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STATUS OF SEASONAL INFLUENZA VACCINATION AMONG THE PATIENTS OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) IN A TERTIARY CARE HOSPITAL OF AZAD KASHMIR, PAKISTAN

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Keywords

COPD, influenza, vaccination, exacerbation, Azad Kashmir, Pakistan.

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Abstract

Back ground: Influenza vaccination plays an important role in preventing the exacerbations of chronic obstructive pulmonary disease (COPD). Despite the proven advantages, there are patients who are reluctant to take up this intervention. There are limited data available analyzing the patient's compliance and effects of vaccination on exacerbation rates of COPD. Methodology: This cross sectional study was conducted in the department of medicine, combined military hospital (CMH), Rawalakot, AJK from Jan to July, 2022. Patients admitted with COPD diagnosed by post bronchodilator spirometery were included in the study. Non probability consecutive sampling was used to collect data. Demographics of patients, their knowledge and attitude towards influenza vaccination were analyzed. Results: Total 1260 patients were included in the study, males comprised 67.2% of involved patients. Diabetes mellitus was the commonest comorbidity (24.7%). Smoking was identified as the major risk factor (88.9%). Patients mainly experienced cough and shortness of breath (79.3%). Most of the COPD symptoms were of mild type (63.1%). Among the total patients, only 24(2%) got influenza vaccination. Conclusion: Patients with COPD should be encouraged regarding the benefits of influenza vaccination. They should be motivated to take up the vaccination annually before the onset of winter season.

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a common respiratory disease which affects one-tenth of the world's population and has been rendered as a major global health issue by the World Health Organization, which predicts that, COPD will become the third leading cause of death within 10 years¹. Smoke exposure is a well-established risk

factor for the development of COPD, and tobacco smoking is the most important COPD risk factor^{2,3}. Pathological basis of the disease is defined by incompletely reversible airflow obstruction, increased mucus secretion and bronchial mucosal lesions⁴. With the progression of disease, there may occur exacerbations several times per year, which may lead

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to frequent hospital admissions which decline lung functions and worsen the quality of life⁵. These exacerbations are mainly triggered by respiratory viruses and bacteria, which colonize the lower respiratory tract and results in airway inflammation⁶. A substantial number of exacerbations are prompted due to influenza virus which affect the progression of disease and cause excess morbidity and mortality⁷. Annual influenza vaccination is globally recommended in COPD guidelines^{8,9}. It can reduce lower respiratory tract infections and prevent mortality^{10,11}. A past study done in Canada showed a reduction of 38% influenza-related admissions in vaccinated as compared to unvaccinated individuals¹².

Yan Li et al studied the effectiveness of influenza and pneumococcal vaccination and percentages of preventing acute exacerbation were much higher as compared to non-vaccinated patients¹³. According to a past study, influenza vaccination is underutilized in Asian population and its prevalence is <12%¹⁴. A study done in Pakistan regarding modifiable risk factors of COPD revealed that 82.2% of patients were not vaccinated against influenza virus over the period of 1 year¹⁵.{ reference unable to cite}

Our study aimed to determine the effectiveness of influenza vaccination in patients with COPD in minimizing the exacerbation of disease and to analyze the usage and compliance of influenza vaccination in a set of patients with obvious indication of its use and their attitude towards vaccination.

Methodology:

This prospective cross sectional study was conducted at combined military hospital (CMH), Rawalakot, AJK, from Jan to July 2022. All patients >40 years, admitted with the diagnosis of COPD based on the clinical features and lung functions were included in the study. Non probability consecutive sampling was used to collect the data. Patients <18 years, who didn't undergo spirometery, no airflow obstruction on spirometery, having missing data of influenza vaccination and who left against medical advice before the completion of their treatment, were excluded from the study.

