

ORIGINAL ARTICLE

Frequency of Atrial Arrhythmias in the Patients With Chronic Obstructive Pulmonary Disease

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ABSTRACT

Background: Chronic obstructive pulmonary disease (COPD) has been linked with various kind of cardiac arrhythmias. The risk of arrhythmias in patients with COPD has been driven by the stage and disease state, with a higher frequency of supraventricular tachycardia during exacerbations.

Aim: To evaluate the frequency of atrial arrhythmias (which include atrial fibrillation, atrial flutter, and multifocal atrial tachycardia) in the patients who were suffering from COPD.

Methods: It was a cross sectional analysis or prevalence study. This research was piloted in the Medicine Department, Medical Division IV, Services Hospital, Lahore. This research was ended in 365 days after endorsement of synopsis from 1st June, 2017 to 30th May 2018.

Results: In our study, 111(46.25%) were in range 40-55 years of age while 129(53.75%) were in range 56-70 years of age, the calculated mean standard deviation was 56.23±8.19 years, 134(55.83%) were male and 106(44.17%) were females, 142(59.17%) between 1-2 years and 98(40.83%) had >2 years of duration. Frequency of atrial arrhythmias in the patients who were suffering from COPD was recorded as 22(9.17%) having Atrial Fibrillation, 53(22.08%) had Atrial flutter and 31(12.92%) had Multifocal atrial tachycardia.

Conclusion: Atrial arrhythmias are common findings in patients with COPD. So, it is very important for treating physicians that every patient having COPD, should undergo Electrocardiogram (ECG) for picking up the atrial arrhythmias.

Keywords: Chronic obstructive pulmonary disease, atrial arrhythmias, frequency

INTRODUCTION

Chronic obstructive pulmonary disease(COPD) state characterize by the presence of airflow obstruction due to chronic bronchitis or emphysema. It is estimated that 14 million of Americans have been diagnosed with COPD. The most important cause of COPD is smoking.¹The main complications of COPD which include atrial fibrillation (AF), atrial flutter (AFL) and multifocal atrial tachycardia (MAT), these are the most common atrial arrhythmias in patients suffering from chronic obstructive disease. Atrial flutter is less common than atrial fibrillation. AFL and MAT mostly occur in patients with the history of COPD.¹⁻³Chronic obstructive pulmonary disease is a global health issue, with cigarette smoking being an important risk factor universally. Global Burden of Disease and Risk Factors project organized by World health organization (WHO) in 2001 show that COPD was the fifth leading cause of death⁴.

Chronic obstructive pulmonary disease is a global health issue, with cigarette smoking being an important risk factor universally. Global Burden of Disease and Risk Factors project organized by WHO in 2001 show that COPD was the fifth leading cause of death Existing literature shows that the prevalence of atrial fibrillation (AF) in the United kingdom (UK) is more than 12/1000,

increasing to over 100/1000 in people aged 85 years and over⁵.

Existing literature showed that a high proportion (which is 40%) of patients were observed to have multifocal atrial tachycardia before the treatment in large cohort study of COPD's patients with no or stable cardiac co-morbidities.⁶ Previous study showed that the 20 percent patients with heart failure were suffering from COPD significantly with $p < .001$. This result showed that COPD is the cause for heart failure.⁴The prevalence of atrial flutter AFL in a survey in United States, it was estimated that 0.07million people were patients of AFL in 2005.⁷ It was reported that the incident of multifocal atrial tachycardia with a range from 2.5% to 20%⁸. Previous study shows that the percentage of atrial fibrillation AF with the history of chronic obstructive pulmonary disease was 12% and the percentage of atrial flutter AFL was 25% having $p=0.006$. so it reveals that patients having AFL had a higher chance of having COPD.² It is noticed that 21.7% patients were diagnosed atrial fibrillation also suffering from COPD with $p=0.001$.³ It was observed that the proportion of multifocal atrial tachycardia was ranged from 27% to 32% with $p=0.70$ ⁶.

Major rationale of the study was to find out the frequency of atrial arrhythmias (atrial fibrillation, atrial flutter, and multifocal atrial tachycardia) in the patients who were suffering from chronic obstructive pulmonary disease. There is no local data available for this topic more over

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there is regional variation in the disease prevalence so the different results will be obtained in local residents.

The objective of the study was to find out the occurrence of atrial arrhythmias (which include atrial fibrillation, atrial flutter, and multifocal atrial tachycardia) in the patients who were suffering from COPD.

