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Original Research Article

Prevalence of chronic obstructive pulmonary disease among non-smokers in rural areas of Lucknow district, Uttar Pradesh, India

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ABSTRACT

Background: Chronic obstructive pulmonary disease (COPD) is a chronic progressive disease of the airways and lung parenchyma and the risk factors include both genetic and environmental factors. Tobacco smoking has remained the most important risk factor associated with it. The occurrence of COPD in non-smokers is not widely appreciated, even though its relative burden is higher in developing countries than developed countries. There is limited information on the risk factors associated with spirometrically confirmed COPD in non-smokers in the general population and more data from population-based studies are needed. Hence, the objective of this study was to determine the prevalence of COPD and associated risk factors among non-smokers in rural areas of Lucknow district, Uttar Pradesh, India.

Methods: This cross-sectional study with multi-stage random sampling was conducted among 552 non-smoking participants aged 18 years and above in rural areas of Lucknow. It was conducted using pre-designed questionnaire for data collection. COPD assessments were done using a combination of clinical history and portable spirometry. Data collected was analysed using SPSS 23.0 version.

Results: FEV1/FVC <0.7 was used to define COPD which yielded a prevalence of 8.5 percent among non-smoking participants. Gender, occupation, type of family, presence of ex-smoker, presence of dampness and livestock in the house were the risk factors that showed statistically significant association with COPD.

Conclusions: The higher prevalence noted in this study highlights the need for enhanced community-based screening programme for secondary prevention of COPD among adults.

Keywords: Chronic obstructive pulmonary disease, Non-smoker, Prevalence, Spirometry

INTRODUCTION

Non-communicable diseases have often been considered less important than communicable diseases in low income and middle-income countries. However, chronic obstructive pulmonary disease (COPD), a disorder of chronic airflow limitation, not reversed by bronchodilators, once regarded as a disease of high-income countries, is now recognised as common in low-income and middle-income countries.[1]

The global initiative for chronic obstructive lung disease (GOLD) has classified COPD as 'a disease state characterized by airflow limitation that is not fully reversible. The airflow limitation is usually both progressive and associated with an abnormal inflammatory response of the lungs to noxious particles or gases'.[2]

COPD is a polygenic disease as it results from gene environment interaction. Like all other chronic diseases,

COPD has modifiable and non-modifiable risk factors. Cigarette smoking is the commonest risk factor noticed globally, but various epidemiological studies have got enough evidence that non-smokers may also develop COPD.[3]

COPD fails to receive adequate attention from the health care communities and governments and is virtually unknown among the public. A major problem is the lack of information about the prevalence and economic and social burden of COPD, especially in developing countries.[4]

But it was noted after exhaustive review of literature that there is not much data on prevalence of COPD among non smokers in India.

Objective

The objective of this study was to determine the prevalence and risk factors of COPD among non smokers in rural areas of Lucknow.

METHODS

Time period of study

The period of study was one year which commenced from September 2018 to August 2019.

Study area

The study was conducted in rural areas of Lucknow.

Study population

The present study was conducted among non-smokers of 18 years and above residing in rural areas of Lucknow district.

Study unit

The study was done on non-smoking men and women aged 18 years and above.

Study design

It was a community based cross sectional study.

Sampling frame

The sampling frame consisted of non smoking men and women of Lucknow.

Sample size

The required sample size was calculated by using following formula:

$$n = \frac{Z^2_{1-\alpha/2} \times p \times q}{d^2}$$

Where,

n = sample size

Z=Z statistic at a level of significance

p = Prevalence

d = Allowable error

Z statistic: for the level of confidence of 95%, which is conventional, Z value is 1.96

Biswajit et al in their study entitled, "chronic airflow limitation in a rural Indian population etiology and relationship to body mass index" showed that the prevalence of COPD in non-smokers was 11%.[5]

p=11% =0.11, q=1-p=0.89

taking d = 3.5% (absolute error)

Putting all values in the formula,

$$n = \frac{1.96 \times 1.96 \times 0.11 \times 0.89}{0.035 \times 0.035}$$

=307

Considering design effect of 1.5, the sample size was-

n = 307 × 1.5 = 460 (including 20% of dropouts)

n = 460 + 92 = 552.

