

Prevalence of chronic respiratory disorders in a rural area of North West India: A population-based study

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ABSTRACT

Introduction: Chronic respiratory diseases are an important cause of disability across the globe. The global burden of these diseases is showing a discernible upward trend. It is estimated that 500 million people suffer from them. **Materials and Methods:** The study was conducted with the aim to estimate the prevalence of chronic obstructive pulmonary disease (COPD) in a rural Indian population. For this, a population-based survey was conducted using modified British Medical Research Council questionnaire. This was followed by subjecting the respondents to Wright's mini peak flow meter to find out the peak expiratory flow rate to diagnose the COPD cases. **Results:** The prevalence of chronic bronchitis, bronchial asthma, and COPD was found to be 3.36%, 1.18%, and 4.21%, respectively. **Conclusions:** Chronic respiratory disorders are more prevalent among rural adults hinting to a rural-urban divide. Therefore, the focus of preventive strategies should take into account this difference.

Keywords: Chronic respiratory disorders, North West India, prevalence

Introduction

Chronic respiratory diseases affect the airways and other structures of the lung with chronic obstructive pulmonary disease (COPD) and bronchial asthma being the most common types of these diseases.^[1] Chronic respiratory diseases remain an important cause of disability and health care burden both globally and in India. The global burden of these diseases is showing a discernible upward trend, and an estimated 500 million people suffer from them.^[2]

COPD happens to be the fourth leading cause of death and 13th leading cause of burden of diseases worldwide with an increase projected over the next decade.^[3]

COPD has classified been classified “a disease state characterized by airflow limitation that is not fully reversible” by the global initiative for chronic obstructive lung disease. The limitation is usually both progressive and associated with an abnormal inflammatory response of the lungs to noxious particles or gasses.^[4,5]

In India, COPD remains a major public health problem requiring management from the primary health care level onward.^[6] In India, 65 million suffer from respiratory diseases of noncommunicable type, out of which asthma and COPD account for 42 million cases, and this figure is likely to grow by 20% by 2030.^[7]

During the review of literature, it was found that although a few studies have been conducted in India, but there was a paucity of

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literature as far as rural prevalence of chronic respiratory diseases was concerned. It was in this context that the current study was undertaken to know the prevalence of chronic respiratory diseases in a rural area of Jammu District in North-West India among people aged 20 years and above.

Materials and Methods

This observational descriptive study; cross-sectional in design; was conducted in Kot Balwal health block of Jammu District between April 1, 2012, and March 31, 2013. In a multi-stage random technique, the Kot Balwal was chosen randomly from a total of 8 blocks existing in Jammu District. The block caters to 7 subcenters. Subcenter Domana was selected from among these 7 by a simple random technique. The subcenter Domana caters for population of four villages. The study was carried in these four villages.

Study population

All individuals above 20 years of age residing in the selected villages and agreeing to participate in the study were included in the study. Individuals not consenting to participate were excluded from the study.

Exclusion criteria

Individuals reporting with a history of pulmonary tuberculosis, cardiac diseases, pregnancy, diabetes, and cancer were excluded from the study. The study has been approved by the Institutional Ethics Committee.

A minimum sample size of 1987 was calculated using a minimum prevalence of 4.7% at 95% confidence intervals with an allowable error of 20%.^[7] All the people aged above 20 years and not eligible for exclusion were eligible for inclusion. This meant that a total of 2018 individuals above 20 years of age were thus included in the study which was more than minimum sample size. This was account for the inclusion of all eligible individuals from selected study area. An informed written consent was obtained from the study participants.

Data collection technique

All individuals fulfilling the inclusion criteria were selected from each household for the purpose of this study. Once the persons gave informed consent to be part of the study, he was subjected to a two-step study. The first step involved collection of basic demographic information from the respondents. This was followed by administration of modified British Medical Research Council in the colloquial language to all the respondents to diagnose chronic bronchitis and bronchial asthma cases. The modification was done using a reiterative process, and the modified version was field tested for its validity before administration on the local population. All the respondents were subjected to Wright's mini peak flow meter to find out the peak expiratory flow rate to diagnose the COPD cases.