Patients were categorized in to mild, moderate, severe and very severe depending on GOLD criteria based on percentage predicted post-bronchodilator

 FEV_1 values (MILD: FEV1 > 80% predicted, MODERATE: 50% ≤ FEV1 < 80% predicted, SEVERE: 30% ≤ FEV1 < 50% predicted, VERY SEVERE: FEV1 < 30% predicted^{16.} Using a assembled questionnaire we demographic information (age, gender, marital status, occupation and qualification), co morbidities, smoking status, pack per year, and compliance to medication, frequency and symptoms experienced during exacerbations. Sample size was calculated by WHO sample size calculator by a statistician. In our questionnaire, we inquired the patients about influenza vaccination and whether they have been told about the pathogens and vaccines by their treating physician. An exacerbation of COPD was defined as a worsening of respiratory symptoms, which needed treatment with oral corticosteroids or antibiotics, or both¹⁷. Nominal data was presented in the form of tables and graphs. Frequency and proportions were calculated for categorical variables. All continuous variables were introduced as mean with standard deviation. Association between categorical variables was computed using Chi-square test. P value less than 0.05 was taken significant.

The study was conducted after ethical approval from the Research Ethics Committee of hospital, and informed consent was taken from the participants. The confidentiality and privacy of the participants was ensured by not disclosing their personal information.

Results:

Over the span of 6 months, 3147 patients reported to the hospital with respiratory illnesses, among which 1260 (40.1%) having COPD were included in the study. The mean age of patients was 57.26 years (SD=16.43). Male population comprised 847(67.2%) and females were 413(32.7%). Majority of the patients 931(73.8%) were married. Among the total patients, 468(37.1%) were having no co morbidities. Diabetes mellitus was the commonest co morbidity, found in 312(24.7%) of patients followed by hypertension in 221 (17.5%). Only 5 (0.39%) of patients were known cases of carcinoma lung. Considering the education level, most of the patients 848(67.3%) were illiterate while 14(1.1%) were graduated. Majority of the patients 341(27.06%) were farmers by profession, 303(24.04%) having

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domestic fire exposure and 128(10.1%) were jobless. Regarding the smoking status, 1121(88.95%) were smokers and 130(10.3%) had quit smoking long ago. Among the current smokers, 490(43.7%) were having less than 10 packs per year while 270(24.08%) had more than 20 packs per year.

Concerning the severity of COPD using GOLD (Global initiative for obstructive lung) criteria, patients were categorized in to mild, moderate, severe and very severe. Mild symptoms being the most 794(63.1%) as shown in fig1. A greater number of patients 924(73.3%) had poor compliance towards

their medications/ inhalers. About half of the patients 681(54.5%) had less than 2 exacerbations of symptoms per year while 147(11.67%) had more than 4 exacerbations. During exacerbations, 1000(79.3%) of patients experienced cough and shortness of breath (SOB), 189(15%) were having mucus production along with cough and SOB and 71(5.63%) went through limitation of activities along with other symptoms. Majority of the patients 1180(93.6%) had regular pattern of exacerbation while 80(6.34%), random.



With regard to vaccination status, 24(2%) received vaccination against influenza virus while remaining 1236(98%) were non-vaccinated. Assessing the awareness and attitude of patients towards vaccination, 56(4.44%) were well aware of vaccination, 950(75.3%) had no knowledge of disease as well as vaccination, 60(4.76%) patients told that they were not informed regarding vaccination by their treating physician and 194(15.3%) were unable to afford the vaccine as summarized in table 1.

Using the Chi square test, a positive co relation was found between co morbidities and severity of illness.

Patient having more than one co morbidity was found to have more severe illness (P <0.05). Patients having lower education levels were found to be least vaccinated as compared to those having higher education status (P< 0.05). Patients who work in an environment more exposed to smoke, and nonvaccinated against influenza were found to have more exacerbations as compared to other professions or vaccinated patients (P<0.05). There was no association found between gender and severity of illness.