OPERATIONAL DEFINITIONS

Atrial Fibrillation (AF): Atrial fibrillation was assessed by the Electrocardiogram (ECG), Irregular rhythm & absence of P-waves

Atrial Flutter (AFL): Atrial flutter was assessed by Electrocardiogram (ECG), regular rhythm, heart rate (100-150 beat/minute & "Sawtooth" pattern of atrial activity in lead II, III and AVF

Multifocal Atrial Tachycardia (MAT): Atrial fibrillation was assessed by Electrocardiogram (ECG) where ECG revealed three or more distinct P-waves morphology & irregular PP interval and heart rate 100-140 beats/minute

PATIENTS & METHODS

It was a cross sectional research or prevalence study. This research was conducted in the Medicine Department, Medical Division IV, Services Hospital, Lahore This study was conducted after endorsement of the project for one year, from 1st June, 2017 to 30th May 2018. The size of sample approximated 240 with confidence level of 95%, 2.5% prevalence of atrial fibrillation with margin of error of 2%. Non- Probability subjective sampling technique was used.

Inclusion Criteria: All Chronic obstructive pulmonary disease patient aged more than 40-70 years, both male and female having the history of COPD >one year duration were included and those who were on regular treatment & all patients who were smoking cigarette for more than 10 years.

Exclusion Criteria: Patients with the history of Ischemic heart disease, It was assessed by Electrocardiogram (ECG) with no ST segment changes, patients with exposure to occupational dusts and chemicals, patients having any history of employment in chemical factories, patients having no history of diabetes mellitus (it was determined by Fasting blood glucose BSF<100mg/dl and Random blood glucose BSR<140mg/dl), hypertension (BP<120/80) & patients not previously using diuretics and no electrolytes imbalance (sodium 135-147mEq/L and potassium 3.5-5.2mEq/L)

Data collection procedure: Two hundred and forty patients of having chronic obstructive pulmonary disease fulfilling the criteria both inclusion and exclusion, were chosen in the Medicine Department, Medical Unit IV, Services Hospital, Lahore. Informed consent was seized from custodian of patients and that the data was utilized and published but privacy was also retained. Age, Sex and address were entered in demographic profile. All data was entered on structured Performa. To observe the presence or absence of p-waves, irregular rhythm, regular rhythm, irregular PP interval and Saw-tooth pattern of atrial activity in lead II, III and AVF we drew Electrocardiogram (ECG) by electrocardiographic machine. Outcome variable was recorded (as per operational definition).

Analysis of data: Data was entered and analyzed in Statistical Package for the Social Sciences, SPSS version 24.0 [arithmetical software] after aggregation and scrutinized through its arithmetical packet. The complete quantitative variables that is age, was conferred as mean and standard deviation SD. The number and percentage of qualitative variables like sex, AF, AFL and MAT was calculated. Stratification was done with respect to age, gender and duration disease. Chi square test was used for post stratification. Significant value is P value ≤ 0.05 .

RESULTS

The entire of 240 cases which met the inclusion/exclusion criteria were entered to assess the rate of atrial arrhythmias (which include atrial fibrillation, atrial flutter, and multifocal atrial tachycardia) in the patients who were suffering from COPD.

According to the age categories of the patients, 111(46.25%) was in range 40-55 years of age while 129(53.75%) was in range 56-70 years old, with mean \pm Standard deviation (SD) were measured as 56.23 ± 8.19 years of age. Dispersal of the patients according to gender was completed which display that male were 134(55.83%) and female were 106(44.17%). Rate of duration of disease was recorded as 142(59.17%) between 1-2 years and 98(40.83%) had >2 years of duration. Frequency of atrial arrhythmias in the patients who were suffering from COPD was recorded as 22(9.17%) having Atrial Fibrillation, 53(22.08%) had Atrial flutter and 31(12.92%) had Multifocal atrial tachycardia (Table 1).

Categorization for frequency of Atrial Fibrillation with respect to age was done which display that out of 22 cases, 7 were in range 40-55 years and 15 were in range 56-70 years, p value was 0.15 (Table 2).

Categorization for frequency of Atrial Fibrillation with respect to gender was done which display that out of 22 cases, Male were 10 and Female were 12, the calculated p value is 0.30 (Table 2).

Categorization for frequency of Atrial Fibrillation with respect to duration of disease was done which display that out of 22 patients, 8 were between 1-2 years of duration of disease and 14 were having >2 years of duration of disease, p value was calculated as 0.04 (Table 2).

Categorization for frequency of Atrial flutter with respect to age was done which display that out of 53 cases, 19 were in range 40-55 years and 34 were in range 56-70 years, the calculated p value is 0.15 (Table 2).

Categorization for frequency of Atrial flutter with respect to gender was done which display that out of 53 patients, Male were 22 and female were 31, the calculated p value is 0.01 (Table 2).