Therefore, 552 ≥18 years of age non smokers were included in the study.

Sampling technique

To recruit the individuals ≥18 years of age from the multi-stage random sampling technique was used.

Selection of study areas in rural Lucknow

Stage 1: In rural Lucknow, there are eight blocks, one block- Sarojini Nagar was selected randomly. Stage 2: List of all the PHCs in Sarojini Nagar block was collected and out of the seven PHCs, one PHC was selected randomly. Stage 3: In the selected PHC, out of total ten sub-centres. One sub-centre was selected randomly. Stage 4: In the selected subcentre, there were 5 villages. In the fourth stage, 3 villages were selected randomly and a minimum of 184 individuals ≥18 years of age were taken from each village to complete the sample size of 552 in the present study (Figure 1).

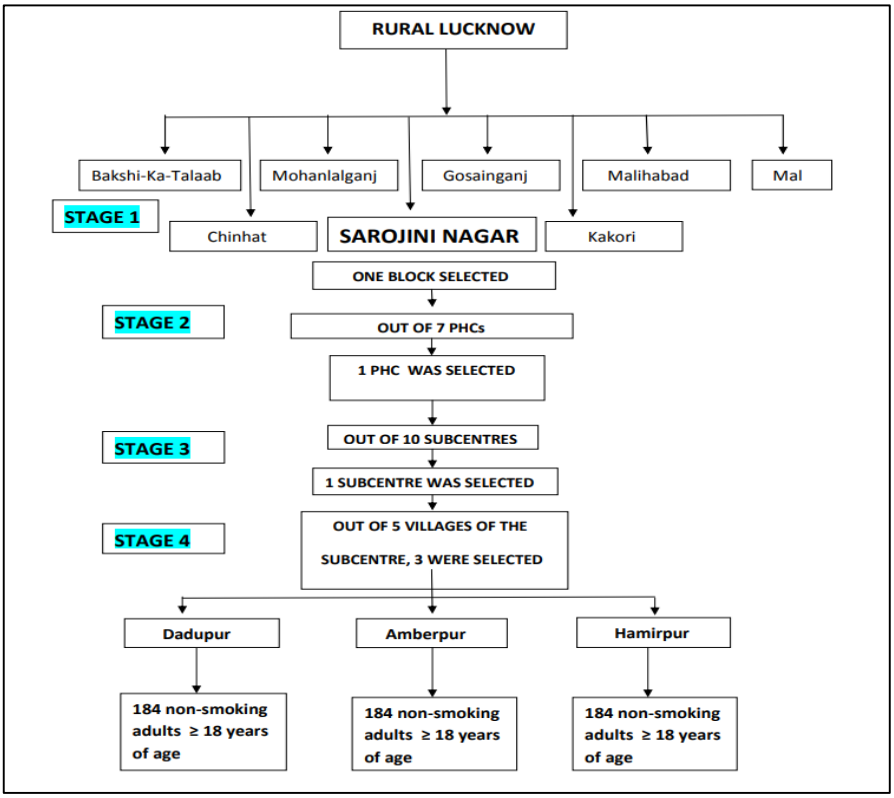

Figure 1: Selection of study areas in rural Lucknow.

Selection of household

Door-to-door survey of all households from the 3 villages was conducted to identify those who were 18 years and above. At each village, a central point was assumed and direction of first house was selected by rolling pencil to get random starting point for data collection. One eligible member from each household was chosen using KISH method. Eligible member from each household underwent an interview. The questionnaire was used to obtain information about socio-demographic variables, respiratory symptoms, co-morbidities and housing conditions. These subjects were then invited to nearby Anganwadi centres and sub-centre for further evaluation of lung function using spirometry.

