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Added Value of the Chest CT Features in Diagnosis of Patients with Corona Virus 2019 (COVID-19) in Early and Late Phase of the Disease with CO-RADS Assessment

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Abstract

Background: An outbreak of coronavirus disease caused by a novel coronavirus (SARS-CoV-2) began in December 2019 in Wuhan in central China. RT-PCR (reverse-transcription-polymerase chain reaction) is the gold standard test in the diagnosis of patients with COVID 19 but due to the shortage of its kits, Chest CT is considered a vital component in the diagnostic algorithm of these patients.

Aim of Study: This study aim to assess the usefulness of chest CT features in diagnosis of patients in early and late phase of COVID-19 infection with assessment of these features with CORADS and determine the relation of the CO-RADS and the phase of the disease.

Patients and Methods: Chest CT of 290 patients who confirmed laboratory by RT-PCR to be infected with COVID 19 were reviewed retrospectively for common CT findings, then we investigate the relation between the initial CT scan and symptoms onset [early, 0-4 days (n=143), late, 5-12 days (n=147)]. After that we assessed these features in correlation to CO-RADS.

Results: The number of early phase group was 143 (49.3%) while the late phase group was 147 (50.7%) patients. Regarding CO-RADS class, there were 45, 47, 18, 11, and 169 patients have CO-RADS class 1, 2, 3, 4, and 5, respectively. Seventy-eight (54.5%) patients who were imaged in the early phase had a normal CT scan, while CT findings such as, mixed ground glass (GGO) and consolidative opacities (74.1%) with peripheral and central distribution, bilateral lung involvement (93.2%), and multilobar affection (91.8%), were statistically significant in late phase group (p<0.001). Patients with late phase of COVID 19 have significantly higher CO-RADS score (≥4) than those in early phase. Also fever, cough and dyspnea (respiratory symptoms) were common in high CO-RADS score (>4) than in low CO-RADS score.

Conclusions: RT-PCR is mandatory for the diagnosis of patients suspected to have COVID 19 in an early phase of illness with normal CT chest or low CORADS score 3. Bilateral GGO and consolidative opacities, multilobar affection, with peripheral and central lesion distribution, in chest CT of patients imaged in a late phase of the disease or high CORADS score ≥4 encourage the radiologists to suggest COVID 19 as a possible diagnosis with confidence in the case global pandemic and shortage of PCR kits supply.

Key Words: *COVID 19 – Chest CT – Coronavirus disease.*

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Introduction

AN outbreak of coronavirus disease infection caused by a novel coronavirus known as COVID-19 or SARS-COV-2 (severe acute respiratory syndrome coronavirus 2) began in December 2019 in the city of Wuhan in central China [1]. Althoughthe initial investigation reported that the virus has a zoonotic origin from the Huanan Seafood Wholesale Market in Wuhan, worldwide spread from human to human has been noted and has resulted in 1 428 428 confirmed cases of COVID-19 and 82 020 deaths across 184 countries [2]. Respiratory symptoms such as fever, cough, and dyspnea were the most common clinical symptoms at presentation in addition to other nonspecific symptoms such as headache, bone pain, and fatigue [3]. Approximately 20% of the COVID 19 cases were reported as severe and the mortality rate was 3% [4]. The World Health Organization declared (COVID 19) as a global epidemic and health emergency On January 30, 2020 [5].

COVID 19 (SARS-CoV-2) is the seventh member of the Coronaviridae family that can infect humans [3]. Two other examples of the coronavirus family include, severe acute respiratory syndrome Corona virus1 (SARS- COV-1) that began in southern China and has a global concern from November 2002 till July 2003 during its outbreak [6], and Middle East respiratory syndrome coronavirus (MERS-COV) in 2012 which originated in Saudi Arabia [7].

Early detection of the COVID 19 cases is invaluable to ensure timely treatment and, rapid isolation of the patients which is crucial for containment of this communicable disease. Some early investigators have observed that; bilateral lung opacities with lobular and subsegmental distribution were the most typical CT findings of COVID 19 and the extensive chest CT changes were noted at approximately 10 days after symptoms onset [8-12]. High rates of ground-glass opacities (GGO) and consolidation, sometimes with peripheral lung distribution was found by another group [13]. As a result of these differences, Prokop et al., proposed the categorical assessment scheme COVID-19 Reporting and Data System (CO-RADS), that provides a qualitative standardization of COVID-19 imaging and helps standardized communication between physician and radiologists [14].