A detailed clinical history on respiratory symptoms was also obtained. Subjects were instructed to avoid the activities such as performing vigorous exercise within 30 min of testing, wearing clothing that substantially restricts full chest and abdominal expansion, and eating a large meal within 2 h of testing, and these requirements were given to the patient at the time of making the recruitment.

The data, thus, collected were compiled, tabulated, and analyzed using Epi-Info 6 software [Centers for Disease Control and Prevention (CDC) in Atlanta, Georgia (USA)]. Epi Info is public domain statistical software for epidemiology developed by Centers for Disease Control and Prevention (CDC) in Atlanta, Georgia (USA).

Statistical tests applied

The data were analyzed using, and prevalence was expressed in terms of percentage. Chi-square test was used as test of significance with a value less than 0.05 taken as statistically significant.

Operation definition

An individual was accepted as a prevalent case of COPD if his/her condition was characterized by airflow limitation that is not fully reversible. The airflow limitation is usually progressive and associated with an abnormal inflammatory response of the lungs to noxious particles or gasses, primarily caused by cigarette smoking.

Results

A total of 2018 rural adults of either gender aged 20 years were included in this study. The population comprised of 1070 males and 948 females. More than half of the study population was in the age group of 20–39 years [Table 1]. As far as an occupation was concerned, majority of the respondents were involved in cultivation. Further, a substantial number (29.23%) of participants were educated up to matriculation while 18.92% were illiterate. As per modified Udai-Parikh scale for socioeconomic status, majority (32.90%) respondents were in identified to belong to middle-middle class whereas 26.56% were identified to belong to lower class.

The crude prevalence of chronic bronchitis was estimated to be 4.85% for males as compared to 1.68% for females [Table 2].

Table 1: Distribution of the study population on the basis of age and sex (n=2018)

Age (in years)	Male n (%)	Female n (%)	Total n (%)
>20-29	305 (28.50)	293 (30.90)	598 (29.63)
30-39	281 (26.26)	254 (26.79)	535 (26.51)
40-49	219 (20.46)	173 (18.24)	392 (19.42)
50-59	125 (11.68)	110 (11.60)	235 (11.64)
60-69	83 (07.75)	56 (05.90)	139 (06.88)
70 and above	57 (05.32)	62 (06.54)	119 (05.89)
Total	1070 (99.97)	948 (99.97)	2018 (99.97)

It was found that the prevalence increased number with the increased in age with individuals of older age showing a higher prevalence. The trend is similar in both genders. The difference in prevalence of chronic bronchitis as per age was found to be statistically significant. The prevalence of bronchial asthma in the current study was estimated at 1.18% [Table 3]. No statistically significant association was found between age and bronchial asthma. The prevalence of COPD was estimated at 5.42% in males and 2.84% in females. The difference in prevalence between the two genders was found to be significant statistically [Table 4].

Discussion

The combined prevalence of chronic bronchitis, bronchial asthma, and COPD was found to be 8.77%. Individually, the prevalence of chronic bronchitis, bronchial asthma, and COPD was found to be 3.36%, 1.18%, and 4.21%, respectively which is in conformity some previous studies.^[8-10] However, one need to recognize that prevalence estimates in COPD may not be totally accurate. Epidemiological studies in past have tried to address the prevalence of COPD in India with the limiting issue being the methodology adopted and the definitions employed for diagnosis. Majority of the studies have used an unvalidated questionnaire based methodologies with or without measurement of peak flows. The reported prevalence estimates have ranged from 2% to 22% in men and from 1.2% to 19% in women.^[8] Recently, “Indian Study of Asthma, Respiratory Symptoms and Chronic Bronchitis” study of 85,105 men and 84,470 women from 12 urban and 11 rural sites reported a prevalence of chronic bronchitis to be 3.49% (4.29% in males and 2.7% in females) in adults >35 years.^[9] The national burden

was thus estimated to be 14.84 million. However, since the study was questionnaire-based and spirometry poorly correlates with symptoms, this study might have missed asymptomatic individuals with significant spirometric abnormalities. An investigation from Pune on COPD prevalence using postbronchodilator spirometry in addition to the questionnaire reported a nearly 2-fold higher prevalence.^[10] A collaborative study with burden of lung disease (BOLD) investigators using BOLD protocol, the prevalence of Stage 1 or higher COPD in participants >40 years of age based in rural Kashmir was found to be 19.3% (Koul P.A. personal communication).