Inclusion criteria

Both males and females aged 18 years and above were included. Should be non smokers.

Exclusion criteria

Those not willing to participate, pregnant women, those with proven or suspected of active pulmonary tuberculosis, those unable to understand and perform lung function test, persons with heart and lung disease as assessed by history or records, those having acute illnesses, those having chest and abdominal pain, those who underwent surgery within previous one and half month, those with uncontrolled blood pressure.

Measuring tools

Measuring tools were semi structured questionnaire and spirometry (Medikro Nano spirometry) to measure airflow obstruction.

Measurements used in this study

Each study subject's height and weight were measured for calculation of reference values and body mass index.

Height

The height was measured in standing position with a measuring tape. It was measured on level ground, the subjects were made to stand straight with their head, shoulders, buttocks and heels vertically aligned against the wall. Hard board was put vertical to wall just above the head and height was marked on the wall and measured to the nearest millimetre.

Weight

It was measured using a weighing machine. The scale was checked for zero error before weighing each person. Then the study subject was asked to stand on it in minimum clothing, without any footwear and looking forward. The same machine was used throughout the study.

Pulmonary function test

It was performed following Indian Chest Society guidelines using a portable data logging Spirometer (Medikro Nano).

This test was performed in a sitting position with nose closed by nose clips and a mouthpiece placed in mouth, making sure that the lips are sealed around the mouthpiece and that the tongue does not occlude it.

The participant was then asked to inhale completely and rapidly with a pause of 1 second at total lung capacity and exhale maximally until no more air could be expelled while maintaining an upright posture.

The participants were verbally encouraged to continue to exhale the air at the end of the maneuver to obtain optimal effort, for example, by saying 'keep going'. The same was repeated for a minimum of three maneuvers and not more than eight was done for acceptability and repeatability.

Spirometer measured forced vital capacity (FVC), forced expiratory volume in 1 second (FEV1), and FEV1/FVC values. Prebronchodilator and postbronchodilator comparisons were recorded. Spirometry with bronchodilation testing after inhalation of 400 µg of levosalbutamol was carried out in order to confirm COPD.

A complete flow volume loop was obtained from the spirometer. The values of the largest FVC and the largest FEV1 were taken from all of the three reproducible and usable curves (acceptable start of test and free from artifact).

Data analysis

900 people were enrolled for evaluation of lung function by spirometry. Of these, 348 refused to participate due to sociocultural issues. Of the 552 people who underwent spirometry, 16 refused bronchodilation with levosalbutamol and 76 could not satisfy Indian Thoracic Society standards. Therefore, analysis was done only on 460 particpants (Figure 2).

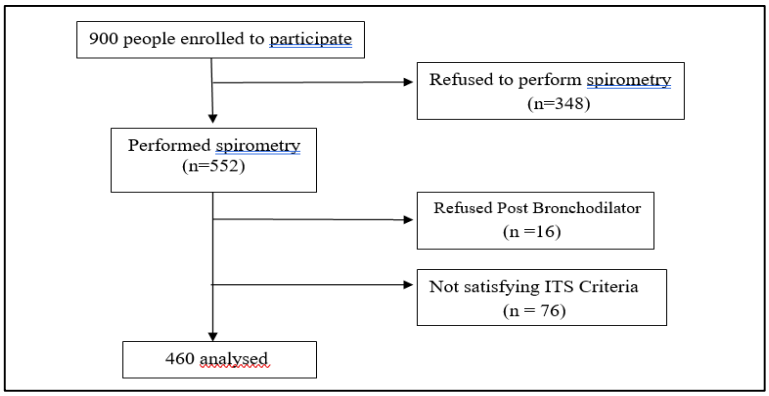

Figure 2: Screening and inclusion.

*ITS- Indian Thoracic Society.

