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Assessment of COVID-19 Virus Infection Among Patients with Atherosclerosis

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Abstract

Coronavirus disease 2019 (COVID-19) is a global pandemic affecting 185 countries and 3000000 patients worldwide COVID-19 is caused by severe acute respiratory syndrome coronavirus which invades cells through the angiotensin-converting enzyme receptors among patients with COVID-19 there is a high prevalence of cardiovascular disease.

Atherosclerosis one type of cardiovascular disease and acute respiratory viral infections can result in cardiovascular involvement such patients having a significant higher motility rate than those without cardiovascular involvement due to the ongoing coronavirus disease 2019 pandemic. It is important to determine whether covid 19 infection in patients with coronary artery diseases but have been recovered from COVID-19 virus and how it's had a relation with the severity of atherosclerosis disease in those patients whose previously infected with this virus.

The data were collected from patients which had recovered from covid -19 virus and they had to progress in the disease to have atherosclerosis and some of the patients had a sign and symptoms of COPD. A total of 125 patients

were taken for this study including both sex males and females with different age groups all of them admitted to specialized surgical-cardiac center hospital in Erbil City in Iraq. All of them suspected to have atherosclerosis so they will be detected by angiograph in catheterization laboratory in the hospital.

the results showed that high frequency of atherosclerosis and the severity of the atherosclerosis in patients recovered from COVID-19 in comparing with patients don't have been recovered from COVID 19 and also the severity of atherosclerosis disease was increases when it will compare with patients have had not recovered from COVID-19.

This study demonstrated that COVID-19 virus is also significant risk factors for coronary artery disease and patients who recovered from COVID-19 have had been suffered more from that increasing the severity of the disease on them.

***Keywords*: COVID-19:** coronavirus disease caused by the SARS-CoV-2 virus., **COPD:** chronic obstructive pulmonary disease.

1.Introduction

Coronavirus disease 2019 (COVID-19) is a global pandemic. As of April 28, 2020, infected patients were present in 185 countries and there were >3 000 000 cases reported worldwide, with more than 210 000 fatalities[1]. The outbreak began in China, but the number of cases outside of China exceeded those in China by March 15, 2020, and rose at an exponential rate. The number of fatalities in several countries now exceeds the total in China. COVID-19 interacts with the cardiovascular system on multiple levels, increasing morbidity in patients with underlying cardiovascular conditions and provoking myocardial injury and dysfunction, with possible exacerbation of atherosclerosis[2].

An unprecedented challenge for the healthcare community across the world was the emergence of novel coronavirus, officially known as severe acute respiratory syndrome. And this virus has high infectivity, the ability to get transmitted even during asymptomatic phase relatively low virulence have resulted in rapid transmission of this virus. Leading to pandemic[3].

COVID-19 infection is caused by the binding of the viral surface spike protein to the human angiotensin-converting enzyme 2 (ACE2) receptor after activation of the spike protein by transmembrane protease serine2 [4].

ACE2 is expressed in the lung (principally type II alveolar cells) [5] and appears to be the predominant portal of entry. ACE2 is highly expressed in the heart as well counteracting the effects of the angiotensin system such as hypertension, congestive heart failure and atherosclerosis[6].

Inflammation plays an important role in triggering acute coronary disease[7]. On the other hand culprit lesions those responsible for triggering acute coronary disease are characterized by more advanced infiltration of inflammatory cells such as macrophages, T-lymphocytes and neutrophils than any other coronary lesion[8] .

Therefor we designed this study to determine the prevalence of atherosclerosis among patients had been recovered from COVID-19 and they were getting an increasing in the severity of atherosclerosis disease as a result to their infection with COVID-19.

2.Materials and Methods

2.1. Patients and Methods

A total of 125 patients were taken for this study including both sex male and female with different age groups all of them admitted to Surgical specialty hospital -cardiac center in Erbil City in Iraq. All of the patients were suspected to have atherosclerosis and underwent coronary angiography in catheterization laboratory in the hospital.