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Characteristics Total Vaccinated $n=24$ Non vaccinated $n=1236$ Gender 10236 10247% 10247% 10247% Male 847(67.2%) 21(2.47%) 826(97.5%) 10295/3 Female 413(32.7%) 03(0.72) 410(99.2%) 10295/3 Age (mean \pm SD) 57.26 years 55.12years 56.22years (SD-15.43) (SD-15.43) (SD-15.43) 10295/3 Married 329(26.1%) 11(3.34%) 318(96.6%) Education 10134% 386(96.9%) 10295/6 Graduation 14(1.1%) 09(64.2%) 05(35.7%) Occupation 12(12.6%) 10(0.47%) 337(98.8%) Factory workers 212(16.8%) 10(0.47%) 211(99.5%) Obmestic fire exposure 332(2040%) 10(0.47%) 213(99.6%) Office workers 267(21.1%) 2(0.74%) 265(99.2%) Office workers 263(24.04%) 10(0.33%) 302(99.6%) Obmestic fire exposure 331(24.04%) 10(0.33%) 303(3.3%) <	Table 1: characteristics of patients with COPD (n=1260)					
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Jobless 128(10.1%) 10(7.8%) 118(92.1%) Co morbidities 468(37.1%) 16(3.41%) 452(96.5%) Asthma 53(4.2%) _ 53(100%) Chronic kidney disease(CKD) 79(6.26%) _ 79(100%) Hypertension(HTN) 221(17.5%) 05(2.26%) 216(97.7%) Diabetes mellitus(DM) 312(24.7%) 03(0.96%) 309(99%) Interstitial lung disease(ILD) 122(9.6%) _ 122(100%) Carcinoma lung 05(0.39%) _ 05(100%) Smoking status	Office workers	09(0.7%)	6(66.6%)	03(33.3%)		
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No co morbidities $468(37.1\%)$ $16(3.41\%)$ $452(96.5\%)$ Asthma $53(4.2\%)$ _ $53(100\%)$ Chronic kidney disease(CKD) $79(6.26\%)$ _ $79(100\%)$ Hypertension(HTN) $221(17.5\%)$ $05(2.26\%)$ $216(97.7\%)$ Diabetes mellitus(DM) $312(24.7\%)$ $03(0.96\%)$ $309(99\%)$ Interstitial lung disease(ILD) $122(9.6\%)$ _ $122(100\%)$ Carcinoma lung $05(0.39\%)$ _ $05(100\%)$ Smoking status $02(22.2\%)$ $07(77.8\%)$ Currently smoking $1121(88.9\%)$ $10(0.89\%)$ $1111(99.1\%)$ Not smoking $09(0.71\%)$ $02(22.2\%)$ $07(77.8\%)$ Ex-smoker $130(10.3\%)$ $12(9.2\%)$ $118(90.7\%)$ Pack per year (n=1121) $490(43.7\%)$ $06(1.22\%)$ $484(98.7\%)$ <10	Co morbidities					
