

## ORIGINAL ARTICLE

# FREQUENCY OF MODIFIABLE RISK FACTORS IN PATIENTS ADMITTED WITH ACUTE EXACERBATION OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE AT PULMONOLOGY UNIT, KHYBER TEACHING HOSPITAL, PESHAWAR.

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## ABSTRACT

**Objective:** To determine the frequency of modifiable risk factors in patients admitted with acute exacerbation of COPD.

**Methods:** This was a descriptive, cross sectional study conducted at Pulmonology Unit Khyber Teaching Hospital Peshawar from October 2009 to October 2010. A total of 151 patients who got admitted with COPD exacerbation were recruited. Demographic characteristics and informations regarding modifiable risk factors of COPD exacerbations (current smoking, exposure to biomass fuel smoke, adherence to treatment and vaccination against influenza and pneumococcus) were recorded in a structured proforma. Mean, median, mode and standard deviation of age; frequencies/percentages of sex and all modifiable risk factors were calculated using SPSS-16.

**Results:** The mean age of patients was 62 ( $\pm$  9.32 SD) years, male to female ratio of 1:1.35, moderate to very severe COPD with a duration of 8.81( $\pm$  5.72 SD) years and smoking history in pack years was 33.07( $\pm$  9.10 SD). The lack of vaccination against influenza (in the last year) and pneumococcus (in the last 5 years) was found in 82.2% and 97.4% respectively. Adherence to treatment (taking  $>$ 80% medicines/doses) was 19.2%, current exposure to biomass fuel smoke was 17.9% while 12.6% were current smokers.

**Conclusion:** Patients with acute exacerbation of COPD had a high prevalence of modifiable risk factors of exacerbation, and failure to address these may lead to avoidable hospitalizations.

**Key words:** COPD, exacerbation, hospitalization, risk factors.

## INTRODUCTION:

Chronic obstructive pulmonary disease (COPD) is a common respiratory disorder which is slowly progressive in nature, characterized by fixed or partially reversible airflow obstruction<sup>1</sup>. Cigarette smoking remains the most important risk factor for its development<sup>2</sup>. It is the 4th most common cause of death worldwide and is expected to be the 3<sup>rd</sup> one by the year 2020<sup>2, 3</sup>. The prevalence of COPD is variable in the world. It affects approximately 9-10% of adults over the age of 40 years<sup>4</sup>. In Pakistan, almost the same prevalence was found in urban areas while it was 14% and 6% in rural females and males respectively. This difference is attributed to indoor pollution exposure of females in rural areas<sup>5</sup>. COPD is frequently complicated by acute exacerbations which usually need hospital admission<sup>6</sup>.

An exacerbation of chronic obstructive pulmonary disease (COPD) is characterized by an increase in the patient's baseline dyspnea and/or amount and/or purulence of sputum that is beyond normal day-to-day variations as defined by Pakistan Chest Society (PCS)<sup>7</sup>.

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Infections (viral and bacterial) and air pollution are the most common causes of exacerbation; other modifiable risk factors include poor adherence to treatment and current smoking<sup>1</sup>.

Exacerbation of COPD is the most important cause of mortality, morbidity and hospital care facilities utilization, accounting for about 70% of the cost of medical care for patients with COPD<sup>8</sup>. Every patient with moderate to very severe COPD (stage II-IV) experiences one to three exacerbations a year, accompanied by 11% in-hospital mortality<sup>9</sup>. Hence prevention of these exacerbations is one of the key goals of COPD management.

Many guidelines recommend smoking cessation, avoidance of exposure to air pollution, yearly influenza vaccination and compliance with inhaled maintenance therapy for prevention of exacerbations<sup>10</sup>. Despite these recommendations, a high prevalence of current smoking, lack of influenza vaccination and incorrect inhaler technique was found in patients with exacerbation of COPD (26%, 28% and 43% respectively) in Spain<sup>11</sup>.

The rationale of this study was that very limited research has been conducted so far on prevention of COPD exacerbations in Pakistan. In addition, evidence is suggestive of unsatisfactory management of these patients leading to increased number of exacerbations and hospitalizations particularly due to these potentially modifiable risk factors.