From these patients 85 of these patients found to have stenotic atherosclerotic lesions with different degree of disease severity so they have been regarded as patient group in this study. Also questionnaire prepared have had some data about patients if they have been previously infected with COVID-19 by a positive test and also if they had any sign and symptoms of COPD which had been also determined.

The study protocol was approved by the ethical committee of Hawler Medical University/ College of Medicine.

2.2. Statistical analysis

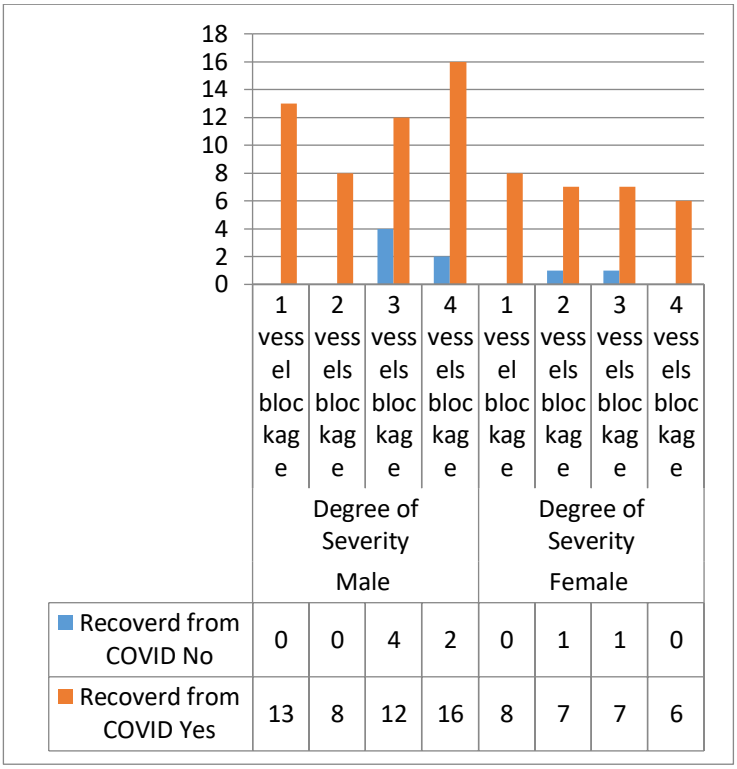
We used statistical package for social sciences (SPSS) version 19 to analyzing the data. P-value of < 0.05 was considered as statistically significant.

3. Results and Discussion: The study included two groups, the first was composed of 85 patients with atherosclerosis.

Including male and females with different age groups including 77 of them having atherosclerosis and had recovered from COVID-19 from near time from their atherosclerosis disease while 8 of them having atherosclerosis but they don't infect with COVID-19.

In Table (1) show that Chi-square value: male= 5.841; female=1.875 and Significance: male =0.120; female= 0.599. there is a significant difference in increasing the severity of atherosclerosis disease (the severity of atherosclerosis was determined by increasing the number of blockage vessels in the patients) in patients recovered from COVID-19 in comparison with patient don't infect with COVID-19.