Asthma $53(4.2\%)$ $ -$ $79(100\%)$ Chronic kidney disease(CKD) $79(6.26\%)$ $ -$ $79(100\%)$ Hypertension(HTN) $221(17.5\%)$ $05(2.26\%)$ $216(97.7\%)$ Diabetes mellitus(DM) $312(24.7\%)$ $03(0.96\%)$ $309(99\%)$ Interstitial lung disease(ILD) $122(9.6\%)$ $ 122(100\%)$ Carcinoma lung $05(0.39\%)$ $ 05(100\%)$ Smoking status $ 05(100\%)$ Currently smoking $1121(88.9\%)$ $10(0.89\%)$ $1111(99.1\%)$ Not smoking $09(0.71\%)$ $02(22.2\%)$ $07(77.8\%)$ Ex-smoker $130(10.3\%)$ $12(9.2\%)$ $118(90.7\%)$ Pack per year (n=1121) $ -$ <10	No co morbidities	468(37.1%)	16(3.41%)	452(96.5%)		
Chronic kidney disease(CKD) $79(6.26\%)$ $ 79(100\%)$ Hypertension(HTN) $221(17.5\%)$ $05(2.26\%)$ $216(97.7\%)$ Diabetes mellitus(DM) $312(24.7\%)$ $03(0.96\%)$ $309(99\%)$ Interstitial lung disease(ILD) $122(9.6\%)$ $ 122(100\%)$ Carcinoma lung $05(0.39\%)$ $ 05(100\%)$ Smoking status $ 05(100\%)$ Currently smoking $1121(88.9\%)$ $10(0.89\%)$ $1111(99.1\%)$ Not smoking $09(0.71\%)$ $02(22.2\%)$ $07(77.8\%)$ Ex-smoker $130(10.3\%)$ $12(9.2\%)$ $118(90.7\%)$ Pack per year (n=1121) $ -$ <10	Asthma	53(4.2%)		53(100%)		
Hypertension(HTN) 221(17.5%) 05(2.26%) 216(97.7%) Diabetes mellitus(DM) 312(24.7%) 03(0.96%) 309(99%) Interstitial lung disease(ILD) 122(9.6%) _ 122(100%) Carcinoma lung 05(0.39%) _ 05(100%) Smoking status	Chronic kidney disease(CKD)	79(6.26%)	_	79(100%)		
Diabetes mellitus(DM) $312(24.7\%)$ $03(0.96\%)$ $309(99\%)$ Interstitial lung disease(ILD) $122(9.6\%)$ _ $122(100\%)$ Carcinoma lung $05(0.39\%)$ _ $05(100\%)$ Smoking statusImage: Currently smoking $1121(88.9\%)$ $10(0.89\%)$ $1111(99.1\%)$ Not smoking $09(0.71\%)$ $02(22.2\%)$ $07(77.8\%)$ Ex-smoker $130(10.3\%)$ $12(9.2\%)$ $118(90.7\%)$ Pack per year (n=1121) $490(43.7\%)$ $06(1.22\%)$ $484(98.7\%)$ <10	Hypertension(HTN)	221(17.5%)	05(2.26%)	216(97.7%)		
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	Diabetes mellitus(DM)	312(24.7%)	03(0.96%)	309(99%)		
Carcinoma lung 05(0.39%)	Interstitial lung disease(ILD)	122(9.6%)	_	122(100%)		
Smoking status1121(88.9%)10(0.89%)1111(99.1%)Currently smoking $09(0.71\%)$ $02(22.2\%)$ $07(77.8\%)$ Not smoking $09(0.71\%)$ $02(22.2\%)$ $07(77.8\%)$ Ex-smoker $130(10.3\%)$ $12(9.2\%)$ $118(90.7\%)$ Pack per year (n=1121) $490(43.7\%)$ $06(1.22\%)$ $484(98.7\%)$ <10	Carcinoma lung	05(0.39%)	_	05(100%)		
Currently smoking1121(88.9%)10(0.89%)1111(99.1%)Not smoking09(0.71%)02(22.2%)07(77.8%)Ex-smoker130(10.3%)12(9.2%)118(90.7%)Pack per year (n=1121)490(43.7%)06(1.22%)484(98.7%)<10	Smoking status					