Categorization for frequency of Atrial flutter with respect to duration of disease was done which display that out of 53 patients, 14 were between 1-2 years of duration of disease and 39 were having >2 years of duration of disease, p value was calculated as 0.00 (Table 2).

Categorization for frequency of multifocal atrial tachycardia with respect to age was done which display that out of 31 cases, 12 were between 40-55 years and 19 were between 56-70 years, p value was calculated as 0.36 (Table 2).

Categorization for frequency of multifocal atrial tachycardia with respect to gender was done which display that out of 31 cases, 26 were male and 27 were females, p value was calculated as 0.25 (Table 2).

Categorization for frequency of multifocal atrial tachycardia with respect to duration of disease was done which display that out of 31 cases, 30 were between 1-2 years of duration of disease and 23 were having >2 years of duration of disease, p value was calculated as 0.67 (Table 2).

Table 1: Distribution of patients with regard to age, gender, duration of disease & Atrial Arrhythmias (n=240)

	n	%age
Age in years		
40-55	111	46.25
56-70	129	53.75
Mean±SD*	56.23±8.19	
Gender		
Male	134	55.83
Female	106	44.17
Duration of disease (years)		
1-2	142	59.17
>2	98	40.83
Atrial arrhythmias		
Atrial Fibrillation	22	9.17
Atrial flutter	53	22.08
Multifocal atrial tachycardia	31	12.92

*SD- Standard deviation

Table 2: Categorization of patients in regard to frequency of atrial fibrillation, atrial flutter & multifocal atrial tachycardia with respect to age, gender, duration of disease (n=22)

	Atrial Fibrillation		P value
	Present	Absent	
Age in years			
40-55	7	104	0.15
56-70	15	114	
Gender			
Male	10	124	0.30
Female	12	94	
Duration of disease (in years)			
1-2	8	134	0.04
>2	14	84	
Atrial flutter			
Age in years			
40-55	19	92	0.15
56-70	34	95	
Gender			
Male	22	112	0.01
Female	31...	75	
Duration of disease (in years)			
1-2	14	128	0.00
>2	39	59	
Multifocal atrial tachycardia			
Age in years			
40-55	12	99	0.36
56-70	19	110	
Gender			
Male	26	108	0.25
Female	27	79	
Duration of disease (in years)			
1-2	30	112	0.67
>2	23	75	

DISCUSSION

This study was designed in a such a way so that we could easily find out the frequency of all atrial arrhythmias in the patients who were suffering from chronic obstructive pulmonary disease considering the fact that there is no local data available for this topic more over there is regional variation in the disease prevalence so the different results will be obtained in local population.

In our study, 111(46.25%) participants were in range 40-55 years old while 129(53.75%) was in range 56-70 years old, Calculated mean±standard deviation were 56.23±8.19 years, Male were 134(55.83%) and Females were 106(44.17%), 142(59.17%) between 1-2 years and 98(40.83%) had >2 years of duration. Frequency of atrial arrhythmias in the patients who were suffering from COPD was recorded as 22(9.17%) having Atrial Fibrillation, 53(22.08%) had Atrial flutter and 31(12.92%) had Multifocal atrial tachycardia.

The findings of our study are comparable with the study by Pappone C et al.⁸ which reported that the incident of multifocal atrial tachycardia with a range from 2.5% to 20%.⁸ Another previous study shows that the percentage of atrial fibrillation AF with the history of COPD was 12% and the percentage of atrial flutter AFL was 25% having p=0.006. It showed that patients with AFL were more likely to have COPD².

It is noticed that 21.7% patients were diagnosed atrial fibrillation also suffering from COPD with p=0.001³. It was observed that the proportion of multifocal atrial tachycardia was ranged from 27% to 32% with p=0.70⁶, these findings are higher than the results of our study, which may be due to regional differences.

A land mark study revealed that patients with COPD and bronchial asthma who are being treated with oral steroids, were more vulnerable to have AF⁹.

A study Conducted by van der Hooft et al¹⁰ revealed that irrespective of the cause of COPD or Bronchial Asthma, there was very high occurrence of AF especially in those patients whose disease is controlled on high doses of oral steroids. Steroids lead to different types of arrhythmias by affecting the cell membrane which in turns shifts the potassium out of the cells¹¹. Theophylline, A major drug used in these patients with COPD and bronchial Asthma, has been strongly associated with the occurrence of AF despite of having normal serum levels of the drug¹². However, in light of the above studies and our findings Atrial Fibrillation was the most common atrial arrhythmia in patients with COPD, but our data in local setup is primary and needs some other studies to be conducted to authenticate our findings.

CONCLUSION

Atrial arrhythmias are common findings in patients with COPD. So, it is very important for treating physicians that every patient having COPD should undergo Electrocardiogram (ECG) for picking up the atrial arrhythmias.

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