The present project was designed to determine the frequency of modifiable risk factors in patients admitted with acute exacerbation of COPD. Addressing these factors helps in preventing exacerbations and avoiding unnecessary hospitalizations.

**PATIENTS AND METHODS:**

This was a descriptive, cross sectional study conducted at Pulmonology Unit, Khyber Teaching Hospital, Peshawar from October 2009 to October 2010. A total of 151 patients were recruited using consecutive non probability sampling technique. All patients diagnosed as having COPD according to the criteria of Pakistan Chest Society<sup>7</sup>, both males and females, >40 years of age, who presented with acute exacerbation to Pulmonology Unit Khyber Teaching Hospital, Peshawar were included.

Patients with COPD exacerbation included earlier on previous admission. Acute severe Asthma and COPD patients with pneumothorax, pulmonary edema or Cardiac arrhythmia were excluded by ECG, Chest X-Ray and Echo where applicable to control bias in the study.

All patients who fulfilled the diagnostic criteria for COPD exacerbation i.e. any patient with the diagnosis of COPD (revealed by Spirometry<sup>7</sup>) who presented with increase in at least one of the three cardinal features of exacerbation (dyspnea, sputum volume and sputum purulence) as per Pakistan Chest Society Guidelines<sup>7</sup>, who presented via emergency or OPD were admitted to Pulmonology unit Khyber Teaching Hospital, Peshawar. The purpose of the study was explained and informed consent was taken. Demographic characteristics were recorded and information regarding modifiable risk factors of COPD exacerbation was obtained by taking history (from patient and attendant both to avoid information bias) and checking the patient's record. Current smoking was defined as an adult who reported as having smoked at least 100 cigarettes in his or her lifetime and who was currently smoking (any number of cigarettes) every day or some days.<sup>10</sup> Current exposure to indoor air pollution was assessed by a positive response of the patient to the question "were you exposed for a period of >4 hours/day to fire

producing smoke during the last 30 days?". Lack of vaccination against influenza and pneumococcus was defined as either the patient was not vaccinated or had received the vaccines more than one year ago for influenza and likewise 5 years for pneumococcus as reported by the patient and/or attendant and/or shown by the patient's record. Adherence to treatment was measured as good, average and poor adherence; when the patient was taking >80%, 50-80% and <50% of all medication of the last prescription for COPD, in proper dosages and frequency, respectively. All data was entered in an objectively structured proforma.

Data collected was entered into SPSS version 16.0 for statistical analysis. Mean, median, mode, standard deviation of age, FEV<sub>1</sub>, pack-years of smoking and duration (years) of COPD; frequencies and percentages of sex, current smoking, current exposure to indoor air pollution, adherence to treatment, lack of vaccination against influenza and pneumococcus were calculated. Results were shown as tables/graphs.

## **RESULTS:**

A total of 151 patients with moderate to very severe COPD (Table I), mean age of 62 ( $\pm$  9.32 SD) years and male to female ratio of 1:1.35 were studied for modifiable risk factors of COPD exacerbation. The mean duration of the disease was 8.81( $\pm$  5.72 SD) years and smoking history in pack years was 33.07( $\pm$ 1 9.10 SD).

The most frequent risk factors of COPD exacerbation were lack of vaccination, and poor compliance with treatment. Majority of the patients (82.8%) were not vaccinated against influenza during the last winter season while this figure was even higher (97.4%) for lack of pneumococcal vaccination in the last 5 years (figure I). Adherence to treatment was poor (taking less than 50% of the medicines/doses) in 47%, average in 33.8% patients while 19.2% had good adherence (taking >80% of the medicines) to the treatment prescribed for COPD. (Figure II)

Of total patients, 12.6% were current smokers (figure III). The current exposure to indoor biomass fuel smoke was found in 17.9% of total patients as illustrated in figure IV, and all of them were females as shown in table II.

## **DISCUSSION:**

A high prevalence of modifiable risk factors was found in patients presented with acute exacerbation of COPD. The most common were lack of vaccination against influenza and pneumococcus, and poor adherence to treatment prescribed for COPD. The prevalence of current smoking and exposure to indoor air pollution (biomass fuel smoke) was relatively lower but still significant to cause/aggravate an exacerbation of COPD.

