



## Role of Radiologic Computed Tomography in Evaluating Coronavirus (COVID-19) Patients

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### Abstract

**Objective:** Coronavirus (Covid 19) is a dangerous viral disease that principally targets the respiratory system of human beings. The main objective of this study is to evaluate the significant effects resulting from Covid19 using radiologic CT scanning technology. **Methods:** The recent study was conducted in order to evaluate covid19 among the local public. The sample size for this study consisted of two hundred and thirty (230) patients diagnosed with coronavirus and underwent a chest computed tomography scan. The study was conducted at Najran city, between the period from September to December 2020. **Results:** The results showed that it is possible to diagnose the complications of coronavirus that affects the respiratory tract in an accurate manner using chest CT imaging and the main results revealed that coronavirus COVID-19 affected all, but males more than female. (50-60) Age group was the big distribution while acute respiratory failure is the most common clinical etiology. The CT scan findings revealed that bilateral pneumonia was the common complication with a high incidence rate of 32% percent and blood coagulation achieved 5% percent as the minimum distribution result. **Conclusion:** The sensitivity of the CT scans in assessing COVID-19 was significantly high, it has the efficiency to assess complications of COVID-19 in an accurate manner, and therefore it has been proposed to use CT scan as a complementary method in covid-19 diagnosis. More studies on coronavirus disease were recommended by the author.

**Keywords:** Coronavirus; Covid19; CT scan technology; Complications; Chest CT.

## 1. Introduction

Covid19 (**coronavirus disease 2019**) it is an infectious disease caused by a newly discovered coronavirus which principally targets the respiratory system, most often it causes respiratory illness but its severity differ from person to other. In older people it might get sever and develop into serious illness especially if they have other illness or have an immune diseases [1, 2].

Coronavirus disease is a virulent and epidemic infection that mainly targets the respiratory system of humans and the causative agent of the disease belongs to a class of pathogens called corona viruses (Co Vs). In previous years, Coronavirus disease epidemics with devastating effects included viruses under various names such as the new corona virus (SARS-CoV-2), severe acute respiratory syndrome (SARS-Co V) and middle east respiratory syndrome, all of which had severe devastating effects on humanity [3, 4].

According to the World Health Organization (WHO) most of the countries of the world have been affected with COVID-19 and Saudi Arabia one of these counters, but prevalence has been with varying rates according to different populations, age groups, and geographic locations. So as coronavirus continues to gross and spread, indeed there is sever need to evaluate the effects resulting from it. Adding to the need of understanding the nature of this virus and how it is transmitted and multiplied. In addition to how to prevent and treat, this matter is of great importance to limit the spread of the disease [5-7].

Criteria to diagnose patient with COVID-19 might including different clinical etiology such as fever, dyspnea, chest pain, tiredness and, the mild cases, symptoms such as headaches, diarrhea, loss of taste or smell were varying according to the degree of the infection, In severe cases, complications might including imbalance, coagulopathy, respiratory failure or multi-organ failure [7, 8].

Radiological examinations techniques, play a great role in detecting and assessment the effects of coronavirus, these techniques including a variety of imaging such as X-ray radiography, magnetic resonance imaging (MRI), Nuclear medicine and ultrasound techniques as well as computed tomography which had been accepted as a diagnostic test of choice in evaluating complication and effects of Covid19, [9, 10] further to the 3-D images of the human structures which can be provided by it in a real time [10, 11]. The definitive diagnosis of COVID-19

requires a positive RT-PCR test, which was performed on the throat and nasal cavity, and given the fact that CT scanning was effective in assessing complications in the chest and body region in general, so even if the RT-PCR test was negative, the CT scan can show the ground glass opacity or any other abnormalities caused by the Coronavirus infection, and this proves that the CT technology can be used to diagnose COVID-19 [11, 12].

The most common imaging findings of the CT scan are bilateral organizing pneumonia, often with peripheral, and basal predominant distribution. Others finding as were reported included present of edema or plural effusion, cystic fibrosis adding to incidence of deep venous thrombosis and pulmonary embolism [13-15]. (fig 1.2).

There is no doubt that these complications affect the health of the individual in general and affect the public health locally and globally. Therefore in current study, epidemiological, clinical etiology, and radiological features of these complications and effects will be explained and discuss.