Aim of work, we aim to assess the usefulness of chest CT features in diagnosis of patients in early and late phase of COVID-19 infection with assessment of these features with CORADS and determine the relation of CO-RADS and the phase of the disease.

Patients and Methods

Patient's selection:

This retrospective study was approved by our institutional review board and patient informed consent was waived. From May 2021 to October 2021, 290 patients; Mean age was 44.41 ± 17.44 years (age range, 1-85 years). There were 151 (52.6%) men and 139 (47.4%) women, referred from chest department out clinics to MSCT unit of radiology department at Assiut University hospital, who confirmed laboratory to be positive for COVID-19 infection were enrolled in our study, and underwent chest CT and the only exclusion criterion was low image quality of the chest CT that is insufficient for image analysis. All patients were confirmed to have COVID-19 nucleic acid on the basis of positive findings for respiratory secretions tested using real–time reverse–transcription –polymerase Chain reaction (RT-PCR) obtained by nasopharyngeal and/or oropharyngeal swab. All the clinical data of the patients including: age, sex and clinical symptoms (fever, headache, cough, dyspnea and bone pain) were analyzed.

CT Scanning protocol:

All the patients underwent Chest CT using a 16 detector CT scanner (Bright Speed, GE Healthcare Technologies). All scans were obtained without intravenous contrast material with the patient in the supine position during end-inspiration. The scanning was starting from the level of thoracic inlet to the lowest costophrenic angle. Only the initial chest CT scans were evaluated. The acquisition parameters used for the scanning protocol were as follows; tube current-exposure time, 200-300mAs; tube voltage, 100-120kv; pitch, 1.375-0.9125; and reconstructed section thickness, 1.25mm.

Image evaluation: All CT images were reviewed by three well-trained thoracic radiologists with at least 6 years of experience and the final decisions were reached by consensus. The CT images were reviewed on a PACS workstation (Synapses, Fujifilm) with multiplanar reconstruction tools.

For each patient, the following chest CT features were analyzed: (1) Lesion density; a. Presence of GGO (defined as increased lung attenuation with preservation of the underlying vascular margins and bronchial wall); b. Presence of consolidation (defined as opacification of the lung parenchyma with obscuration of underlying vascular margins and airway wall) [15]; c. Presence of mixed GGO and consolidation; (2) Frequency of the affected lobes; (3) Number of lobes affected by either GGO or consolidative opacities or both; involvement of three lobes or more considered multilobar affection; (4) Laterality of the GGO and consolidation (unilateral or bilateral); (5) Distribution of the lung opacities, a. Peripheral (involving the peripheral one-third of the lung), b. Central (involving mainly the central region comprising two-thirds of the lung), or c. Peripheral & central (involving both the peripheral and central regions) [16], (6) Other CT findings were also evaluated such as 1. Broncial wall thickening; 2. Vascular enlargement in the lesion; 3. Pleural thickening; 4. Septal thickening; 5. Pleural effusion; 6. intralesional cavitation; and 7. Thoracic lymphadenopathy (defined as lymph node size of ≥ 10mm in short-axis dimension).

Then CO-RADS score was applied for all the patients as described by Prokop et al., [14]; normal CT examination considered as CO-RADS 1, indicating very low level of suspicious of pulmonary involvement; bronchial involvement with absence of GGO considered as CO-RADS 2, indicating low level of suspicious of pulmonary involvement by COVID-19; single small GGO or consolidation considered CO-RADS 3, implies equivocal findings for pulmonary involvement of COVID-19; multi focal unilateral GGO or consolidations considered as CO-RADS 4, implies a high level of suspicion for pulmonary involvement by COVID-19; bilateral multifocal GGO and/or consolidations with pleural based distribution considered as CO-RADS 5,

implies a very high level of suspicion for pulmonary involvement by COVID-19.

The time between the initial appearance of patient symptoms (e.g., fever, cough, dyspnea, headache and bone pain) and the date of the initial chest CT examination was registered for each patient. If the time between the first clinical symptom and the initial CT was 4 days or less, the patient was considered to have been imaged in the early phase of the illness. If the time between symptom onset and initial CT was between 5 and 12 days, the patient was considered to have been imaged in the late phase of the disease.

Lastly the CT features and the clinical symptoms of the COVID 19 patients were compared with CO-RADS score.

