

Risk of Cardiovascular Comorbidity in Patients with Chronic Obstructive Pulmonary Disease

Janan A. Alreface, PhD* Ruaa N. Al-Saraj, MSc**

ABSTRACT

The most prevalent chronic pulmonary illness is chronic obstructive pulmonary disease (COPD). The incidence of cardiovascular disease (CVD) in COPD patients is more than those without COPD and worsening their prognosis. This state is still unclear widely in Mosul city. The purpose of this study was to assess the percentage of CVD occurrence in COPD patients and identify the most common cardiovascular condition that coexists with COPD in Mosul. Additionally, investigate the connection between the severity of COPD and the existence of these cardiovascular comorbidities. From November 2024 to March 2026, a cross-sectional study was carried out. Fifty five COPD patients of both sexes, aged 45 years and more, included in this study. They were attendees to pulmonary counseling unit at Ibn –Sena Teaching Hospital complaining from dyspnea and/or cough and or expectorations of sputum. All these patients were formerly proved as COPD due to spirometry report pre and post-bronchodilator and had been subjected to the clinical and baseline collecting data. The study showed 84% of COPD patients had cardiovascular disease and 91% of them were hypertension. The two CVDs and more group had a significant lower Post-FEV1% predicted and Post-FEV1/FVC ratio means (43 vs 54) (50 vs 59) respectively than one CVD group. There were significant positive correlation between FEV1/FVC ratio and echo ejection fraction ($r=0.51$, $p=0.00$) as well as resting O2% ($r=0.60$, $p=0.00$). The frequency of CVDs and the post-FEV1/FVC ratio showed a significant negative connection ($r=-0.35$, $p=0.01$). There were a significant negative correlation between duration of COPD and echo ejection fraction ($r=-0.30$, $p=0.05$) in addition to resting O2% ($r=-0.43$, $p=0.01$). In Mosul, individuals had established COPD exhibited a high prevalence of CVDs. Hypertension frequently observed as a cardiovascular condition, followed by ischemic heart disease. Patients had moderate COPD were more expected to have a single CV comorbidity, whereas those had severe COPD were more likely to present with two or more cardiovascular diseases. These results demonstrate the intimate connection between COPD severity and cardiovascular involvement and recommended cardiovascular assessment in patients with early established COPD.

Keywords: Chronic Obstructive Pulmonary Disease, COPD and CVD, cardiovascular disease.

INTRODUCTION

The most prevalent chronic pulmonary illness is chronic obstructive pulmonary disease (COPD), it is affecting around ten percent of people worldwide¹. Many COPD sufferers receive a delayed diagnosis or go undetected, particularly in low- and middle-income nations². The third principal cause of death worldwide is COPD³. It is a complex condition, causing its pathophysiology and clinical appearance⁴. It is caused by smoking tobacco, breathing a toxic particles or gasses from indoor and outdoor air pollution. Chronic inflammation lead to pulmonary structural changes, a narrowing as well as luminal exudate in small airways and reducing lung elastic recoil. This illness frequently shows itself through a dyspnea, cough, phlegm production, wheezing and tightness and fatigue⁵.

The frequency of cardiovascular disease (CVD) in people with COPD varies between 20 and 70%, depending on the research population and cardiovascular diseases studied⁶. Furthermore, this incidence is twenty five percent greater in COPD compared to those without COPD⁷. There is a consequence of linked risk issues between COPD and CVD for instance smoking, incomplete lung development, aging, thrombocytosis and platelet reactivity and arterial stiffness⁸. Systemic

inflammation, oxidative stress, hypoxemia and hyperinflation may provide an essential part according cardiovascular involvement in patients of COPD⁹. The most serious and common CVDs comorbidity in COPD include ischemic heart disease, hypertension, may be stroke, atrial fibrillation as well, and heart failure; as their presence worsening prognosis in patients with COPD¹⁰.

Coexistence of CVD beside COPD has a substantial influence on people's quality of life, a greater number of hospitalizations and results in early but preventable mortality¹¹. This situation is still unstudied widely in our locality in Mosul city.