Data analysis was done using IBM statistical package for social sciences, version 23.0. For categorical data, descriptive statistics were presented as frequencies with percentages. Since the outcome variables were categorical, associated factors were tested using the Chi-square test; in case, the expected frequency was found to be less than 5 in any particular cell, Fischer exact test was used and, p value <0.05 was considered statistically significant. Multivariate logistic regression was used to identify the predictors of COPD. A minimum 95% confidence interval or p value <0.05 were considered statistically significant.

RESULTS

FEV/FVC<0.7 was used to define COPD which yielded a prevalence of 8.5 percent among non-smoking study participants. Out of which, 5.0 percent were males and 3.5 percent were females. Out of the participants who were diagnosed with COPD, a maximum of 38.5 percentage had mild airflow limitation (Figure 3).

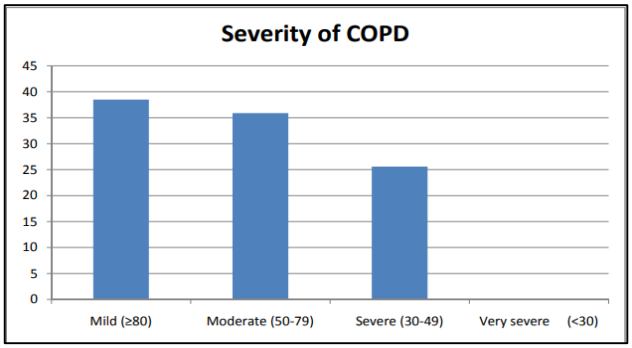

Figure 3: Airflow limitation severity (Post bronchodilator- % predicted FEV1*) among COPD participants.

*% predicted FEV1- based on GOLD grading (global initiative for obstructive lung disease).

Table 1: Association of COPD with socio-demographic profile.

Variables	COPD present N (%)	COPD absent N (%)	N	P value#
Sex				
Male	23 (12.8) [59.0]	157 (87.2) [37.3]	180	0.008
Female	16 (5.7) [41.0]	264 (94.3) [62.7]	280	
Age (in years)				
<40	13 (6.1) [33.3]	201(93.9) [47.7]	214	0.084
≥40	26 (10.6) [66.7]	220 (89.4) [52.3]	246	
Marital Status				
Married	35 (9.3) [89.7]	341(90.7) [81.0]	376	0.176
Unmarried	4 (4.8) [10.3]	80 (95.2) [19.0]	84	
Religion				
Hindu	37 (8.7) [94.9]	387 (91.3) [91.9]	424	0.757*
Muslim	2 (5.6) [5.1]	34 (94.4) [8.1]	36	
Category				
Reserved	27 (10.2) [69.2]	237 (89.8) [56.3]	264	0.118
Unreserved	12 (6.1) [30.8]	184 (93.9) [43.7]	196	
Education level				
Above high school	10 (5.5) [25.6]	171 (94.5) [40.6]	181	0.067
High school and below	29 (10.4) [74.4]	250 (89.6) [59.4]	279	
Occupation				
Service	7 (8.6) [17.9]	74 (91.4) [17.6]	81	0.001
Business	2 (8.3) [5.1]	22 (91.7) [5.2]	24	
Agriculture	15 (21.7) [38.6]	54 (78.3) [12.8]	69	
Daily wage labourer	2 (8.3) [5.1]	22 (91.7) [5.2]	24	
Homemaker	11 (5.8) [28.2]	178 (94.2) [42.3]	189	
Unemployed/retired/student	2 (2.7) [5.1]	71 (97.3) [16.9]	73	
Type of family				
Nuclear family	16 (6.3) [41.0]	240 (93.8) [57.0]	276	0.044
Joint family	23 (11.3) [59.0]	181 (88.7) [43.0]	204	
Socioeconomic Status* **				
Upper	4 (8.0) [10.3]	46 (92.0) [10.9]	50	0.961
Upper middle	7 (9.0) [17.9]	71 (91.0) [16.9]	78	
Middle	6 (8.1) [15.4]	68 (91.9) [16.2]	74	
Lower middle	10 (7.3) [25.6]	127 (92.7) [30.2]	137	
Lower	12 (9.9) [30.8]	109 (90.1) [25.9]	121	

***Source- (modified BG Prasad Scale, 2019) # Chi-square test, *Fisher's exact test, ( )- row percentage, [ ]- column percentage.

