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Study of chronic obstructive pulmonary disease (COPD) among female patients at a tertiary hospital

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Abstract

Background: Chronic obstructive pulmonary disease (COPD) is a slowly progressing disease involving the airways or pulmonary parenchyma (or both) resulting in airflow obstruction. Among women, the increased prevalence of COPD can be attributed to the biological differences, environmental tobacco smoke and occupational exposure. Present study was aimed to study chronic obstructive pulmonary disease (COPD) among female patients at a tertiary hospital. **Material and Methods:** Present study was single-center, prospective, observational study, conducted in women with chronic cough for periods over 2 months for 2 or more years with sputum production, dyspnea, recently diagnosed as a case of COPD on spirometry. **Results:** Among 41 women diagnosed with COPD, mean age was 60.92 ± 12.54 years. Majority were from age group was 51-70 years (63.41 %). Common clinical features were cough (100 %), expectoration (95.12 %), fever (39.02 %) & edema feet (17.07 %). Staging of COPD was done according to GOLD (Global Initiative for Obstructive Lung Disease) guidelines, majority were from stage 1 & 2 (36.59 % each), followed by stage 3 (17.07 %) & 4 (9.76 %). No patient had history of active smoking. In cases smoke exposure was noted as passive tobacco smoke (19.51 %), biomass smoke (chulha) (14.63 %) & no exposure noted in majority cases (65.85 %). On chest X ray, radiological findings noted were hyperinflation (82.93 %), increased bronchovascular markings (BVM) (80.49 %), low placed diaphragm (51.22 %), presence of bullae (34.15 %) & tubular heart (21.95 %). At the time of diagnosis complications noted were pneumonia (17.07 %), bronchiectasis (14.63 %), right heart failure (12.2 %) & pneumothorax (7.32 %). **Conclusion:** Traffic and other outdoor pollution, secondhand smoke & biomass smoke are likely causes of COPD in women who don't smoke tobacco products.

Keywords: COPD, secondhand smoke, biomass smoke, tobacco smoke

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Introduction

Chronic obstructive pulmonary disease (COPD) is a slowly progressing disease involving the airways or pulmonary parenchyma (or both) resulting in airflow obstruction. The Global Initiative for Obstructive Lung Disease (GOLD) describes COPD as a common preventable and treatable disease, characterised by persistent airflow limitation that is usually progressive and associated with an enhanced chronic inflammatory response in the airways and the lung to noxious particles or gases.[1]

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The prevalence of COPD is underestimated as most symptoms such as cough and dyspnea are ignored by the patients until they worsen, and are not confirmed by objective lung function tests.[2,3] The perception that COPD is a disease of older, male smokers is outdated; COPD affects both men and women globally and is particularly prevalent in low- and middle-income countries.[4]

Indeed, the prevalence of COPD globally is increasing more rapidly in women than in men, and the number of female COPD-related deaths now surpasses the number in men in some countries.[5] Among women, the increased prevalence of COPD can be attributed to the biological differences, environmental tobacco smoke and occupational exposure.[5] Present study was aimed to study chronic obstructive pulmonary disease (COPD) among female patients at a tertiary hospital.

Material And Methods

Present study was single-center, prospective, observational study, conducted in department of general medicine, at XXX medical college & hospital, XXX, India. Study duration was of 1 year (January 2022 to December 2022). Study approval was obtained from institutional ethical committee. Recently diagnosed women with COPD from OPD's and medicine wards were considered for present study.

Inclusion criteria

- Women with chronic cough for periods over 2 months for 2 or more years with sputum production, dyspnea, recently diagnosed as a case of COPD on spirometry, willing to participate in present study

Exclusion criteria

- Patients with active tuberculosis, any cardiovascular illness
- Not willing for participation

Study was explained to patients in local language & written consent was taken for participation & study.Demographic details & detailed history regarding duration of cough and dyspnea, past treatment, and family history of asthma or COPD, risk factors (tobacco smoking, passive smoking, past lung tuberculosis, exposure to indoor air pollution, biomass smoke exposure) was taken.