**Fig-1.** Shows bilateral fibrosis reticulation after infected with coronavirus



**Fig-2.** Shows bilateral pneumonia after infected with Coronavirus



## 2. Material and Methods

### 2.1. Study Setting and Design

This study was descriptive quantitative hospital based study, which search through the entering patients files, whom was diagnosed with COVID-19 and being detected by chest CT scan. The study was carried out in Najran province (K.S.A) during the period from September to December 2020.

### 2.2. Study Population and Sampling

The study was restricted to hospitalized subgroup of the general patients whom affected with coronavirus infection with complications that are evaluated by chest CT scan. The study was conducted on 230 male and female patients of different age groups (1-100) years, and the inclusion criteria included all ages whom were confirmed with Covid19 and underwent a chest CT scan, the normal results were excluded.

### 2.3. Method of Data Collection, Data Analysis and Instrumentation

The researcher designed special sheet for obtaining the data of the recent study, to carry out demographic characteristics which included (age, gender, Ct finding of complications, clinical etiology and site). The data was

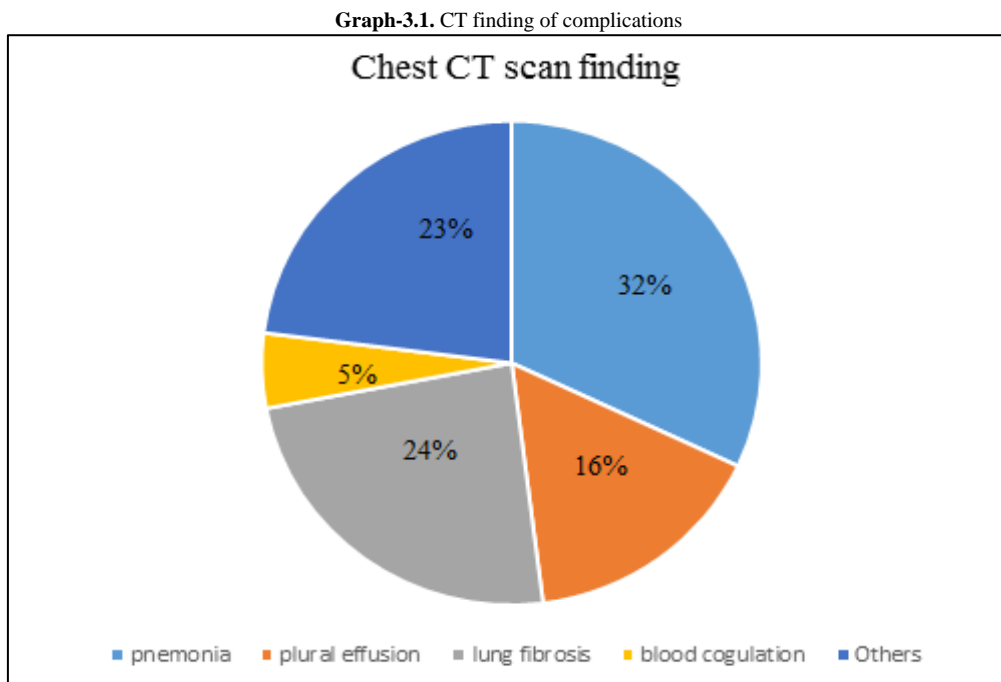
collected based on patients files, images and records. The scan techniques of the chest covered the areas of pulmonary lungs, heart and great vessels. The CT exam of the chest used thin slices high speed CT imaging which routinely done without contrast. Contrast used just for patients with blood coagulation of pulmonary artery and vein to detect any clots present. The Equipment of CT scanner system used is multidetector 128 slice general electric (GE) .Statistical analysis were performed using the latest version Microsoft excel (2020).