Pneumococcal vaccine was given only to 2.6% of patients which is near to 3% reported by Garcia-Aymerich et al<sup>11</sup>. The lower rate of pneumococcal vaccination could be due to three reasons. First, the improper approach towards COPD management across the country<sup>12</sup>. Second, the evidence for efficacy of pneumococcal vaccination in preventing exacerbations is weaker (as compared to influenza vaccine)<sup>13</sup>. Third reason could be its high cost.

The overall vaccination rate for influenza was 17.2%, which is different from 40% found by Poole et al<sup>14</sup> in a similar group of patients. This variation could be due to differences in local practices and approach towards COPD management. One explanation can be derived from the study conducted on similar groups of patients by Mukhtiar Zaman et al. and Israrul haque et al. showing that guidelines for COPD management are not followed by chest physicians and more

so by general practitioners in Pakistan<sup>12,15</sup>. Guidelines recommend vaccination against influenza and pneumococcal infection for all COPD patients, as it decreases exacerbation rate and mortality in these patients<sup>16</sup>.

Patients' adherence to prescribed treatment for COPD was poor. Only 19.2% of the COPD patients had good adherence to the prescribed treatment for COPD (taking more than 80% medicines of the last prescription for COPD). These findings are in conformation with figures described by WHO<sup>17</sup>, Restrepo et al.<sup>18</sup>, Lavorini et al.<sup>19</sup> and Cramer et al.<sup>20</sup> as less than 50%, 40-60%, 6-96%, and 15-63% respectively. Increasing symptoms does not always mean an exacerbation; rather adherence to the treatment should be looked for before starting new drugs, changing or increasing their doses. Treatment adherence of COPD patients should be checked on every visit as it decreases hospitalization frequency<sup>21</sup>.

The frequency of current smoking in this study was 12.6 % of total (151) and 28% of the ex-smokers, consistent with 33% and 34% reported by other studies<sup>22, 23</sup>. Smoking cessation decreases the rate of faster decline in lung function, and exacerbations of COPD<sup>24</sup>. It is currently being recommended for health professionals to ensure smoking cessation in all COPD patients to decrease the risk of exacerbations.

The exposure to biomass fuel smoke was found in 17.9% in our study; all were females. Data collected from different countries showed that 22 to 45% of COPD patients who never smoked cigarettes were exposed to biomass fuel smoke<sup>25</sup>. This variation could be due to the geographical and cultural differences between these study groups. This is supported by a Chinese study showing that indoor air pollution from cooking fire smoke (often using biomass fuel such as wood and animal dung) is a common cause of COPD, especially in women in developing countries, in contrast to developed world where cigarette smoking is the etiological agent in 80-90% of the patients<sup>26</sup>. Similar findings of exposure to indoor air pollution were reported in rural areas of Pakistan<sup>27</sup>. Whatever is the reason, it is a high percentage and needs to be addressed in COPD management and prevention of its exacerbations.

In summary, all studies show a moderate to high prevalence of modifiable risk factors in patients with COPD exacerbation. This emphasizes the need for addressing these factors in management of COPD and preventing its exacerbations.

## CONCLUSION:

Current smoking, exposure to indoor air pollution, poor adherence to treatment and lack of vaccination (against influenza and pneumococcus) are common potentially modifiable risk factors of COPD exacerbation in our set up.

Most episodes of COPD exacerbations are associated with potentially modifiable risk factors. To prevent further episodes, all risk factors for exacerbation should be sought and modified, if possible, in all COPD patients. Failure to recognize and address these factors may lead to unnecessary escalation of the therapy and avoidable hospitalizations

**TABLE I:** Mean, Median, Mode and Standard deviation of FEV<sub>1</sub> (% predicted) in patients with COPD exacerbation.