Aim of the study: This study was directed toward evaluation prevalence of cardiovascular disorders in people with chronic obstructive lung disease. Moreover, evaluate the association between COPD severity and the presence of these cardiovascular conditions. Additionally, identify the most common cardiovascular condition that coexists with COPD in Mosul. In addition, identify main risk aspects for developing cardiovascular disorders in people with chronic obstructive lung disease in term of smoking, diabetes mellitus and hypercholesterolemia. This helps to lessen the burden of both diseases and improves their outcomes by preventing late detection and starting early treatment.

* Department of Physiology, College of Medicine
University of Mosul.
Email: janan.alnoman@uomosul.edu.iq

** Department of Anatomy, Al-Batool College of Medicine
University of Mosul.

METHOD

This study was carried out as a cross-sectional study from November 2024 to March 2026. Patients included in this study were attendees to pulmonary counseling unit at Ibn –Sena Teaching Hospital that monitors respiratory health status in Mosul City.

The present study enrolled fifty seven previously diagnosed COPD patients were of both sexes, aged 45 years and more presented complaining from dyspnea and/or cough and or expectorations of sputum. All these patients were formerly proved as COPD due to spirometry report pre and post-bronchodilator. Two of these patients were excluded as incomplete post- bronchodilator test.

All patients that participate in this study had been subjected to the following collecting data:

Anthropometric details: include age plus sex, height, weight, and finally body mass index [BMI].

Social history data: counting smoking status, duration of smoking and number of cigarette packet per day besides residence and education.

History of confirmed cardiovascular disease: as ischemic heart disease, heart failure, hypertension, pulmonary hypertension, cardiac arrhythmia and stroke.

History of risk factor for cardiovascular disease: as previous diagnosed diabetes mellitus or hypercholesterolemia or both

Diagnostic information: as systolic and diastolic blood pressure, respectively and resting O₂%, in addition to heart rate.

Investigation information: as Echo Ejection Fraction.

Clinical history: as the presenting symptoms (cough, dyspnea and expectoration of sputum), duration of COPD, number of COPD exacerbation per year, number of cardiovascular disease, duration of cardiovascular disease.

Body mass index was figured out by dividing the patient' body weight (kilogram) by their height (square meter)¹².

Performing Lung function tests

All participants performed twice pulmonary function test in term of Pre-bronchodilator and post-bronchodilator through using spirometry [Piston Spirometer, Made In Hungary, REF PDD_301/s, SN 301-SH, Date 11 _2018, Have a CE, The ip is 20] as per the guidelines of ATS/ERS¹³. The patients were requested to pull entirely deep breath inspiration as much as possible, and then hold the breath for one second. Later, then the patients were trained to blow as much as fast, hard and continue puffing until feel empty of the lungs totally. The test was frequently repeated minimally three times in order to select best significant result.

All participant performed post-bronchodilator pulmonary function test after 15 minutes from inhaling a dose of salbutamol [200 µg] in one breath by metered dose inhaler¹⁴.

Spirometry test products take account of pre-bronchodilator besides post-bronchodilator forced expiratory volume in first second percentage predicted [FEV1% predicted], forced vital capacity percentage predicted [FVC% predicted] and FEV1/FVC ratio calculating from measurement raw data.

The patients were proved as COPD when their ratio of FEV1/FVC after bronchodilator was still below 70¹⁵.

Grouping of COPD was prepared relying on GOLD guidelines as mild (FEV1≥80% predicted), moderate (50%≤FEV1<80% predicted), severe (30%≤FEV1<50% predicted) and very severe (FEV1 < 30% predicted)⁵.

Ethical Approval: The Ethics Committee of the University of Mosul's College of Medicine has assumed its approval to the research requests [UOM/COM/MERC/23-24/MAR7-26/03/2024]. Each COPD patient provided informed consent.