**2.4. Ethical Issue**

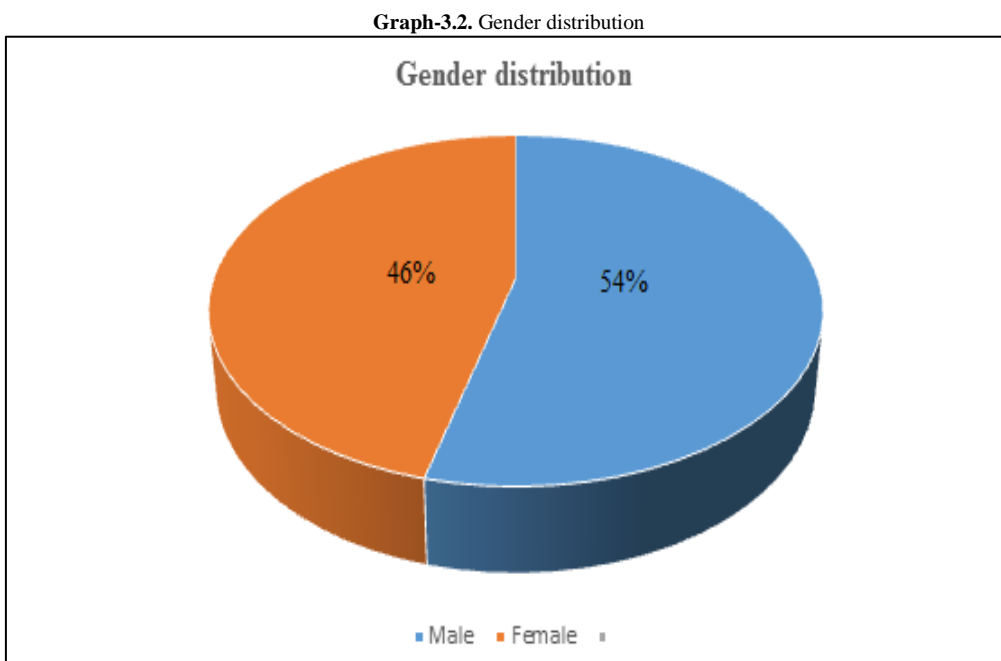
Ethical aspect was taken into consideration prior to performing the current study, Permission was taken to allow access to patients information in addition to formal approval from ethics committee of Najran University, Deanship of Scientific research

**3. Results**

The main result concerning evaluation of the complications of coronavirus (covid19) using Chest CT techniques achieved that , the incident among population samples was 230 patients and (32%) of them affected with pneumonia complication as the big distribution result and blood coagulation achieved the minimum result distribution (5%) as represented in graph (3.1).



Result regarding gender distribution achieved that male has larger percentage (54%) more than female (46%) as shown in graph (3.2).



-The outcomes of age distribution showed that the age group (50-60) years old had the highest percentage (19.6%) and the group (10-19) years, which represents the category of children and adolescents, was the least affected by Coronavirus as represented in [Table \(3.1\)](#).

**Table-3.1.** Age group distribution

Age group	Frequency	Percent
10-19	3	1.3 %
20-29	27	11.7%
30-39	30	13 %
40-49	35	15.2 %
50-59	45	19.6 %
60-69	25	10.9
70-79	35	15.2
80-89	25	10.9
90-99	5	2.2
Total	230	100 %

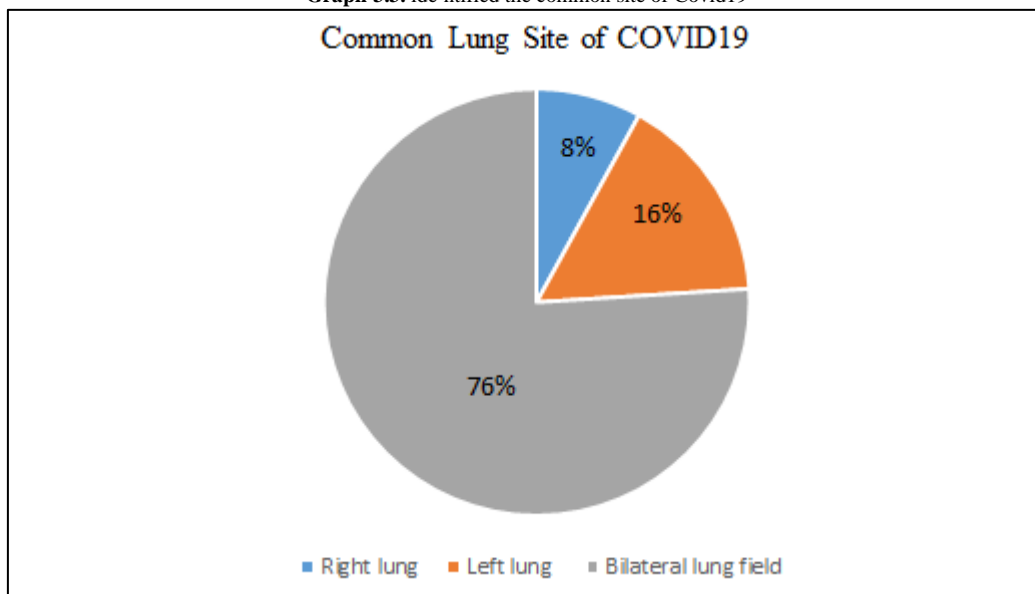
-The results concerning clinical etiology showed that acute respiratory failure (hypoxia) had the largest percent of (24%) more than other etiology such as dry cough, headage and fever, this symptoms were shown in [Table \(3.2\)](#).

