

# Prevalence of Influenza vaccination in Chronic Obstructive pulmonary disease patients

Amir Suleman,<sup>1</sup> Raza Ullah,<sup>2</sup> Hamid Nisar,<sup>1</sup>  
Shahida Naz,<sup>3</sup> Rab Nawaz Khan,<sup>4</sup>

<sup>1</sup>Department of Pulmonology,  
Ayub Teaching Hospital,  
Abbottabad - Pakistan

<sup>2</sup>Department of Pulmonology,  
Khyber Teaching Hospital,  
Peshawar - Pakistan

<sup>3</sup>Department of Dermatology,  
Hayatabad Medical Complex,  
Peshawar - Pakistan

<sup>4</sup>Department of Endocri-nology,  
Hayatabad Medical Complex,  
Peshawar - Pakistan

Address for correspondence:  
**Amir Suleman**  
Department of Pulmonology,  
Ayub Teaching Hospital,  
Abbottabad - Pakistan

E-mail:  
amirsuleman2013@gmail.com

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## Author Contributions

AS, conceived data, AS HN drafted the study, AS HN collected data, AS RU SN did statistical analysis and data interpretation, AS RU RNK review manuscript, All approved final version of manuscript to be publish.

## Declaration of conflicting interests

The Authors declares that there is no conflict of interest.

## ABSTRACT

**Background:** Chronic obstructive pulmonary disease (COPD) is a preventable, treatable and progressive disease characterized by persistent airflow limitation. Influenza is a common respiratory infection in winter. Viral infection especially influenza is the most common cause of COPD exacerbation. The objective of this study is to determine the prevalence of influenza vaccination in patients presented with COPD exacerbation.

**Methods:** This population-based cross sectional study was carried out in the department of Pulmonology Ayub Teaching Hospital Abbottabad. All patients diagnosed with COPD, irrespective of duration of disease and both males and females were included in the study. History of influenza vaccination in the past 3 years was retrieved from all these patients.

**Results:** Among 150 patients 90 (60%) were male and 60 (40%) were female. Mean age was 60.5 ( $\pm 10.3$  SD) years in males and 53 ( $\pm 8.4$  SD) years in females. Overall prevalence of influenza vaccination was 26.7%. This was more prevalent in patients with severe and more severe disease according to FEV1 (62.5%). Rate of vaccination was higher in males and in advance disease.

**Conclusion:** Influenza vaccination rate is not optimal in patients with COPD although it is recommended for COPD patients and this might be a contributing factor to increased rate of acute exacerbation in COPD patients.

**Key Words:** Chronic Obstructive Pulmonary Disease; vaccination; influenza

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## Introduction

Chronic obstructive pulmonary disease (COPD) is an obstructive airway disease that is characterized by the presence of persistent airflow limitation that is not completely reversible with treatment and does not change markedly over several months and is usually progressive in the long term. It is the fourth leading cause of death worldwide.<sup>1</sup> COPD exacerbation refers to increase in shortness of breath, amount of sputum and increase in sputum purulence.<sup>2</sup> Frequency of COPD exacerbation is the most important determinants of health related quality of life.<sup>3</sup> It is an important cause of hospital admission and

re-admission and poses a huge burden on health resources.<sup>4</sup> In 2012 COPD caused deaths of more than 3 million people accounting for 6% of all deaths globally. Because of ageing and continued exposure to COPD risk factors, its burden is going to increase in the coming decades.<sup>5</sup>

Smoking is the commonest and most important cause of COPD although non-smokers can develop COPD. In non-smokers outdoor, occupational and indoor air pollution (resulting from the burning of wood and other biomass fuels) is major COPD risk factors.<sup>6,7</sup> COPD development results from a complex interplay of genetic factors, environmental exposure, accumu-

lation of noxious gases and particles, airway hyper-sensitivity and poor lung growth during childhood.<sup>8,9</sup> Mortality rate of COPD in Pakistan<sup>10</sup> is 71 deaths per 100,000.

Influenza is an acute respiratory infection affecting 10-20% population in winter during epidemics.<sup>11</sup> Viral infection leading to COPD exacerbation is very common in these patients. Influenza virus is detected in 5-28% of patients following an exacerbation.<sup>12</sup> Influenza vaccine contains in-activated antigens from two types of influenza virus, A and B. 2 strains of influenza A and 1 of influenza B are included for trivalent vaccines.<sup>13</sup> Injectable vaccine, which contains inactivated virus, is available in a variety of dosage forms. The intramuscular (IM) form contains 45 µg of influenza hem agglutinin per 0.5 mL while intradermal dosage form contains 27 µg of influenza per 0.1 mL.

It is now established that influenza vaccines reduces the exacerbation rates in patients with COPD.<sup>14</sup> COPD exacerbation is the leading cause of death in this cohort of patients.<sup>15</sup>

The purpose of this study was to determine the prevalence of Influenza Vaccination in Chronic Obstructive Pulmonary Disease Patients. No local data is available at the time of the study and this study will help in addressing earlier this problem and timely management if vaccination rate is found low in these patients.

## Material And Methods

This population-based cross sectional study was carried out in the department of Pulmonology Ayub Teaching Hospital Abbottabad from October 2016 to

October 2017. Total of 150 patients were included through consecutive, non-probability sampling technique.

Patients aged >35 years and diagnosed with COPD and both gender were included. All those Patients diagnosed with restrictive lung disease, asthma and bronchiectasis were excluded.

After taking written informed consent, each patient and attendant where their involvement was felt necessary, was interviewed for influenza vaccination. Information was also received from the health record, discharge reports and outpatient clinic records. All the data was entered in a proforma.