A higher prevalence can be attributed probably to nonuse of cleaner fuels in the domestic kitchens, a common practice in rural kitchens of North India. In contrast, a lower prevalence of 3.3% was reported from a rural area of South India probably pointing to a North-South divide in prevalence.^[11] There appears to be rural-urban divide as well with Urban Kashmir reporting a prevalence of 5.7% prevalence for chronic bronchitis. Similar to this a lower prevalence was has been reported by Chhabra *et al.* in a study in New Delhi.^[12]

The results of this study showed that chronic bronchitis and COPD increased with advancing age, and it concurs with those reported by Malik^[13] and Radha *et al.*^[14] It is mostly attributed to changes in immune system and negative impact of age on lung physiology. In contrast, there was absence of any association between chronic bronchitis and increasing age in a study conducted in Pune slums.^[15] Both chronic bronchitis and COPD have shown a male preponderance in the current study and it could be best explained by differential rates of smoking

Table 2: Age- and sex-wise prevalence of chronic bronchitis in study population (n=2018)

Age in years	Males n (%)		Females n (%)		Total n (%)	
	Cases	Study population	Cases	Study population	Cases	Study population
20-49	11 (1.36)	805 (52.78)	2 (0.27)	720 (47.21)	13 (0.85)	1525 (75.56)
50 and above	41 (15.47)	265 (53.75)	14 (6.14)	228 (46.24)	55 (11.15)	493 (24.44)
Total	52 (4.85)	1070 (53.03)	16 (1.68)	948 (46.97)	68 (3.36)	2018 (100)

$\chi^2=108.24$; $df=1$; $P<0.05$

Table 3: Prevalence of bronchial asthma on the basis of age and sex (n=2018)

Age (in years)	Males n (%)		Females n (%)		Total n (%)	
	Cases	Study population	Cases	Study population	Cases	Study population
20-49	8 (0.99)	805 (52.78)	8 (1.11)	720 (47.21)	16 (1.04)	1525 (75.56)
50 and above	6 (2.26)	265 (53.75)	2 (0.87)	228 (46.24)	8 (1.62)	493 (24.44)
Total	14 (1.30)	1070 (53.03)	10 (1.05)	948 (46.97)	24 (1.18)	2018 (100)

$\chi^2=1.02$; $df=1$; $P<0.05$

Table 4: Age- and sex-wise prevalence of chronic obstructive pulmonary disease in study population (n=2018)

Age in years	Males n (%)		Females n (%)		Total n (%)	
	Cases	Study population	Cases	Study population	Cases	Study population
20-49	14 (1.73)	805 (52.78)	9 (1.25)	720 (47.21)	23 (1.50)	1525 (75.56)
50 and above	44 (16.60)	265 (53.75)	18 (7.89)	228 (46.24)	62 (12.5)	493 (24.44)
Total	52 (5.42)	1070 (53.03)	27 (2.8)	948 (46.97)	85 (4.21)	2018 (100)

$\chi^2=25.27$; $df=1$; $P<0.05$

and occupational exposures between the two genders. However, Pandey^[6] in a rural study in Nepal reported contrasting results with higher prevalence of chronic bronchitis in females, and it was attributed to domestic smoke pollution.

An important limitation of the current study is that since it was conducted only in four villages, so it may lack generalization. Authors recommend more such studies in different rural areas of India to really make them generalizable.

Conclusions

The current study has shown a higher prevalence of chronic respiratory diseases such as chronic bronchitis and COPD in rural adults. Prevalence of bronchial asthma (1.18%) was on the lower side in comparison to other rural studies. The prevalence increased with advancing age. The epidemiological data so generated can be useful in the design of new preventive strategies especially in the primary health care.

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Conflicts of interest

There are no conflicts of interest.

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