**Table-3.2.** present sever clinical etiology

Etiology	Frequency	Percent
Chest pain	18	7.8%
Dry cough	40	17.4%
fever	25	10.9%
Headage	35	15.2%
vomiting	23	10%
Acute respiratory failure	58	25.2%
Dyspnea	31	13.5%
Total	230	100%

- Results regarding the common affecting lung site achieved that bilateral lung had the big percentage (76%) as identified in [graph \(3.3\)](#)

**Graph-3.3.** identified the common site of Covid19



#### 4. Discussion

Results related to the efficacy of CT radiologic techniques in assessing complications of COVID-19 concluded that CT scan of the chest is considered the gold standard and can be used easily in diagnosing patients with coronavirus infection. This study conducted on 230 patients suffering of Covid19 and being detecting by chest computed tomography scan, were most of patients found have pneumonia which appear as ground glass opacity and it is the most common complication of covid-19 occupied the highest rate ( 32%) compared with pleural effusion which occupied the lowest rate(16%) [graph \(3.1\)](#). These results agree with previous studies found in literatures [16, 17] which reported that pneumonia is the most common complication of covid-19. In fact Coronavirus disease

poses a threat to individuals of all nationalities with all ages and ethnicities, but in current study the gender distribution achieved that men develop more serious complications than women, with percentage of (54%) comparing with female (46%) , graph (3.2), this matched with others researches which have been written recently [18]. On the other hand, the age distribution has resulted in the age group (50-59) having the highest percentage among all groups (19.6 %) while [10-19] age group was the lowest percentage (1.3 %) as described in Table (3.1). this results found agree with another previous studies, particularly that written on coronavirus epidemiology during the pandemic which struck the whole world [19, 20]. The result of covid-19 symptoms distribution showed that acute respiratory failure (hypoxia) is the most common sever etiology with percentage of (25.2%) as represented in Table (3.2). Moreover, the severe cases of coronavirus showed evidence of a blockage (thrombosis) in the pulmonary blood that occupied (5%) represented the lower percentage of the severe clinical etiology of covid19. These results agree also with another previous studies found in literatures [13]. The final result in current study concerning the site of COVID-19 distribution showed that ,the bilateral lung were the common site of covid-19 with a highest distribution ratio (76%), compared to the right and left lung field graph (3.3), this result matched with other studies which reported that, the CT finding of covid19 showed a wide range pattern of ground-glass opacity demonstrated in sub-segmented as well as symmetrical lobular lung field [21] .

Outcomes concerning gender, age groups and symptoms were varied from individual to individual as well as the complications reaction. Were certain groups of people are more susceptible than others a according to their immune capabilities.

## 5. Conclusion

The sensitivity of the CT scans in assessing COVID-19 was significantly high, it has an efficiency to assess complications of COVID-19 in an accurate manner, and therefore it has been proposed to use CT scan as a complementary method in covid-19 diagnosis. Since the Corona epidemic is a real pandemic that afflicted the world and is still suffering from it at the present time and methods of treatment and prevention are still uncertain, therefore there is an urgent need for scientific research and more studies in this topic recommended by the author.

## Competing Interest

The author declare that no competing interest.

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