Statistical analyses were carried out with SPSS-15. Frequencies and percentages were calculated for categorical variables e.g., gender, FEV1 and vaccination status while Mean  $\pm$  standard deviation (SD) was calculated for continuous variables e.g., age.

## Results

A total of 150 patients were included in the study. 90 (60%) were male and 60 (40%) were female (Table 1). Mean age was 60.5 ( $\pm$ 10.3 SD) years in males and 53 ( $\pm$  8.4 SD) years in females (Table 2).

COPD was stratified against FEV1. 70 (46.7%) were having FEV1 more or equal to 50%, 50 (33.3%) were having FEV1 less than 50% but more than 30% while only 30 (20%) were having FEV1 less or equal to 30% (Table 3).

In our study, the prevalence of influenza vaccination among COPD patients was found to be 26.7% (n = 40) (Table 4). Among these 40 vaccinated patients 30 were male and 10 were female.

Table 1: Gender distribution of study case

| Gender       | FREQUENCY  | PERCENTAGE  |
|--------------|------------|-------------|
| Male         | 90         | 60%         |
| Female       | 60         | 40%         |
| <b>Total</b> | <b>150</b> | <b>100%</b> |

Table 2: Age distribution of study case

| Gender | Mean Age                    |
|--------|-----------------------------|
| Male   | 60.5 ( $\pm$ 10.3 SD) years |
| Female | 53 ( $\pm$ 8.4 SD) years    |

Table 3: Distribution of patients according to FEV1

| % FEV1        | No. of patients |
|---------------|-----------------|
| = 50%         | 70 (46.7%)      |
| <50% but >30% | 50 (33.3%)      |
| =30%          | 30 (20%)        |

Table 4: Vaccination status

| Gender | Vaccinated | Non-vaccinated |
|--------|------------|----------------|
| Male   | 30 (33.3%) | 60 (66.7%)     |
| Female | 10 (16.7%) | 50 (83.3%)     |
| Total  | 40 (26.7%) | 110 (73.33%)   |

Table 5: Vaccination status on the basis of COPD severity

| % FEV1 | No. of patients vaccinated |
|--------|----------------------------|
| ≥ 50%  | 15 (37.5%)                 |
| ≤ 50%  | 25 (62.5%)                 |

Vaccination rate was higher in patients with severe and very COPD on the basis of FEV1 (<50%) (Table 5).

## Discussion

Chronic obstructive pulmonary disease is characterized by airflow limitation. Globally COPD, in the coming decades is expected to increase. Worldwide, COPD prevalence is more in males than in females.<sup>16</sup> Similar to studies from Cote et al.<sup>17</sup> and Tripathy et al.<sup>18</sup> where male are predominantly suffered from COPD, in our study the predominant gender was male. This can be explained by the fact that 80-90% cases are associated with cigarette smoking<sup>19</sup> which is more common in male. There is no standardized definition of an acute exacerbation of COPD. Symptoms vary between individuals.<sup>20</sup> Breathlessness, wheeze, chest tightness, increased cough, and increased sputum volume and purulence being more common.

The impact of influenza in COPD patients is important because of the increased incidence of influenza-related complications in these patients. Influenza is a big contributor to COPD acute exacerbation. Influenza vaccination has protective effects on the COPD exacerbation.<sup>21</sup> In specific risk groups like COPD generally influenza vaccination is favoured although the number of studies published is limited.<sup>22</sup> Influenza vaccination in developed countries varies widely in patients with COPD and is considered suboptimal.<sup>23,24</sup>

In our study the prevalence of influenza vaccination in COPD patients was found to be 26.7% (n=40). This is in contrast to studies in Spain where prevalence of influenza vaccination was found to be 52.2%<sup>25</sup> and 87.2%.<sup>26,27</sup> This difference can be explained by poor socioeconomic status of our patients, lack of education, awareness and availability of health care facilities. In many developed countries, despite the protective effects of influenza vaccination on prevention of COPD exacerbation, the prevalence is suboptimal.<sup>21</sup> Plans-Rubio P<sup>28</sup> and Harper SA et al.<sup>24</sup> also

found this lower rate of influenza vaccination in COPD patients.

There was a cohort of patient who rejected vaccination because of the fear of exacerbations or adverse reactions caused by the vaccine itself. This was more pronounced in patients with low FEV1. Similar findings of vaccine rejection especially in advanced COPD (low FEV1) patients were found in study by Roberto Garrastazu et al.<sup>21</sup> Also patients with advanced COPD were found to have sub optimal vaccination. This finding is in contrast to our study which showed maximum influenza vaccination in those patients with more advance disease (FEV1 < 50%). This may be because of frequent exacerbation leading to high concern of the families about the health of these patients in our society.

Our study has few limitations like small size of the study population. We did not observe for the protective effects of influenza vaccination objectively and solely dependent on the information from patients themselves, their attendants and their documents and the exacerbation of COPD was not characterized etiologically.

Despite recommendations for annual vaccination against influenza in developed countries, more than half of patients with COPD and other chronic medical conditions do not receive vaccine. In patients with COPD, influenza is associated with complications, such as bacterial pneumonia, exacerbation and worsening of pulmonary disease.

## Conclusion

Influenza virus infection is one of the important causes of hospitalization in patients with cardiorespiratory disease. Despite the protective effect in these patients, overall the prevalence of influenza vaccination was low, especially in patients with less severe disease. Further multi-centre studies need to be done to know the exact prevalence and causes leading to decreased vaccination rates in

COPD patients. This might help overcoming this problem and planes to vaccinate more patients in order to decrease burden over healthcare resources by decreasing hospitalization due to influenza and its associated complications in COPD patients.

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