Table 2: Association of COPD with housing related characteristics.

Variables	COPD present N (%)	COPD absent N (%)	N	P value#
Type of house (n=460)				
Kaccha/semi-pucca	14 (6.5) [35.9]	201 (93.5) [47.7]	215	0.156
Pucca	25 (10.2) [64.1]	220 (89.8) [52.3]	245	
Overcrowding (n=460)				
Present	21 (10) [53.8]	189 (90) [44.9]	210	0.283
Absent	18 (7.2) [46.2]	232 (92.8) [55.1]	250	
Passive smoking (n=460)				
Present	10 (7.6) [25.6]	121 (92.4) [28.7]	131	0.682
Absent	29 (8.8) [74.4]	300 (91.2) [71.3]	329	
Ex-smoker in the house (n=460)				
Present	15 (21.1) [38.5]	56 (78.9) [13.3]	71	0.001
Absent	24 (6.2) [61.5]	365 (93.8) [86.7]	389	
Dampness present in rooms (n=460)				
Yes	26 (11.8) [66.7]	195 (88.2) [46.3]	221	0.015

Continued.

Variables	COPD present N (%)	COPD absent N (%)	N	P value#
No	13 (5.4) [33.3]	226 (94.6) [53.7]	239	
Livestock present in the house (n=460)				
Yes	30 (11.7) [76.9]	226 (88.3) [53.7]	256	0.005
No	9 (4.4) [23.1]	195 (95.6) [46.3]	204	
Use of incense sticks and seasonal use of mosquito repellents (n= 460)				
Yes	35 (8.9) [89.7]	360 (91.1) [85.5]	395	0.468
No	4 (6.2) [10.3]	61 (93.8) [14.5]	65	
Hours of exposure to incense and mosquito repellents (n=395)				
≤1 hour	16 (10.8) [45.7]	132 (89.2) [36.7]	148	0.574
>1-≤3 hours	14 (8.3) [40.0]	154 (91.7) [42.8]	168	
>3-≤5 hours	4 (8.9) [11.4]	41 (91.1) [11.4]	45	
>5 hours	1 (2.9) [2.9]	33 (97.1) [9.2]	34	

Chi-square test *Fishers Exact test, ( )- row percentage, [ ]- column percentage.

Gender was significantly associated with presence of COPD with males showing more prevalence of (12.8%) than females (5.7%). Occupation was found to be significantly associated with presence of COPD. Prevalence was highest among agricultural workers (21.7%). Association between type of family with presence of COPD was found to be statistically significant showing higher prevalence of (11.3%) among participants living in joint family than participants living in nuclear family (Table 1).

COPD was more prevalent (51.3%) in participants living in houses at a distance of <500 m from the main road than those living at a distance ≥500 m and also COPD was found more prevalent in participants living in houses close to farm field (79.5%) than those who lived in houses away from them (20.5%), but no significant association was found between them.

Presence of ex-smoker in the house was significantly associated (p=0.001) with COPD. Presence of dampness in bedroom (p=0.015) and livestock in the house (p=0.005) were also significantly associated with presence of COPD (Table 2).

Table 3: Association of COPD with kitchen related characteristics.