A comprehensive physical examination was performed to assess the findings of COPD and its severity. Spirometry was done with an electronic spirometer and the following parameters were documented: FVC, FEV 1.0, FEV 1.0/FVC, peak expiratory flow rate, and forced expiratory flow 25%–75%. To assess broncho-reversibility, these parameters were repeated after inhaled salbutamol delivered with a valve‑triggered spacer device. COPD was diagnosed when spirometry parameters of forced expiratory volume (FEV) 1.0/forced vital capacity (FVC) <70%; FEV 1.0 <80% of predicted normal; and patients with less than 12% and 200ml decrease in FEV1 after administration of bronchodilator were present. Chest X ray, 2D echo, arterial blood gases estimation was done in all patients.

Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Statistical analysis was done using descriptive statistics.

Results

Among 41 women diagnosed with COPD, mean age was 60.92 ± 12.54 years. Majority were from age group was 51-70 years (63.41 %). Common clinical features were cough (100 %), expectoration (95.12 %), fever (39.02 %) & edema feet (17.07 %).

Table 1: General characteristics

Characteristic	No. of patients (n-41)	Percentage
Age (years)		
≤30	1	2.44

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31-50	8	19.51
51-70	26	63.41
>70	6	14.63
Mean age (years)	60.92 ± 12.54	
Symptoms		
Cough	41	100
Expectoration	39	95.12
Fever	16	39.02
Edema feet	7	17.07
Cachexia	6	14.63
Skeletal muscle wasting	6	14.63

Staging of COPD was done according to GOLD (Global Initiative for Obstructive Lung Disease) guidelines, majority were from stage 1 & 2 (36.59 % each), followed by stage 3 (17.07 %) & 4 (9.76 %).

Table 2: Classification and staging of COPD according to GOLD guidelines[1].

Stage of COPD	**No. of patients (n-41)**	**Percentage**
GOLD 1: Mild	15	36.59
GOLD 2: Moderate	15	36.59
GOLD 3: Severe	7	17.07
GOLD 4: Very severe	4	9.76

High risk factors such as past History of pulmonary TB (26.83 %), cardiovascular disease (21.95 %), gastro-esophageal reflux disease (14.63 %), diabetes mellitus (12.2 %) & carcinoma lung (2.44 %) were noted in study patients.

Table 3: High risk factors

High risk factors	**No. of patients (n-41)**	**Percentage**
Past History of pulmonary TB	11	26.83
Cardiovascular disease	9	21.95
Gastro-esophageal reflux disease	6	14.63
Diabetes mellitus	5	12.2
Carcinoma lung	1	2.44

No patient had history of active smoking. In cases smoke exposure was noted as passive tobacco smoke (19.51 %), biomass smoke (chulha) (14.63 %) & no exposure noted in majority cases (65.85 %).

Table 4: Type of smoke exposure and

Type of smoke exposure	**No. of patients (n-41)**	**Percentage**
Passive tobacco smoke	8	19.51
Biomass smoke (chula)	6	14.63
No exposure noted	27	65.85

On chest X ray, radiological findings noted were hyperinflation (82.93 %), increased bronchovascular markings (BVM) (80.49 %), low placed diaphragm (51.22 %), presence of bullae (34.15 %) & tubular heart (21.95 %).

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Table 5: Radiological findings

Radiological findings	No. of patients (n-41)	Percentage
Hyperinflation	34	82.93
Increased bronchovascular markings (BVM)	33	80.49
Low Placed diaphragm	21	51.22
Presence of bullae	14	34.15
Tubular heart	9	21.95

At the time of diagnosis complications noted were pneumonia (17.07 %), bronchiectasis (14.63 %), right heart failure (12.2 %) & pneumothorax (7.32 %).

Table 6: Complications

Complications	No. of patients (n-41)	Percentage
Pneumonia	7	17.07
Bronchiectasis	6	14.63
Right heart failure	5	12.2
Pneumothorax	3	7.32

Discussion

COPD is preventable and treatable disease with significant extrapulmonary effects that lead to comorbid conditions.[6] These include muscle wasting, cachexia, worsening comorbid diseases, such as ischaemic heart disease, heart failure, osteoporosis, normocytic anaemia, lung cancer, depression and diabetes.[7]

The diagnosis of COPD is done by spirometry in patients having respiratory symptoms and exposure of noxious particles. The presence of a postbronchodilator forced expiratory volume 1 s (FEV1)/forced vital capacity <0.70 confirms the presence of persistent airflow limitation. The severity of COPD is also assessed by spirometry as mild (FEV1 >80%), moderate (FEV1 50%–79%), severe (FEV1 30%–49%), and very severe (FEV1 <30%).[8]