Statistical analysis: The data of present study had been offered in term of mean ± standard deviation [minimum-maximum] or numbers and percentage. Tests of normality were figured out for all data using Shapiro-Wilk. Comparison of two related patients groups was figured out using nonparametric [Wilcoxon]. Comparisons of two independent groups were figured out using a Mann-Whitney and chi square test as appropriate. Correlations between groups were carried out using Spearman as appropriate. The data that collected were statistically analyzed consuming SPSS software [IBM, SPSS, Statistics 21, Collaboration /Java]. Significantly was proved when $P \leq 0.05$.

RESULTS

Fifty five adult COPD patients participated in this study, were 41 [75%] of them men and 14[25%] were women, aged 45 up to 84 years old. In term of COPD grading: 34(62%) were moderate COPD, 12(22%) were sever and only 9(16%) were very sever COPD. Most of the patients (42%) had cough and dyspnea at their presentation. Most of them (58%) of them were urban; most of them (66%) were ignorant and primary school. Most of them (86%) were current smoker.

Table 1 shows that post-bronchodilator testing for lung function displayed pattern of irreversible obstruction and FEV1/FVC ratio. There was a significant rise [$p<0.05$] in FEV1per FVC ratio mean of post- bronchodilator but it is still less than 70 indicating COPD.

Among the 55 patients with COPD, 46 (84%) had cardiovascular disease (CVD). The most common CVD was hypertension, present in 42 (91%) patients, followed by ischemic heart disease in 21 (46%), heart failure in 8 (17%), both pulmonary hypertension and cardiac arrhythmia present in 5(11%) patients and finally stroke in 1(2%).

Table 2 and Table 3 present a comparison of clinical and baseline features in COPD patients that categorized depending on cardiovascular state into nine COPD patients without CVD and forty six COPD patients with CVD. In table 2; there was a substantial association between cardiovascular grade and current smoker; the amount of current smokers was significantly higher among COPD patients without cardiovascular disease (100%) compared with those with cardiovascular disease (83%) [$p<0.05$]. The proportion of COPD with diabetes mellitus or hypercholesterolemia was significantly [$p<0.05$] higher with CVD than those without CVD. No significant differences were seen in other variables between the two groups in table 2 and table 3.

Note: Some patients in this study with elevated blood pressure but no prior hypertension diagnosis. According to the American Heart Association, hypertension is confirmed only after elevated readings on at least two separate occasions. Therefore, these patients were considered as not confirmed hypertension, and were recruited as patients without cardiovascular disease^{16,17}.

Table 4 show the comparison of baseline and clinical characteristics in COPD patients that categorized depending on number of cardiovascular disease into twenty one had one CVD and twenty five had two CVDs and more. There was a significant association between the number of CVDs and age ($p<0.05$), where patients with two CVDs and more group had highest mean in age than those with one CVD group (69 vs 60). There was a significant association between the number of CVDs

and gender ($p<0.05$), where the group with two CVDs and more had highest male percentage (92%) while that with one CVD group had highest female percentage (42%). There was a significant association between the number of CVD and duration of smoking ($p<0.05$), where the two CVDs and more group had highest mean of smoking duration (44 years vs 33 years) than single CVD group. A significant association was seen between the number of CVDs and body mass index ($p<0.05$), where the two CVDs and more group had less BMI mean than those with one CVD group (25 vs 30). There was a significant association between the number of CVDs and echo ejection fraction ($p<0.05$), where the two CVDs and more group had lower echo ejection fraction

mean (48 vs 56) than one CVD group. a significant association was identified between the number of CVD with Post-FEV1% predicted and Post-FEV1/FVC Ratio ($p<0.05$), where the two CVDs and more group had lower Post-FEV1% predicted and Post-FEV1/FVC ratio means (43 vs 54) (50 vs 59) respectively than one CVD group. No significant differences were observed between both groups in other variables.

