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Original Article

Frequency of Stroke in Patients Presenting with Chronic Obstructive Pulmonary Disease

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Abstract

Objective: To determine the frequency of stroke in patients presenting with COPD.

Methods: This was a Cross sectional study conducted at North Medical Ward, Mayo Hospital, Lahore for Six months i.e. 28-7-2020 to 28-1-2021. Total 250 patients fulfilling the study criteria were enrolled. Then patients were evaluated by using spirometer and FEV1 and FVC were noted. Two groups were formed i.e. group I with COPD (FEV1/FVC<0.70) and group II without COPD. Then patients were asked for their medical record and history of stroke. If there was positive history of stoke, then it was noted. All this information was recorded on a predesigned proforma.

Results: The mean age of the patients was 60.21±19.32 years. There were 188 (75.2%) males and 62 (24.8%) females in this study. There were 72 (28.8%) patients with COPD and 178 (71.2%) without COPD. In this study there were 44 (17.6%) patients who were having stroke and 206 (82.4%) had no stroke. There was significant association between Stroke and COPD (p-value:<0.001)

Conclusion: It was concluded that frequency of stroke among COPD patients was 36.1%. Age, Gender, BMI, Hypertension, Diabetes and smoking had a significant impact on stroke frequency among COPD patients. Keeping in mind these results stroke screening should be carried out periodically by the pulmonologist to reduce it risk.

Key words: Chronic Obstructive Pulmonary Disease, Stroke, FEV1, FVC.

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Introduction

Chronic obstructive pulmonary disease (COPD) is an obstructive airway disease associated with cardiovascular complications.[1] Worldwide it is the third leading cause of death. Although with newer treatment options, its prognosis has improved, still the mortality is quite high in these patients. Stroke is a neurological disorder caused by vessel blockage or leakage resulting in disability. There are a number of studies in literature on prevalence of the disease but very little is available in literature on the prospective and standardized incidence of the disease. In Rotterdam cohort Study prevalence was 4.7 % and the overall incidence was 0.9% annually.[2]

Cardiovascular complications are most common finding in patients of COPD. This is the major cause of longer duration of hospital admissions and increased mortality and morbidity.[3] This clearly alarms the physicians, pulmonologists and cardiologists' and highlights the need for screening and timey management of cardiovascular complications in COPD.[1,4] Among the cardiovascular stroke is major disability if not promptly treated. However there is no clear data whether chances of getting any stroke ischemic or hemorrhagic types, increase with COPD or not. More multicenter and large sample size studies are required to prove it.[5]

It has been reported that there were 20% patients who were diagnosed with COPD based on spirometer finding (FEV1/FVC<0.70). Among patients with COPD, stroke was positive in 7% cases while in 4.7% in patients without COPD.[6] Another study reported that that there were 20.4% patients who were diagnosed with COPD based on spirometer finding (FEV1/FVC<0.70). Among patients with COPD, stroke was positive in >20% cases while in <20% in patients without COPD.[7]

Rationale of this study was to see any association of stroke with COPD. Stroke is a major disability for life. Literature showed that there is association of COPD with stroke but varied frequency has been observed in

literature. Moreover, local data is also deficient in this regard which could help us to determine the relationship of COPD with stroke. So we want to conduct this study to confirm the current incidence of stroke in patients of COPD in our local population. So that in future we may be able to implement the results of this study in local setting and can add screening of COPD in patients to prevent occurrence of stroke in future. The objective of present study was to determine the frequency of stroke in patients presenting with chronic obstructive pulmonary disease.

Methods

It was a cross sectional study carried out at North Medical Unit, Mayo Hospital, Lahore from 28-7-2020 to 27-1-2021. 250 patients were taken with 95% confidence level, 5% margin of error and taking expected percentage of COPD i.e. 20% presenting for routine check-up.Patients aged 16-85years with either gender presenting of routine check-up in medical OPD were recruited by non-probability, consecutive sampling. Patients with asthma, cardiac disease (on medical record), hepatic disease, renal disease and with incomplete medical record were excluded. COPD was defined as presence of FEV1/FVC<0.70 at the time of presentation assessed on pulmonary function tests. Stroke was labeled if there was medical record of hypodense (ischemic) or hyperdense (hemorrhagic) area detected on computed tomography(CT) Brain plain and patient presented with facial or body paralysis anytime in past. Informed consent was obtained. Demographic details (name, age, sex, BMI, diabetes (BSR>200mg/dl), blood pressure (Bp ≥ 140/90mmHg), cigarette smoking) was taken. Then patients were evaluated by using spirometer and FEV1 and FVC were noted.. Then patients will be asked for their medical record and history of stroke. If there was positive history of stoke, then it was noted (as per operational definition). Patients were managed as per standard protocol. The collected data was analysed by SPSS version 21. Quantitative variables e.g. age were taken as mean ± standard deviation. Qualitative variables like gender, diabetes, blood pressure, were taken as frequency and percentage. Frequency of stroke was seen by using chi-square test. p-value ≤0.05 was taken as significant. Data was stratified for age, gender, BMI, diabetes, blood pressure and cigarette smoking. Post-stratification, chi-square test was applied to compare COPD in stratified groups for each strata. p-value ≤0.05 was taken as significant.