Table 1: Frequency of atherosclerosis severity cases recovered from COVID-19

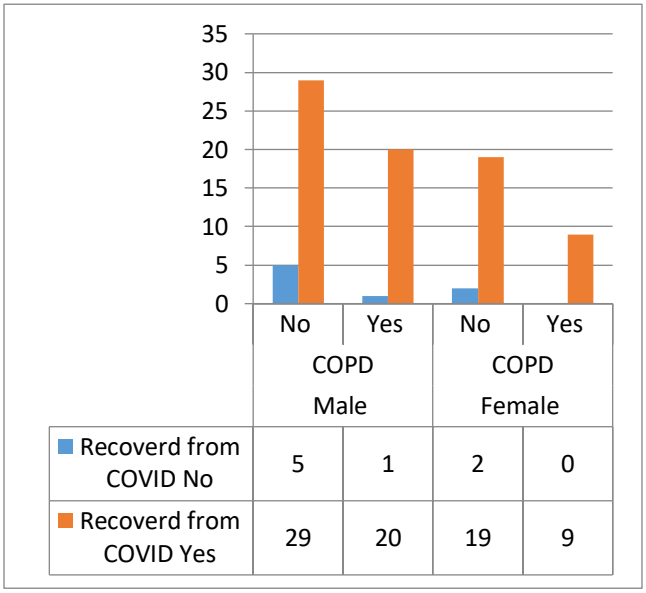


	Male				Female			
Recoverd from COVID No	0	0	4	2	0	1	1	0
Recoverd from COVID Yes	13	8	12	16	8	7	7	6

In Table (2) show the rate of appearing beside atherosclerosis disease also appearing sign and symptom of COPD in those patients with atherosclerosis but also there is a significant difference between patients who have recovered from COVID-19 were more to be having COPD in comparison to patients didn't have been infected with COVID-19.

Chi-square value: male= 1.321; female=0.918, and Significance: male =0.250; female= 0.338. Spearman correlation: male=0.155; female=0.175, and Significance: male =0.110; female=0.067. Odd ratio: male=3.448; female=0.905.

Table 1: Frequency of COPD and COVID-recovered atherosclerosis cases



The clinical manifestations of COVID-19 are respiratory symptoms; some patients develop cardiovascular disorders. According to Coronavirus disease 2019 (COVID-19) Situation Report – 51 from World Health Organization, people of all ages can be infected by the new coronavirus [10].

Research from early cases in China suggests that some individuals are more vulnerable to the worst outcomes of the virus. The virus poses a particular risk to people over the age of 60 and those we have underlying medical conditions, including: Cardiovascular disease, Hypertension, Diabetes, Chronic respiratory disease, Cancer [9].

Our results demonstrate some other result from previous studies like Gaurav.*et al* 2020[11] in which that underlying the history of CVD is directly associated with both worse prognosis and severity out comes COVID-19 patients. There are several possible explanations for these findings one of them coexistence of COVID-19 may considerably enhance the severity of underlying cardiovascular disease which has already proven in some of the respiratory infections[11].

In our study we collected the data only from patients were had atherosclerosis disease and the study aimed to compare between two groups of patients one of them recovered recently from COVID-19 and other group don't infected with COVID-19 but they have detected to had atherosclerosis disease in comparing the severity of disease (atherosclerosis) we found a significant difference between them in degree of disease severity that increased in group patients which they were previously infected with COVID-19 then the group patients which didn't affected with this virus.

Unfortunately, in patients with COVID-19 inflammation becomes a bigger problem, dysregulation affecting T-lymphocytes and un controlled inflammatory process in patients with COVID-19 are the main concerns connected with immunopathology [12].

It means that the infection with COVID-19 virus cause quick infection and may affected the artery and increase the lesion so many studies on COVID-19 and cardiovascular disease were show the relation between the COVID-19 and cardiovascular disease like [11],[13].

Also, some other found that a high burden of cardiovascular disease risk factors may be particularly

Vulnerable to develop complications from COVID-19 disease [14].

Furthermore, in our study we detected that the patients who has had COVID-19 and atherosclerosis the also had an increasing in COPD sign and symptoms appearing in compression with other patients' group who didn't have recovered from COVID-19. On the other hand, studies mentioned that COPD patients are considered to be at a higher risk of developing severe illness from COVID-19.

5.Conclusions

this study demonstrated that COVID-19 virus are also significant risk factors for coronary artery disease and patients who recovered from COVID-19 have had been suffered more from atherosclerosis and they had more multi vessel disease than those with previous COVID 19 infections, also they were at increased risk for obtained COPD disease. Further researches are needed to be done on this subject

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