A systematic review revealed the gender-wise variation in prevalence, where COPD rates in males ranged between 2% to 22% and that for females between 1.2 to 19% .[9] In a review with 8,569 individuals, of which 50.8% are females. gender‐wise prevalence of COPD among males and females were 11.4% and 7.4% respectively.[10] Evidence from the studies done among women in 24 villages of central India reported a 2.7% prevalence of chronic bronchitis and variation amongst social determinants of health (e.g., age, socioeconomic status, and exposure to pollution).[11]

Verma A et al.,[12] noted that prevalence of COPD among population aged 30 years and above in India was 7%. Risk factors like active and passive smoking, biomass fuel exposure, environmental tobacco smoke, occupational exposure to dust, indoor and outdoor pollution, and increasing age were reported to have a significant association with COPD among Indian population.

Karnam A[13] noted that severity of illness according to the Global Initiative for Chronic Obstructive Lung Disease staging revealed that 49.4% were in Grade 1 and 2 and 50.5% were in Grades 3 and 4. The duration of symptoms correlated with severity. Most patients were exposed to biomass smoke; the mean biomass index was 136.8 hour-years. The nature of exposure did not appear to influence the severity of illness.

In study by Gautam K[14], 46 women were diagnosed with COPD, mean age was 61.23 ± 11.35 years. Most commonly involved age group was 51-70 years (68%). Common clinical features

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were cough (96%), expectoration (89%), fever (37%), edema feet (13%), cachexia (15%) and skeletal muscle wasting (11%). Staging of COPD was done according to GOLD guidelines, 28%, 43%, 17% and 11% study patients were from stage 1,2,3 and 4 respectively. No patient had history of smoking. 24 % had history of passive smoking at home and 17 % had exposure to biomass smoke (chula). On chest X ray, hyperinflation (67%), increased bronchovascular markings (76%), tubular heart (24%), low placed diaphragm (61%) and presence of bullae (35%) was noted. Past History of pulmonary TB (35%) was most significant comorbidity noted in study patients. At the time of diagnosis complications such as right heart failure (13%), pneumonia (11%), bronchiectasis (11%) and pneumothorax (4%) were noted in study patients

In study by Vinay KM et al.,[15] 2868 women screened, a total of 529 (18.4%) women were confirmed to have COPD in which 123 (4.2%) were "Women with known COPD" and 406 (14.2%) "Women with new COPD". The mean age at the time of Diagnosis was 61±5.2 and 47±3.6 respectively. The duration of exposure to biomass fuel had a great impact on the risk of COPD with OR 1.2, 95% CI (1.1-1.9) for patients with 10-15 years exposure and OR 2.9, 95% CI (2.5-3.1) for exposure >25 years, $p<0.001$. The prevalence of COPD among women exposed to biomass fuel is very high. A strong correlation was found between the risk of COPD and the duration of exposure along with the age at which the exposure to biomass fuel begins. Underdiagnosis of COPD was frequent in women due to the lack of the availability of spirometry, lack knowledge of hazards of biomass fuel, a low level of education and the ignorance of the health care provider being the important determinants of underdiagnosis.

Soni NA, et al.,[16] studied 113 patients; [82 (72.6% men and 31 (27.4%) women]). Severity of COPD was not linearly correlated with the severity of risk factors like male sex (p=0.99), advancing age (p=0.70), smoking (p=0.78) and indoor air pollution (p=0.82). Low BMI (Body mass index) (18.1 Vs 20.1 Kg/m2, p<0.01) was associated with severity of COPD. Women tended to spend more time in house (p<0.01) and Indoor risk time product grade was significantly higher in females.

Multifaceted approach is needed, with sustained effort, to reduce the prevalence of COPD by mitigating risk; improve timely diagnosis rates in women by raising awareness of COPD; and improve the management of COPD in women through further sex-specific research and better consideration of sex-relevant factors, such as common comorbidities.[17]

There is a need to adopt a multipronged framework approach involving the reduction of risk factors, improving availability of health personnel and other infrastructure such as drugs and devices, implementation of standard treatment guidelines, a functional referral mechanism, the introduction of pulmonary rehabilitation programmes, and effective surveillance systems.[18]

Conclusion

Traffic and other outdoor pollution, secondhand smoke & biomass smoke are likely causes of COPD in women who don't smoke tobacco products. Tobacco control, reduction of household and ambient air pollution and occupational exposures are important steps to reduce the risk of COPD in women.

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