Table 5, Table 6 and Table 7 show the comparison of Post-FEV1/FVC Ratio and other parameters among COPD patients with CVDs according to diabetes status excluding those with hypercholesterolemia,

Table 1. Pre and Post-bronchodilator FEV1/FVC ratio testing displayed pattern of irreversible obstruction

The patients	Diagnostic Post- bronchodilator FEV1/FVC ratio level	Total no.	Pre FEV1/FVC ratio	Post FEV1/FVC ratio	p-value
COPD	< 70	55	52±13(23-6)	55±13(25-69)	< 0.001 *

All values gives as mean ± SD (min-max). *significant p value

Table 2. Comparison of baseline characteristics in COPD patients by cardiovascular status

Baseline characteristics	Without CVD/No.=9	With CVD/No.=46	P value
Age	61±11(45-83)/9	65±10(46-84)/45	0.33
Sex			
male	7(78%)	34(74%)	0.81
female	2(22%)	12(26%)	
Current smoker	9(100%)	38(83%)	< 0.001 *
Duration of smoking (years)	32±9(20-45) /9	38±11(20-60)/39	0.17
Smoking packet/day	2±0.8(1-3)/9	2±0.8(1-3)/38	0.71
Residence			
urban	6(67%)	26(59%)	0.67
rural	3(33%)	18(41%)	
Education			
Ignorant	1(11%)	17(37%)	0.49
Primary school	4(45%)	14(30%)	
Secondary school	3(33%)	10(22%)	
University	1(11%)	5(11%)	
Presenting symptom			
Dyspnea	5(56%)	13(30%)	0.27
Cough and dyspnea	2(22%)	21(48%)	
Cough, dyspnea and sputum	2(22%)	10(22%)	
Duration of COPD(months)	41±38(12-120)/7	61±63(6-240)/38	0.6
No. of COPD exacerbation/year	3±1(1-5)/6	2±1(1-6)/27	0.06
Diabetes mellitus	1(11%)	12(26%)	< 0.001 *
Hypercholesterolemia	2(22%)	26(57%)	< 0.001 *

All values gives as mean ±SD (min-max)/ number or numbers (%). Total patients' numbers vary due to incomplete data. *significant p value

Table 3. Comparison of clinical characteristics in COPD patients by cardiovascular status

Clinical characteristics	Normal range	Without CVD/ No.=9	With CVD/ No.=46	P -value
BMI	18.5-24.9	27±5(21-35)/9	27±5(19-38)/46	0.97
Systolic blood pressure^θ	<120 mmHg	129±15(110-160)/9	133±20(90-170)/46	0.41
Diastolic blood pressure^θ	<80 mmHg	71±21(20-90)/9	80±13(50-110)/45	0.22
Resting O2%	≥95%	93±3(89-97)/5	92±8(55-99)/40	1
Heart Rate	60-100beat/minute	81±13(64-98)/6	80±19(53-126)/33	0.91
Echo Ejection Fraction	≥55%	57±8(43-69)/8	51±8(33-65)/42	0.08
Post-FEV1%	≥80%	55±16(27-76)/9	49±16(16-78)/46	0.33
Post-FVC%	≥80%	68±14(40-86)/9	67±17(35-101)/46	0.97
Post-FEV1/FVC Ratio	≥70%	56±11(42-69)/9	54±14(25-69)/46	0.72

All values gives as mean ±SD (min-max)/ number. Total patients' numbers vary due to incomplete data. ^θ had elevated BP but not confirmed hypertension.

Table 4. Comparison of baseline and clinical characteristics in COPD patients with cardiovascular diseases by number of CVDs