Variables	COPD present N (%)	COPD absent N (%)	N	P value#
Location of Kitchen (n=460)				
Kitchen in living room	11 (10.2)	97 (89.8)	108	0.696
Separate room	22 (8.3)	242 (91.7)	264	
Outdoor kitchen	6 (6.8)	82 (93.2)	88	
Preferred choice of fuel used (n=460)				
LPG gas/ Electricity	33 (8.2) [84.6]	369 (91.8) [87.6]	402	0.613*
Charcoal/wood/cowdung/crop residue	6 (10.3) [15.4]	52 (89.7) [12.4]	58	0.613*
Cooking room ventilation (n=460)				
Present	37 (9.5) [94.9]	354 (90.5) [84.1]	391	0.071
Absent	2 (2.9) [5.1]	67 (97.1) [15.9]	69	
Years of exposure to biomass smoke (n=58)				
≤ 5 years	7 (38.9) [53.8]	11 (61.1) [24.4]	18	0.208*
>5-≤12 years	4 (21.1) [30.8]	15 (78.9) [33.3]	19	
>12-≤19 years	0 (0.0) [0.0]	4 (100) [8.9]	4	
≥20 years	2 (11.8) [15.4]	15 (88.2) [33.3]	17	
Hours exposed per day to biomass smoke (n=58)				
≤1 hour	0 (0.0) [0.0]	14 (100) [31.1]	14	0.231*
>1-≤3 hours	5 (18.5) [38.5]	22 (81.5) [48.9]	27	
>3-≤5 hours	6 (46.2) [46.2]	7 (53.8) [15.6]	13	
>5 hours	2 (50.0) [15.4]	2 (50.0) [4.4]	4	

#Chi-square test *Fisher's Exact test, ( )- row percentage, [ ]- column percentage.

Table 4: Logistic regression for COPD and risk factors.

Variables	Univariate logistic regression		Multivariate logistic regression	
	Odds-ratio	P value	Adjusted odds ratio	P value
Sex				
Male	2.417 (1.239-4.714)	0.010	2.002 (1.001-4.006)	0.050
Female	1		1	
Occupation				
Service/business/unemployed/retired/student	0.598 (0.290-1.233)	0.163	-	
Agriculture/ daily wage labourer/ homemaker	1		-	
Type of family				
Nuclear family	0.525 (0.269-1.022)	0.058	-	
Joint family	1		-	
Ex-smoker in the house				
Present	4.074 (2.015-8.234)	0.001	3.834 (1.837-8.003)	0.001
Absent	1		1	
Dampness present in bedroom				
Yes	2.318 (1.159-4.634)	0.017	2.356 (1.141-4.863)	0.020
No	1		1	
Livestock present in the house				
Yes	2.876 (1.333-6.206)	0.007	2.518 (1.143-5.547)	0.022
No	1		1	
Previous history of childhood hospitalization due to respiratory problems				
Yes	3.722 (1.285-10.781)	0.015	-	
No	1		-	

COPD was more prevalent in participants who had kitchen in their living rooms (10.2%) followed by participants who had separate kitchen (8.3%) and those who had outdoor kitchen (6.8%). 9.2% percent participants who were diagnosed with COPD were biomass fuel users (charcoal/wood/cow dung/crop residue), but no statistically significant association was found between the two (Table 3).

Significant association (p<0.025) between participants who had a previous history of childhood hospitalization due to respiratory problems and presence of COPD was seen. No associations between COPD with co-morbidities (asthma, diabetes, hypertension, heart disease, previous history of stroke) were found to be statistically significant.

Most of the COPD patients were found to have normal body mass index (12.3%) followed by 10.9% patients who were underweight, and 7.6 percent were overweight and 4.1% who were pre-obese.

Multivariate logistic regression was used to identify the predictors of COPD. A minimum 95% confidence interval or p value <0.05 were considered statistically significant. On factors associated with presence of COPD, among gender, males were twice at risk of COPD than females [aOR: 2.002 (1.001-4.006)]. Participants who had dampness in the bedroom were 2.3 times at higher risk [aOR: 2.356 (1.141-4.863)] of having COPD than those who didn't have dampness in their rooms. Participants who had livestock in their house were 2.5 times [aOR: 2.518 (1.143-5.547)] at higher risk of COPD than those who didn't have (Table 4).