Not smoking 09(0.71%) 02(22.2%) 07(77.8%) Ex-smoker 130(10.3%) 12(9.2%) 118(90.7%) Pack per year (n=1121) 490(43.7%) 06(1.22%) 484(98.7%) <10	Currently smoking	1121(88.9%)	10(0.89%)	1111(99.1%)		
Ex-smoker $130(10.3\%)$ $12(9.2\%)$ $118(90.7\%)$ Pack per year (n=1121)490(43.7\%) $06(1.22\%)$ $484(98.7\%)$ <10 $490(43.7\%)$ $06(1.22\%)$ $484(98.7\%)$ $10-20$ $361(32.2\%)$ $03(0.83\%)$ $358(99.1\%)$ >20 $270(24.08\%)$ $01(0.37\%)$ $269(99.6\%)$ Compliance to medication/ inhalerGood $336(26.6\%)$ $21(6.25\%)$ $315(93.7\%)$ Poor $924(73.3\%)$ $03(0.32\%)$ $921(99.6\%)$	Not smoking	09(0.71%)	02(22.2%)	07(77.8%)		
Pack per year (n=1121) $490(43.7\%)$ $06(1.22\%)$ $484(98.7\%)$ <10 $361(32.2\%)$ $03(0.83\%)$ $358(99.1\%)$ >20 $270(24.08\%)$ $01(0.37\%)$ $269(99.6\%)$ Compliance to medication/ inhaler GoodGood $336(26.6\%)$ $21(6.25\%)$ $315(93.7\%)$ Poor $924(73.3\%)$ $03(0.32\%)$ $921(99.6\%)$	Ex-smoker	130(10.3%)	12(9.2%)	118(90.7%)		
<10	Pack per year (n=1121)					
10-20 $361(32.2%)$ $03(0.83%)$ $358(99.1%)$ >20 $270(24.08%)$ $01(0.37%)$ $269(99.6%)$ Compliance to medication/ inhaler $336(26.6%)$ $21(6.25%)$ $315(93.7%)$ Good $336(26.6%)$ $21(6.25%)$ $315(93.7%)$ Poor $924(73.3%)$ $03(0.32%)$ $921(99.6%)$	<10	490(43.7%)	06(1.22%)	484(98.7%)		
>20 270(24.08%) 01(0.37%) 269(99.6%) Compliance to medication/ inhaler 336(26.6%) 21(6.25%) 315(93.7%) Good 924(73.3%) 03(0.32%) 921(99.6%)	10-20	361(32.2%)	03(0.83%)	358(99.1%)		
Compliance to medication/ inhaler 336(26.6%) 21(6.25%) 315(93.7%) Good 924(73.3%) 03(0.32%) 921(99.6%)	>20	270(24.08%)	01(0.37%)	269(99.6%)		
Good 336(26.6%) 21(6.25%) 315(93.7%) Poor 924(73.3%) 03(0.32%) 921(99.6%)	Compliance to medication/ inhaler					
Poor 924(73.3%) 03(0.32%) 921(99.6%) Erequency of exacerbation	Good	336(26.6%)	21(6.25%)	315(93.7%)		
Frequency of exacerbation	Poor	924(73.3%)	03(0.32%)	921(99.6%)		
	Frequency of exacerbation			, , ,		
<2 681(54.04%) 11(1.61%) 670(98.3%)	<2	681(54.04%)	11(1.61%)	670(98.3%)		
2.4 (432(34.2%) 7(1.62%) 425(98.3%)	2-4	432(34.2%)	7(1.62%)	425(98.3%)		
>2 147(11.67%) 6(4.08%) 141(95.9%)	>2	147(11.67%)	6(4.08%)	141(95.9%)		
Symptoms during exacerbation	Symptoms during exacerbation					
Cough +Shortness of breath(SOB) 1000(79.3) 18(1.8%) 982(98.2%)	Cough +Shortness of breath(SOB)	1000(79.3)	18(1.8%)	982(98.2%)		