Parameters	Single CVD/ no:21	Two and more CVDs/no.25	P value
Age	60±7(50-70)/20	69±11(46-84)/25	0.03*
Sex			
male	11(52%)	23(92%)	< 0.001 *
female	10(48%)	2(8%)	
Current smoker	15(71%)	23(92%)	0.25
smoking packet/day	2±0.8(1-3)/15	2±0.9(1-3)/23	1
duration of smoking (years)	33±7(23-50)/15	42±11(20-60)/24	< 0.001 *
Residence			
urban	14(70%)	12(50%)	0.23
rual	6(30)	12(50%)	
Education			
ignorant	5(24%)	12(48%)	0.16
Primary school	6(28.5%)	8(32%)	
Secondary school	6(28.5%)	4(16%)	
University	4(19%)	1(4%)	
Presenting symptom			
dyspnea	7(33%)	6(26%)	0.81
Cough and dyspnea	10(48%)	11(48%)	
Cough, dyspnea and sputum	4(19%)	6(26%)	
BMI	30±5(19-38)/21	25±4(19-33)/25	0.01*
Duration of COPD (months)	46±49(6-180)/14	69±69(6-240)/24	0.31
No. of COPD exacerbation/year	2±1(1-3)/7	3±1(1-6)/20	0.23
Heart Rate(beat/minute)	80±20(53-126)/14	80±19(54-111)/19	0.97
Resting O2%	94±3(91-99)/17	90±10(55-97)/23	0.23
Echo Ejection Fraction	56±5(50-65)/17	48±8(33-61)/25	< 0.001 *
Systolic blood pressure	134±19(90-170)/21	133±22(90-160)/25	0.9
Diastolic blood pressure	82±12(60-110)/21	79±14(50-100)/24	0.72
Diabetes	3(14%)	9(36%)	0.15
Hypercholesterolemia	10(48%)	16(64%)	0.33
Post-FEV1%	54±14(20-78)/21	43±16(16-70)/25	< 0.001 *
Post-FVC%	70±14(36-100)/ 21	65±19(35-101)/25	0.33
Post-FEV1FVC Ratio	59±11(34-69)/21	50±15(25-69)/25	0.03*

All values gives as mean ±SD (min-max)/ number or numbers (%). Total patients' numbers vary due to incomplete data. *significant p value

Table 5. Comparison of pulmonary clinical parameters among COPD patients with CVD according to diabetes status excluding those with hypercholesterolemia

Parameters	Without Diabetes	With Diabetes	P value
Post-FEV1/FVC Ratio	55±13(34-68)/15	57±15(31-69)/5	0.79
Duration of COPD (months)	55±59(6-240)/28	76±75(12-240)/10	0.26
No. of COPD exacerbation/year	2±1(1-4)/17	3±2(1-6)/10	0.85

All values gives as mean ± SD (min-max)/ number

Table 6. Comparison of pulmonary clinical parameters among COPD patients with CVD according to hypercholesterolemia status excluding those with diabetes

Parameters	Without hypercholesterolemia	With hypercholesterolemia	P value
Post-FEV1/FVC Ratio	55±13(34-68)/15	58±12(25-69)/19	0.40
duration of COPD (months)	49±48(6-180)/15	68±71(6-240)/23	0.48
No. of COPD exacerbation/year	2±1(1-3)/11	3±1(1-6)/16	0.71

All values gives as mean ± SD (min-max)/ number

Table 7. Comparison of pulmonary clinical parameters among COPD patients with CVD according to existence both of hypercholesterolemia and diabetes status

Parameters	Without DM & hypercholesterolemia	With both DM & hypercholesterolemia	P value
Post-FEV1/FVC Ratio	55±13(34-68)/15	42±13(26-69)/7	0.15
Duration of COPD (months)	50±53(6-180)/12	89±86(24-240)/7	0.19
No. of COPD exacerbation/year	2±1(1-3)/8	3±2(1-6)/7	0.90

All values gives as mean ± SD (min-max)/ number

Table 8. Correlation between pulmonary clinical variables with cardiovascular and O2 status findings in all COPD patients

Pulmonary clinical variables	Cardiovascular and O2 status findings	No. of COPD patients	RS(Spearman) Correlation	p-value
Post-FEV1/FVC Ratio	Echo Ejection Fraction	50	0.51	< 0.001 *
Post-FEV1/FVC Ratio	no. of CVD	55	-0.35	0.01*
Post-FEV1/FVC Ratio	Resting O2%	45	0.60	< 0.001 *
duration of COPD	Echo Ejection Fraction	43	-0.30	0.05*
duration of COPD	no. of CVD	45	0.11	0.46
duration of COPD	Resting O2%	39	-0.43	0.01*
no. of COPD exacerbation/year	Echo Ejection Fraction	32	-0.13	0.49
no. of COPD exacerbation/year	no. of CVD	33	-0.18	0.31
no. of COPD exacerbation/year	Resting O2%	28	-0.30	0.12

*significant p value

according to hypercholesterolemia status excluding those with diabetes and according to existence both of diabetes and hypercholesterolemia status correspondingly. No significant differences were noticed between the compared groups in all variables in these tables.