Statistical analysis:

Data were recorded using spread sheet software (Excel 2010, Microsoft) and were analyzed using statistical software (SPSS, version 22.0, IBM).

Continuous data were expressed in the form of mean ± SD or median (range) values while nominal data were expressed in the form of frequency (percentage). The frequency of CT signs was expressed as the number (percentage) of occurrence.

Chi^2 test was used for comparison between early and late phase of the disease for all data with the exception of age that was compared using Student-*t* test. Differences for which $p<0.05$ were considered statistically significant.

Results

Mean age of the enrolled patients was 44.41 ± 17.44 years (age range, 1-85 years). There were 151 (52.6%) men and 139 (47.4%) women. Fever was the most frequent symptom (83.4%) followed by headache (54.1%), cough (49%), dyspnea (29.9%) and bone pain (25.5%).

It was noticed that 86 (29.7%) of the 290 patients had no GGO or consolidation on CT examination. Of the remaining 204 patients, 28 (9.7%) patients had only consolidation and 54 (18.6%) patients had only GGO, while 122 (42.1 %) patients had both findings. The most frequently affected lobes were right and left lower lobe (61.7%) (Table 1). One hundred sixty-one patients (55.5%) had ≥3 affected lobes. Bilateral lung affection was reported in 60.7% patients. Ninety-five (32.8%) patients had peripheral lesions distribution while 103 (35.5%) patients had peripheral and central lesions. Bronchial wall thickening and vascular enlargement were more frequently seen in 73.4% and 54.5% respectively, the other findings listed in Table (1).

Table (1): Findings in CT chest.

CT findings	N=290
Lesion density:	
No consolidation or GGO	86 (29.7%)
Consolidation	28 (9.7%)
GGO	54 (18.6%)
Mixed GGO& consolidation	122 (42.1 %)
Frequency of the affected lobe:	
Right lower lobe	179 (61.7%)
Left lower lobe	179 (61.7%)
Left upper lobe	165 (56.9%)
Right upper lobe	157 (54.1 %)
Right middle lobe	126 (43.3%)
No. of affected lobes:	
One lobe	27 (9.3%)
Two lobes	16 (5.5%)
≥Three lobes	161 (55.5%)
Laterality	
Unilateral	28 (9.7%)
Bilateral	176 (60.7%)
Distribution of lung opacities:	
Central	6 (2.1%)
Peripheral	95 (32.8%)
Both	103 (35.5%)
Other findings:	
Bronchial wall thickening	213 (73.4%)
Vascular enlargement	158 (54.5%)
Pleural thickening	71 (24.5%)
septal thickening	48 (16.6%)
Pleural effusion	1 (0.70%)
Cavitation	1 (0.30%)
Thoracic lymphadenopathy	1 (0.30%)

Data expressed as frequency (percentage).
GGO: Ground glass opacity.

Regarding CO-RADS class, there were 45 (15.5%) had CO-RADS 1, 47 (16.2%), 18 (6.2%), 11 (3.7%), and 169 (58.2%) patients have CO-RADS class 2, 3, 4, and 5, respectively (Figs. 1-4, respectively).

As the time between initial onset of symptoms and subsequent chest CT was known for the 290 patients, the number of early-phase group was 143 (49.3%) and the late phase group was 147 (50.7%). Patients in the late phase of the disease were significantly older than those with early disease (51.40 ± 14.45 vs. 37.22 ± 17.37; $p<0.001$). The frequency of headache was considerably higher among patients in the early group, while fever, cough and dyspnea were more common in patients in the late phase of the illness (Table 2). Seventy-eight (54.5%) of the patients imaged in the early phase of the disease had no lung opacities compared to

eight patients in late phase (5.4%). In contrast, most (n=109, 74.1%) of the in late-phase patients had mixed GGO and consolidation with a significant difference between both groups (p<0.001). GGO was the most frequent lesion in the early group patients (23.1%) (Fig. 2) (Table 3). Multilobar affection (91.8%), bilateral lung involvement (93.2%), peripheral and central lesion distribution of the opacities, bronchial wall thickening (85.7%), vascular enlargement (85.7%), pleural thickening (39.5%) and septal thickening (31.3%) were more likely to be found in patients in the late phase of illness (p<0.001). Unilobar or bilobar lung affection, unilateral lung involvement, peripheral lesion distribution were significantly more common in patients imaged in the early phase of the disease. Cavitation, pleural effusion and thoracic lymphadenopathy were all absent in the early phase group (Table 3).