Statistical test	FEV <sub>1</sub> (% Predicted)
Mean	37.85
Median	33.00

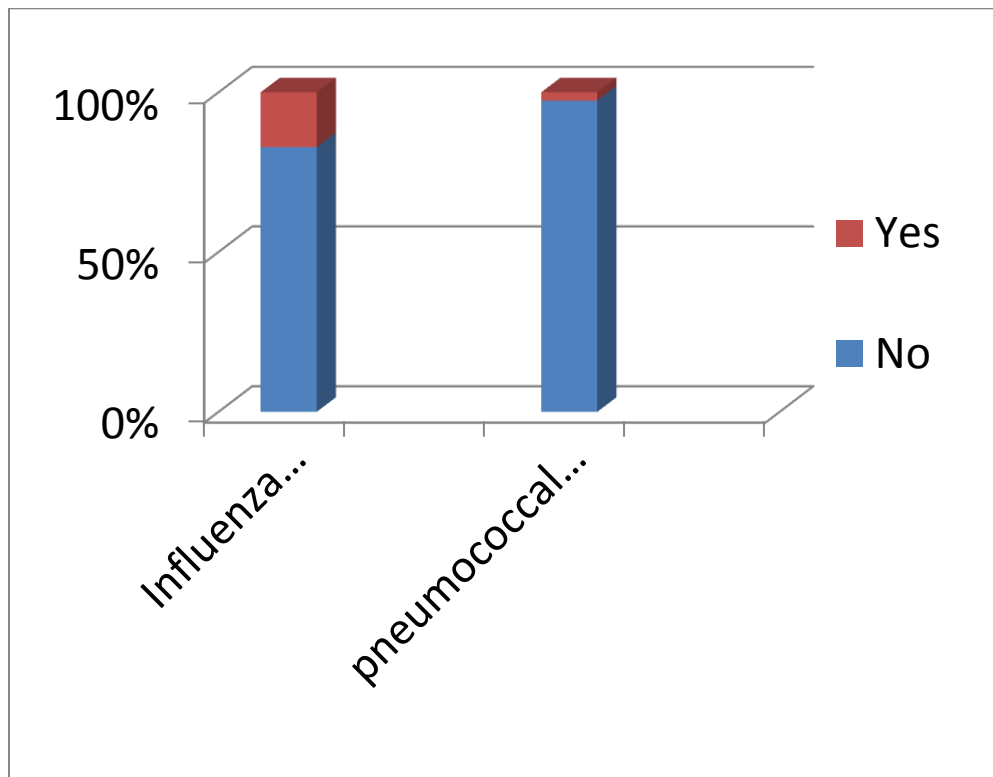
Mode	28.00
Standard deviation	18.24

FEV<sub>1</sub>: Forced expiratory volume in 1<sup>st</sup> second.

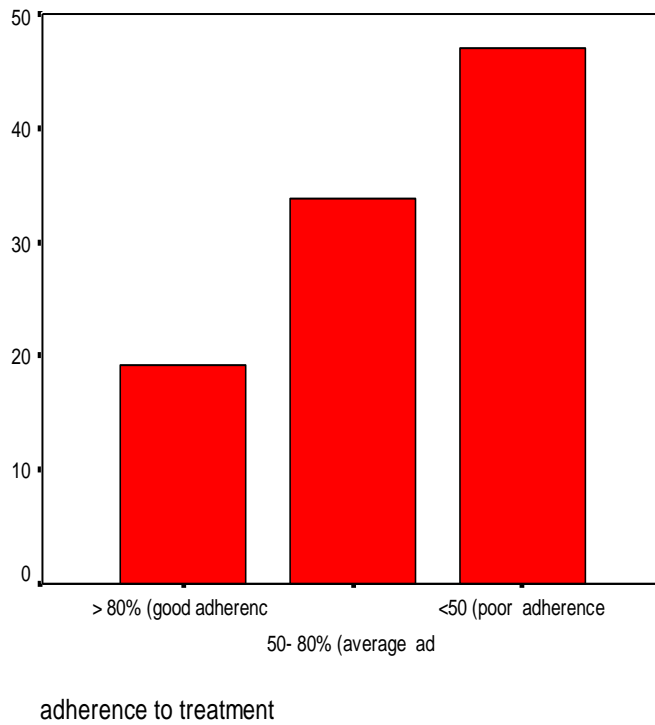
**TABLE II:** Sex difference of patients currently exposed to indoor air pollution.