Table 8 shows the correlation between pulmonary clinical variables with cardiovascular findings and O2 status in all COPD patients. There were significant positive correlation between FEV1/FVC ratio and echo ejection fraction ($r=0.51$, $p=0.00$) as well as resting O2% ($r=0.60$, $p=0.00$). A substantial negative correlation ($r=-0.35$, $p=0.01$) between FEV1/FVC ratio and the number of CVDs. There were a significant negative correlation between duration of COPD and echo ejection fraction ($r=-0.30$, $p=0.05$) as well as resting O2% ($r=-0.43$, $p=0.01$). No significant correlation was detected between duration of COPD and number of CVDs. No significant correlation was seen between numbers of COPD exacerbation per year with echo ejection fraction, number of CVDs as well as resting O2%.

DISCUSSION

This study was conducted to explore the relationship between COPD and CVDs amongst COPD patients, those who are forty-five and older in Mosul city. The majority of present study patients fall in moderate COPD grad. An India study showed that the bulk of their individuals fall in severe and very severe COPD grads due to deficiency of attentiveness and disregarding the initial symptoms of COPD¹⁸.

Our results suggested that about 84% of Mosul COPD patients had at least one CVD. This is comparable to 78.2% of other study using echocardiography for early detection of CVD in stable COPD¹⁸. Other studies found that it fluctuate between 20 to 70%. This relies on the research population and the cardiovascular illnesses investigated⁶.

The most common cardiovascular disease in COPD patients in our locality was hypertension. This copy with the other study which found that hypertension developed in many patients with COPD¹⁹. Other study found that coronary heart disease is most common among American COPD²⁰. This difference related to a different locality.

This study revealed that current smoking was more common among COPD patients without cardiovascular disease in comparison to those having cardiovascular disease. This Identifying is inconsistent with preceding study that reporting that tobacco smoking is a risk factor for raised up aortic pulse wave velocity in COPD²¹. This inconsistency may be due small sample of COPD patients without CVDs.

In the present study, Diabetes mellitus was further widespread among COPD people with cardiovascular disease than those had not cardiovascular disease. This may be attributed to the shared mechanisms between COPD, diabetes mellitus, and CVD, including inflammation²².

The C-reactive protein becomes high in systemic inflammation and concomitant with augmented vessels stiffness, endothelial dysfunction, deteriorating cardiovascular complicated symptoms in COPD people with diabetes mellitus of type 2²³. It is interesting result consistent with other study that revealed an important human association was established between a COPD and existence of comorbid Diabetes mellitus, hypertension and cardiovascular condition²⁴.

The current study showed that hypercholesterolemia was more widespread among COPD people with cardiovascular disease than those lacking cardiovascular disease. This finding copy with other study that suggested cholesterol levels are an essential prognostic indicator of cardiovascular risk in individuals with COPD²⁵.

This study showed an older age COPD patients were associated with the presence of two or more cardiovascular diseases more frequently than those with a single CVD. This supported by the study that approved high incidence of new CVD in older Americans²⁶.

In our study, male population more frequently presented with two or more cardiovascular diseases, whereas female patients more commonly had only one CVD in the manifestation of COPD. It is supported by other research mentioned that females in general have a lesser occurrence of CVD than men²⁷.

The existing study demonstrated that COPD patients with two or more CVDs tend to have a longer smoking duration history compared to those with a single CVD. At the same time, there is no effect of smocking packet amount per day on the number of CVDs. This finding is consistent with preceding studies that reinforce smoking duration importance as a risk assessment in COPD than number of pack-years and highlight the potential greater harm of prolonged low-intensity smoking, while also emphasizing the vascular implications of tobacco use in COPD patients^{21,28,29}.