Results

The mean age was 60.21±19.32 years the minimum age was 30 years and maximum was 90 years. There were 188(75.2%) males and 62(24.8%) females in this study. There were 155(62%) patients with normal BMI, 33(13.2%) were overweight and 62(24.8%) were obese. There were 83(33.2%) patients with diabetes and 167 (66.8%) without diabetes. There were 65(26%) patients with hypertension and 185(74%) without hypertension. There were 100(40%) patients who were smokers and 150(60%) were nonsmokers.

In this study there were 44(17.6%) patients who were having stroke and 206(82.4%) had no stroke. There was significant association between Stroke and COPD as the p-value was significant. (p-value:<0.001) There was no significant association between COPD and age group as the p-value was not significant. (p-value: 0.971) There was no significant association between COPD and gender as the p-value was not significant. (p-value: 0.711) There was no significant association between COPD and BMI as the p-value was not significant. (p-value: 0.975)There was no significant association between COPD and diabetes as the p-value was not significant. (p-value:0.977)There was no significant association between COPD and hypertension as the p-value was not significant. (p-value:0.819)There was no significant association between COPD and smoking. (p-value: 0.73) There was significant association between frequency of stroke and COPD in all the age groups i.e. 30-50, 51-70 and more than 70 years. (p-value: 0.003, 0.005 and 0.012 respectively) There was significant association between frequency of stroke and COPD among both males and females. (p-value: <0.001and 0.006) There was significant association between frequency of stroke and COPD in the patients with normal BMI, overweight and obese. (p-value: 0.001, 0.053 and 0.007 respectively) There was significant association between frequency of stroke and COPD in both type of patients with diabetes and without diabetes (p-value: 0.002 and <0.001) There was significant association between frequency

Table 1: *Descriptive statistics of COPD patients*

n	***250***
Mean	60.21
SD	19.32
Minimum	30
Maximum	90
Male	188(75.2%)
Female	62(24.8%)
Diabetics	83(33.2%)
Non-Diabetics	167(66.8%)
Hypertensive	65(26%)
Non-hypertensive	185(74%)
Smokers	100(40%)
Non-smokers	150(60%)

of stroke and COPD in both type of patients with hypertension and without hypertension (p-value: 0.014 and <0.001)There was significant association between frequency of stroke and COPD among patients who were smokers and who were non-smokers. (p-value: <0.001 and 0.001).

Table 2: *Frequency of Stroke among COPD Patients*

	Frequency	Percent
Yes	44	17.6%
No	206	82.4%
Total	**250**	**100%**
P-VALUE= < 0.001		

Discussion

In this study we have seen significant association between frequency of stroke and COPD. There are a number of studies that support our results. Lin et al 2015 reported conducted a study concluded that ischemic stroke was greater among COPD patients than those without COPD after modifying risk factors and follow up of almost 3 years.[10]

Whereas the findings of our study also reported that there was significant association between frequency of stroke and COPD. (p-value:<0.001) In a study, treatment with short-acting β2-agonists showed increased risk of stroke, whereas there was decreased risk of stroke with long-acting β2-agonists plus inhaled corticosteroids.[11]

In some studies it has been seen that there is significantly increased serum levels of tumor necrosis factor-α, C-reactive protein, fibrinogen and alteration of circulating inflammatory cells in COPD patients compared with controls that contribute to stroke 8. Smoking and low socioeconomic status is the major contributing factor for stroke in COPD patients 93.

In contrary few studies showed that COPD was associated with increased risk of stroke. Similar were the findings of our study as in our study as in our study there was significant association between stroke and gender and stroke and Smoking status.[14]

In previous literature smoking has been identified as the most important cause of COPD and it's also risk factor for stroke. These findings are similar as in our study there was significant association found between COPD and stroke among both smokers and non-smokers.[10]

In another study 16 it was found that smokers with COPD had a significantly higher prevalence of stroke than smokers without COPD.[17] Although smokers had increased prevalence of stroke with COPD in our study, our results conclude that COPD is somehow present before the harmful effect of smoking on stroke becomes apparent resulting in simultaneously developing cardiovascular & pulmonary involvement.

The chances of stroke gradually increase with age 17. The more the age of patients, higher the chances of getting stroke with COPD. However it is unlikely that the small difference in age could explain the much higher prevalence of stroke compared with the age-specific prevalence of stroke described by Poels and coworkers[10,11]. Similar findings were 55 reported by our study as in our study there was significant association between frequency of stroke and COPD in all the age groups as the p-values were significant.[10]

Another study Donaldson et.al. found out higher chances of stroke following acute exacerbation of COPD.[12] In line with the literature already avilable, we also found an increased risk of developing stroke among COPD patients. Hence it concludes that the COPD-related inflammatory response may lead to atherosclerosis and stroke.[11]

Conclusion

It was concluded that frequency of stroke in COPD patients was 36.1%. Age, gender, BMI, hypertension, diabetes and smoking had a significant impact on stroke frequency among COPD patients. Keeping in mind these results stroke screening should be periodically carried out by the internist and pulmonologist to reduce it risk.

Conflict of Interest: *None*

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