Exposure to current indoor air pollution	Males	Females	Total number
Yes	0.00	27	27
No	64	60	124
Total	64	87	151

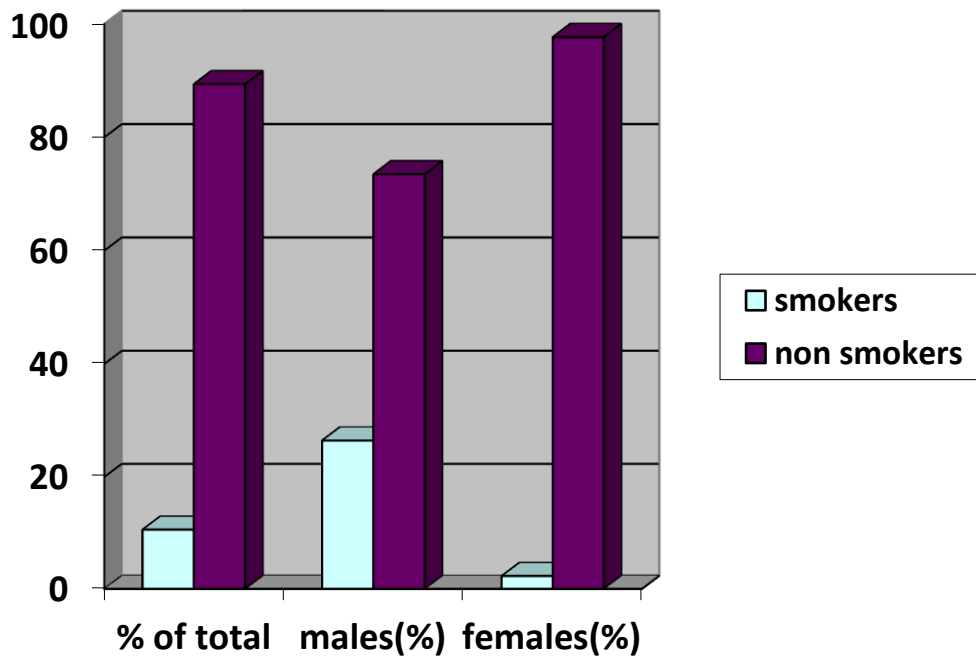
**Figure I:** Vaccination (influenza and pneumococcal) among patients with COPD exacerbation.



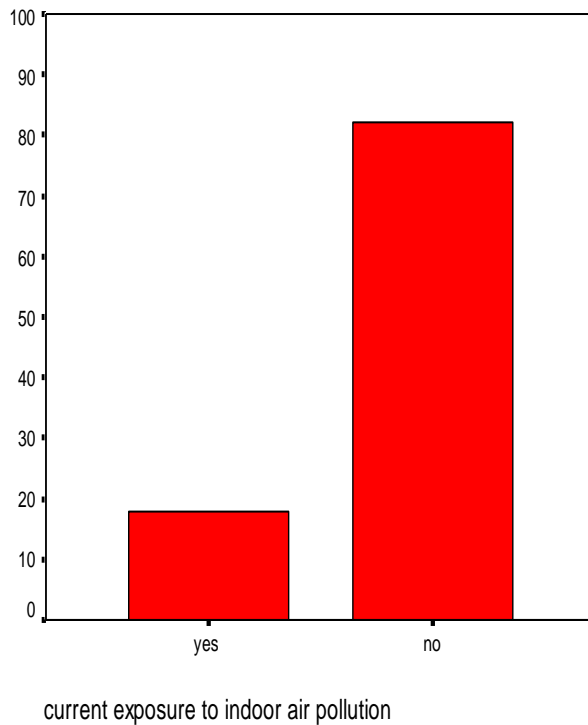
**Figure II:** Adherence to treatment in patients with COPD exacerbation.



**Figure III:** Smoking status of patients with COPD exacerbation.



**Figure IV:** Current exposure to biomass fuel smoke among patients with COPD exacerbation.



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