In COPD patients of this study, the BMI is lower in those with two or more CVDs in comparison to those had one CVD. The result maycopy with other studies finding that suggested low body weight may pose a warning indicator for COPD and it was highly connected with increased long-term risk of mortality and cardiovascular problems as compared to normal weight^{30,31}.

In our study, COPD patients with a single cardiovascular disease tended to have better echo ejection fraction than those with two or more CVDs. This observation is consistent with other studies showing that COPD is linked with significant left ventricular dysfunction and routine echocardiography is recommended to detect early cardiac complications³².

This research discovered that COPD population suffering from worse

both post-FEV1%predicted (severe grade) and post-FEV1/FVC ratios had multiple CVDs compared to those with better post-FEV1% predicted (moderate grade) and post-FEV1/FVC ratios, which typically had only a single CVD. This finding aligns with other study showing COPD patients are more likely to develop one or more cardiovascular diseases than those without GFCOPD²⁰.

This study suggested that COPD patients with relatively preserved FEV1/FVC ratio tend to have better echo cardiac ejection fraction. This is proved previously by a study that mentioned that FEV1/FVC ratio was significantly associated with cardiac failure and low ejection fraction³³.

Our current study proposed a decline in FEV1/FVC ratio is associated by CVD number increases in COPD population. This finding consistent with the previous study that demonstrated; as COPD severity grows, so do cardiovascular co-morbidities¹⁸.

The existing study demonstrated that patients with relatively preserved Post-FEV₁/FVC ratio tend to maintain higher levels of oxygen saturation at rest in COPD patients. This copy with other study that suggested reduced oxygenation at resting is associated with deterioration of lung function in COPD³⁴. This O₂ status finding may explain the above two findings that demonstrated the associations between the Post-FEV₁/FVC ratio and echocardiographic ejection fraction the as well as number of cardiovascular diseases among COPD patients. As hypoxia in COPD patients lead to CVD due to increase atherosclerosis and alter cardiac output and blood pressure, and influence vascular function^{35,36}.

This study revealed that the longer COPD duration is associated with reduced ejection fraction. This finding parallel to other research result that revealed a long-term COPD patients show left ventricular hypertrophy¹⁸.

Current study demonstrated that, the longer duration of COPD correlating with lower resting O₂%. This may be due to that the pulmonary gas exchange worsens as the COPD disease progress⁵.

Recommendation: The simultaneous presence of COPD, cardiovascular disease, and significant risk factors for cardiovascular issues underscores the urgent importance of developing effective strategies for screening and mitigating cardiovascular risks linked to COPD.

CONCLUSION

The local population in Mosul city with established COPD exhibited a high prevalence of CVDs. People had moderate COPD were more prone to have a single cardiovascular comorbidity, whereas those with severe COPD were more likely to present with two or more cardiovascular diseases. Hypertension was the most frequently observed cardiovascular condition, followed by ischemic heart disease. Additionally, diabetes mellitus and hypercholesterolemia were substantially related to occurrence of cardiovascular diseases with COPD, suggesting their role as important cardiovascular risk factors in this population. COPD progression was associated with a decline in cardiac ejection fraction and resting oxygen saturation, accompanied by an increasing burden of cardiovascular comorbidities. These outcomes underline the close association between COPD severity and cardiovascular involvement. Furthermore, emphasizing the need for thorough cardiovascular examination in individuals with early established COPD in order to manage cases as soon as possible. This leads to minimize the economic and health care burden on community.

Authorship Contribution: All authors share equal effort contribution towards (1) substantial contributions to conception and design, acquisition, analysis and interpretation of data; (2) drafting the article and revising it critically for important intellectual content; and (3) final approval of the manuscript version to be published. Yes.

Potential Conflicts of Interest: None

Competing Interest: None

Acceptance Date: 28 August 2026

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