DISCUSSION

Prevalence of COPD among non-smokers

In the present study, fixed ratio of FEV1/FVC below 0.7 was used to define airway obstruction which yielded a prevalence of 8.5 percent among nonsmokers. Hagstad et al, in their study showed prevalence of COPD to be (6.9%).[6] Lindburg et al, in their study showed prevalence of 6.5%.[7] Similar prevalence was seen in a study conducted by Behrendt et al, (6.6% 0.6%) among non smokers was found.[8] Terzikhan et al and Tan et al, in their study showed in never smokers, the prevalence of COPD was the same (6.4%).[9,10] Zhou et al showed almost the same prevalence of COPD among nonsmokers to be 5.2%, as well as in study conducted by Bridevaux et al.[11,12] Chakrabart et al showed that 11 percent of never smokers were found to exhibit airflow obstruction on spirometry.[5] Saleem et al, in their study showed prevalence among non smokers to be (12%).[3]

Factors associated with COPD

Gender

Present study showed that gender was significantly associated (p=0.008) with COPD, with males showing

more prevalence of (59.0%) than females (49.0%). In multivariate model on factors associated with presence of COPD, in gender, males were twice at risk of COPD than females [aOR: 2.002 (1.001-4.006)]. Gender was an independent risk factor for COPD in non-smokers according to the multivariate analysis. Saleem et al, in their study showed that males (39.2%) had higher prevalence than females (12.2%).[3] Zhou et al showed that male nonsmokers were more likely to have COPD than female nonsmokers (8.8% versus 4.4%, respectively).[11]

Age

In the present study, COPD was found to be more prevalent in participants with age ≥40 years. This is a reasonable finding since the disease needs a cumulative dose of toxic exposures for it to manifest. Kim et al and Celli et al in their study showed COPD prevalence in nonsmokers was 8.8% in Koreans aged ≥45 years and 9.1% in subjects from the USA aged ≥30 years, respectively.[13,14] Danielsson et al in their study showed that COPD was independently associated with age.[15]

Occupation

In the present study, occupation was found to be significantly associated with presence of COPD. Prevalence was highest among agricultural workers (38.5%), followed by homemakers (28.2%) and other occupations. This was found to be significantly associated. Blanc et al showed that among lifelong never smokers, VGDF (vapours, gas, dust, fumes) exposure during the longest held job was associated with a greater risk of COPD after controlling for covariates (OR 2.0; 95% CI 1.28-3.18).[16] Liu in their study showed that the prevalence of COPD was found to be 24.3% and 20.8% among fungus greenhouse farmers, poultry greenhouse farmers, respectively.[17]

Socioeconomic status

In the present study, COPD was found to be more common in lower socioeconomic class. Gershon et al in their study showed that lifetime risk was higher in individuals of lower socioeconomic status than in those of higher socioeconomic status.[18] Hegewald et al, in their study showed to have significant correlation between socioeconomic status and lung function, even after adjustment for occupational exposure and ethnic origin.[19]

Previous history of tuberculosis

In the current study, a prior history of tuberculosis as a risk factor of COPD in non-smokers did not reach statistical significance, although such a trend could be noted. This can probably be attributed to the low numbers entailed. Bridevaux et al, Ehrlich et al and Menezes et al, have shown a link between tuberculosis and COPD, which also can explain the higher prevalence of COPD among non-smokers.[12-21]