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Above all + mucus production	189(15%)	05(2.64%)	184(97.3%)
Above all +limitation of activity	71(5.63%)	01(1.40%)	70(98.5%)
Pattern of exacerbation			
Regular	1180(93.6%)	02(0.16%)	1178(99.8%)
Random	80(6.34%)	22(27.5%)	58(72.5%)
Attitude towards vaccination			
Have knowledge	56(4.44%)	24(42.8%)	32(57.1%)
Don't have a knowledge	950(75.3%)	-	950(100%)
Not told by physician	60(4.76%)	-	60(100%)
Can't afford	194(15.3%)	-	194(100%)

Discussion:

In our study, the rate of influenza vaccination of the observed COPD patients was 2%, which is far below the targeted set by WHO internationally¹⁸. A Study from past is consistent with the fact that influenza vaccination is underutilized in Asian region and is not routinely offered to COPD patients¹⁹. And the prevalence is \leq 12% in hospitalized patients who require vaccination²⁰. Studies from other countries higher vaccination rates. reported In an epidemiological study done in Italy, rate of influenza vaccination was 30.5%²¹. Studies from turkey and Germany showed higher rates i.e. 36.5% and 46.5% respectively^{22, 23}. The reason for higher prevalence of vaccination in developed countries is probably because they make policies based on cost effectiveness, affordability, and prevention of ambulatory care visits²⁴.

Our results have proved that, influenza vaccination decrease the exacerbations among COPD. Among 24 patients who were vaccinated, experienced <2 exacerbations in 11 patients, 2-4 in 7 while >4 exacerbations were only in 6 patients. Similar results were found in the study from Spain which showed that a significant protective effect was observed against severe exacerbations after having influenza vaccination: Ora: 0.54 (95%CI: 0.35-0.84)²⁵.

More than half (75.3%) of our patients have no knowledge regarding vaccination, 15.3% have affordability issues and 4.76% revealed that they were not informed about the vaccination. Similarly, a study done in Poland shows that lower acceptance of vaccination was because of misconceptions and cost of vaccine²⁶. Vandenbos et.al²⁷ found that negative attitude towards vaccination was because of lack of recommendation from the physician. In some cases people have misconceptions regarding vaccine use

and they don't believe in effectiveness of the vaccine as stated by Ciblak et.al²⁸.

In our study we found the barriers associated with lower likelihood of getting vaccination including lower education status (illiteracy rate: 67.3%) and bad habits i.e. smoking (88.9% were active smokers). A study done in Boston found the same factors along with lack of health insurance and heavy alcohol consumption as barriers to have a vaccination against influenza²⁹. A recent study identified beliefs about vaccine side effects, time constraints and fear of needles as main barriers to vaccination uptake³⁰. T.Olanipekun et. al stated getting sick from influenza vaccine(58%), fear of worsening COPD by vaccine(50%), doubts regarding ineffectiveness of vaccine(41%) as main reason for not taking vaccine³¹. According to our study, 16.8% of patients were farmers, 24.04% have domestic fire exposure mainly females and 21.1% were transport workers exposed to air pollutants. And there was a positive association between pollutants exposure and frequency of exacerbation. Boehm A at.al mentioned that vehicle's emissions, combustion gases from households wood and industrial pollution contribute to air pollution which leads to frequent exacerbation of COPD³².

There is a risk of developing influenza infection among the patients of COPD so, World health organization (WHO) recommends annual influenza vaccine not only for patients having COPD but also includes pregnant women at any stage of pregnancy, children aged between 6 months to 5 years, elderly individuals (aged more than 65 years), individuals with chronic medical conditions and health-care workers³³.

This study has several limitations. First, as this is a single centered study, this design might effects the findings. Second, the patients could who got

vaccinated at the recent visit couldn't be followed up to record the frequency of exacerbations after getting vaccine.

Conclusion:

Influenza vaccination is much effective in the prevention of acute respiratory infection due to influenza regardless of the severity of COPD. This study identifies most vulnerable groups for which vaccination programs can be arranged in order to prevent the exacerbations of COPD. Our results emphasize the recommendations of annual influenza vaccination and highlight its necessity. Despite guidelines for routine vaccination in patients with COPD there is a significant influenza infections which effect patient's outcomes. The use of better surveillance and development of novel steps for influenza vaccination may help prevent recurrent hospital admissions.

Recommendation:

Providing proper guidance on vaccination and ensuring the availability of vaccines at the study center can significantly improve outcomes and reduce the exacerbations of Chronic Obstructive Pulmonary Disease (COPD) in the future.

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