average no. of bidi/cigarette/hooka per day among smokers | | | | |
| 1-5                           |                  | 03         | 09       |                   |
| 06-10                         |                  | 12         | 11       |                   |
| 11-15                         |                  | 15         | 05       | \(\chi^2=17.6177, DF=4, p=0.0041\) |
| 16-20                         |                  | 17         | 04       |                   |
| 21+                           |                  | 18         | 03       |                   |
| Passive smoking at home upto 18 years age (yrs of exposure) | | | | |
| 0-4                           |                  | 02         | 02       | \(\chi^2=9.8569, DF=4, p=0.0429\) |
| 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       | \(\chi^2=9.9495 DF=4, p=0.0413\) |
| 5-9                           |                  | 17         | 13       |                   |
| 10-19                         |                  | 09         | 08       |                   |
| 20+                           |                  | 52         | 34       |                   |
| Passive smoking at work place (yrs of exposure) | | | | |
| 0-4                           |                  | 11         | 04       | \(\chi^2=9.9677 DF=4, p=0.0462\) |
| 5-9                           |                  | 16         | 10       |                   |
| 10-19                         |                  | 17         | 14       |                   |
| 20+                           |                  | 30         | 25       |                   |
| Biomass fuel smoke exposure   | Not exposed      | 08         | 24       | \(OR=3.53, (CI 1.51-8.23); \chi^2=9.9677 DF=4, p=0.0462\) |
| Exposed                       |                  | 107        | 91       |                   |
| Type of biomass fuel used among exposed | Wood | 10 | 18 | \(\chi^2=5.1974 DF=4, p=0.26\) |
| 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 | \( \chi^2=9.9772, \text{DF}=4, \ p=0.0444 \) |
| | 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) \( \chi^2=5.7323 \text{DF}=1, \ p=0.166 \) |
| | Exposed | 74 | 56 |  |
| **Time spent in dusty job exposure among exposed** | Upto 5 yrs | 09 | 17 |  |
| | 06-10 yrs | 11 | 07 |  \( \chi^2=10.4084 \text{DF}=4, \ p=0.0341 \) |
| | 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) \( \chi^2=3.8972 \text{DF}=1, \ p=0.0483 \) |
| | Exposed | 24 | 13 |  |
| **Time spend on job exposure to gas/smoke/chemical vapors** | Upto 5 yrs | 01 | 03 |  \( \chi^2=11.0197 \text{DF}=4, \ p=0.0263 \) |
| | 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) \( \chi^2=3.9627 \text{DF}=1, \ p=0.0465 \) |
| | Positive | 43 | 29 |  |
| **Family history of COPD** | Negative | 86 | 99 | OR=2.09 (CI 1.01-4.10) \( \chi^2=4.6691 \text{DF}=1, \ p=0.0307 \) |
| | Positive | 29 | 16 |  |
| **Physical activity** | Light | 44 | 27 | \( \chi^2=6.1505 \text{DF}=2, \ p=0.04617 \) |
| | Moderate | 58 | 63 |  |
| | Heavy | 13 | 25 |  |
| **Body mass index** | Underweight | 37 | 23 | \( \chi^2=6.3945, \text{DF}=2, \ p=0.0408 \) |
| | Normal range | 48 | 66 |  |
| | Overweight | 30 | 26 |  |

Table 2: Multivariate logistic regression analysis of risk factors associated with COPD.
Table 3: 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 vapours 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).

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 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. 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. A study commissioned by ICMR estimated that smokers have three times more risk to develop COPD than their nonsmokers. 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.

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

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. Similar findings reported by Garg et al from their study in Delhi. Behrens et al reported that incidence of COPD more among obese and underweight
subjects similar to findings of our study. Similar results were found by Gupta et al from their study carried out in Lucknow.

Health seeking behavior in our study was supported by similar study carried out by Grover et al in Rural Haryana and urban Chandigarh. 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. Patel et al reported mean direct cost as Rs.2942/- per hospital event incurred by COPD case.

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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