Outdoor air pollution characteristics

This study showed that out of the total participants, a majority of (51.7%) were living in houses located <500 m from the main road, out of them, (54.3%) were females and about (47.8%) were males. Andersen et al, in their study showed that COPD incidence was associated with the 35-year mean NO_2 level (hazard ratio, 1.08; 95% confidence interval, 1.02-1.14, per interquartile range of 5.8 mg/m^3), with stronger associations in subjects with diabetes (1.29; 1.05-1.50) and asthma (1.19; 1.03-1.38).[22] Long-term exposure to traffic-related air pollution may have contributed to the development of COPD with possibly enhanced susceptibility in people with diabetes and asthma. Kan et al, in their study showed that higher traffic density was significantly associated with lower forced expiratory volume in 1 s (FEV1) and forced vital capacity (FVC) in women.[23] Using distance from major roads as a simpler index of traffic related air pollution exposure, the FEV1 was 215.7 ml (95% CI 234.4 to 2.9) lower and the FVC was 224.2 ml (95% CI 246.2 to 22.3) lower for women living within 150 m compared with subjects living further away. Schikowski et al in their study showed that women living less than 100 m from a busy road had a significantly decreased lung function and COPD was 1.79 times more likely (95% CI 1.06-3.02) than for those living farther away.[24]

The present study showed COPD was more prevalent (10.2%) in participants living in houses close to farm field than those who lived in houses away from them, but no significant association was found between the two.

Indoor air pollution characteristics

In the current study, ex-smoker in the house was significantly associated with COPD. Presence of dampness in bedroom was significantly associated with presence of COPD. Faulty plumbing, alone or coupled with weather conditions lead to an increased incidence of indoor wall dampness. Norba¨c et al in their study showed that women with dampness at home had an additional decline in forced expiratory volume in 1 second (FEV1) of 2.25 ml/year (95% CI 4.25 to 0.25), with a significant trend in increased lung function decline in relation to the dampness score ($p<0.03$). Hernberg et al in their study showed that mold odor at home or at work or both was related to a reduced lung function level.[26] FEV1 was on average 200 ml lower (effect estimate −0.20, 95% CI −0.60 to 0.21) and FVC on average 460 ml lower (−0.46, −0.95 to 0.03) in those exposed compared to those without exposure. Alves et al, in their study showed that indoor wall dampness formed an ideal environment for the growth of fungi such as *Alternaria*, *Aspergillus*, *Cladosporium*, and *Penicillium*, which contribute a great deal to household air pollution.[27]

In the current study, livestock in the house was also significantly associated with COPD. Apte et al, in their study showed that presence of livestock in the house was

associated with pet dander, which contributed to household air pollution.[28]

The present study showed that COPD was more prevalent in participants who had kitchen in their living rooms (10.2%) followed by participants who had separate kitchen (8.3%) and those who had outdoor kitchen (6.8%), but no statistically significant association was found between location of kitchen and presence of COPD. A maximum 10.3% percent participants who were diagnosed with COPD were biomass fuel users (charcoal/wood/cow dung/crop residue) whereas (8.2%) were LPG gas/electricity users, but no statistically significant association was found between the two. Other studies in India and many other countries incriminated biomass smoke in the etiology of COPD. In the present study, association with this factor did not reach statistical significance. This may be due to low number of individuals in some subgroups, which may have decreased the power to detect significant associations.

COPD was more prevalent (8.9%) among incense sticks and mosquito repellent users, but no statistically significant difference was seen.

Past history of childhood respiratory illness

Current study showed that COPD was more prevalent in participants with previous history of childhood hospitalization due to respiratory problems. It showed significant association between the two. These findings were also seen in studies conducted by Wu et al, Bridevaux et al, Vozoris et al and Larsson et al where higher prevalence of COPD in non smokers was associated with chronic cough and respiratory infections during childhood.[12,29-31]

CONCLUSION

Cigarette smoking is the commonest risk factor noticed globally, but not many epidemiological studies have got enough evidence that non-smokers may also develop COPD. So, it is recommended that we focus on non-smokers. Spirometry should be recommended as a screening tool in asymptomatic individuals to detect COPD. The higher prevalence noted in this study highlights the need for enhanced community-based screening programmes for secondary prevention of COPD among adults.

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