Lastly, we noticed that patients with late phase of COVID 19 have higher CO-RADS score (4&5) than those in early phase with a significant difference between two groups (p<0.001) (Table 4). Also fever, cough and dyspnea (respiratory symptoms) were common in high CO-RADS score (≥4) than in low CO-RADS score (Table 5).

Table (2): Clinical data of the examined patients based on the phase of the disease.

	Early phase (n=143)	Late phase (n=147)	p-value
Age (years)	37.22± 17.37	51.40± 14.45	<0.001
Range	1-73	16-85	
Fever	108 (75.5%)	134 (91.2%)	<0.001
Cough	30 (21%)	112 (76.2%)	<0.001
Dyspnea	6 (4.2%)	69 (46.9%)	<0.001
Headache	97 (67.8%)	60 (40.8%)	<0.001
Bone pain	33 (23.1%)	41 (27.9%)	0.21

Data expressed as frequency (percentage), Mean (SD).
p-value was significant if <0.05.

Table (3): Chest CT findings based on the phase of the disease.

CT findings	Early phase (n=143)	Late phase (n=147)	p-value
Lesion density:			
No consolidation or GGO	78 (54.5%)	8 (5.4%)	<0.001
GGO	33 (23.1%)	21 (14.3%)	
Consolidation	19 (13.3%)	9 (6.1%)	
GGO and consolidation	13 (9.1%)	109 (74.1%)	
Frequency of affected lobe:			
Right lower lobe	44 (30.8%)	135 (91.8%)	<0.001
Left lower lobe	47 (32.9%)	132 (90.4%)	<0.001
Left upper lobe	31 (21.7%)	134 (91.2%)	<0.001
Right upper lobe	28 (19.6%)	129 (87.8%)	<0.001
Right middle lobe	15 (10.5%)	111 (75.5%)	<0.001
No. of affected lobes:			
One lobe	25 (17.5%)	2 (1.4%)	<0.001
Two lobes	14 (9.8%)	2 (1.4%)	
≥ three lobes	26 (18.2%)	135 (91.8%)	
Laterality:			
Normal	78 (54.5%)	8 (5.4%)	<0.001
Unilateral	26 (18.2%)	2 (1.4%)	
Bilateral	39 (27.3%)	137 (93.2%)	
Lesion distribution:			
Central	4 (2.8%)	2 (1.4%)	<0.001
Peripheral	50 (35%)	45 (30.6%)	
Both	12 (8.4%)	91 (61.9%)	
Other findings:			
Bronchial wall thickening	87 (60.8%)	126 (85.7%)	<0.001
Vascular enlargement	32 (22.4%)	126 (85.7%)	<0.001
Pleural thickening	13 (9.1%)	58 (39.5%)	<0.001
Septal thickening	2 (1.4%)	46 (31.3%)	<0.001
Pleural effusion	0	1 (0.70%)	0.50
Cavitation	0	1 (0.70%)	0.50
Thoracic lymphadenopathy	0	1 (0.70%)	0.50

Data expressed as frequency (percentage).
p-value is significant if <0.05.
CT : Computed tomography.
GGO: Ground glass opacity.

Table (4): Comparison between CO-RADS class and phases of the disease.

	Early phase (n=143)	Late phase (n=147)	*p*-value
CO-RAD class:			
Class 1	41 (28.7%)	4 (2.7%)	<0.001
Class 2	43 (30.1%)	4 (2.7%)	
Class 3	16 (11.2%)	2 (1.4%)	
Class 4	8 (5.6%)	3 (2%)	
Class 5	35 (24.5%)	134 (91.2%)	

Data expressed as frequency (percentage).
p-value is significant if <0.05.
Chi^2 test was used for comparison between both groups.

Table (5): Relation between the demographic data and clinical symptoms of patients with COVID 19 based on CO-RAD class.

	CO-RAD class					*p*
	I (n=45)	II (n=47)	III (n=18)	IV (n=11)	V (n=169)	
Age (years)	26.17±15.74	31.97±14.07	38.27±15.63	52.72±13.77	52.69±12.78	<0.001
Sex:						
Male	16 (35.6%)	26 (55.3%)	9 (50%)	2 (18.2%)	98 (58%)	0.01
Female	29 (64.4%)	21 (44.7%)	9 (50%)	9 (81.8%)	71 (42%)	
Fever	30 (66.7%)	29 (61.7%)	16 (88.9%)	11 (100%)	156 (92.3%)	<0.001
Cough	0	3 (6.4%)	7 (38.9%)	8 (72.7%)	124 (73.4%)	<0.001
Dyspnea	0	0	0	4 (36.4%)	71 (42%)	<0.001
Headache	33 (73.3%)	34 (72.3%)	11 (61.1%)	9 (81.8%)	70 (41.4%)	<0.001
Bone pain	7 (15.6%)	12 (25.5%)	3 (16.7%)	5 (45.5%)	47 (27.8%)	0.21

Data expressed as frequency (percentage), Mean (SD). *p*-value was significant if <0.05.
Chi^2 test was used for comparison between both groups for all data exception of age that was compared with ANOVA test.

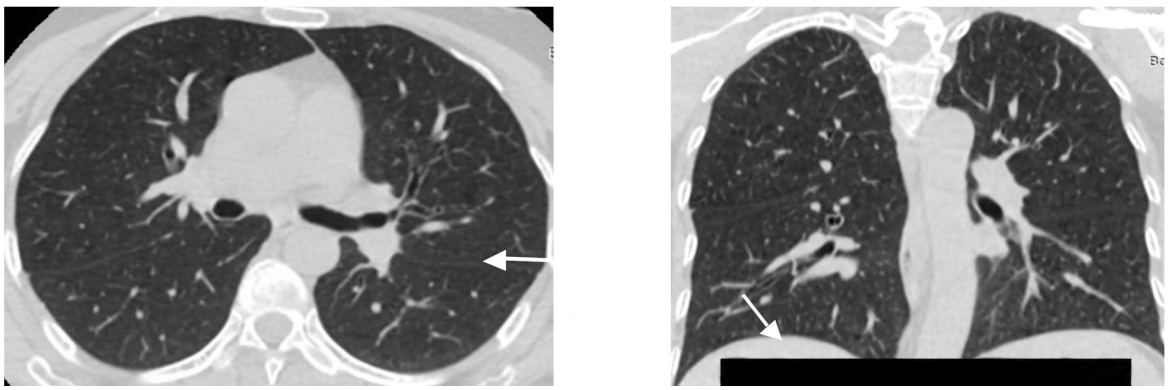

Fig. (1): Axial and coronal non contrast CT images in 32 years old man imaged 3 days from symptoms onset (early phase) with CO-RADS 2, shows bilateral bronchial wall thickening (white arrow).

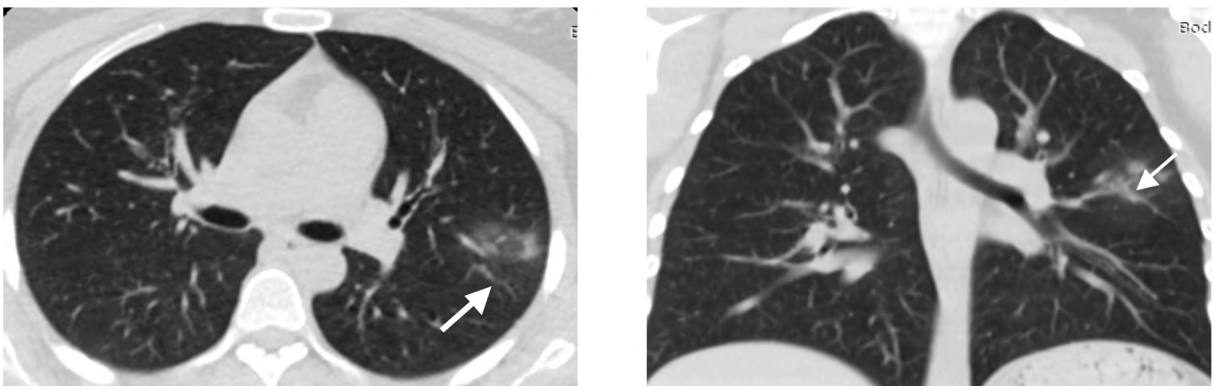

Fig. (2): Non contrast axial and coronal CT chest images in 27 year sold woman imaged 4 days from symptoms onset (early phase), shows unifocal left upper lung lobe GGO (arrow), CO-RADS 3.

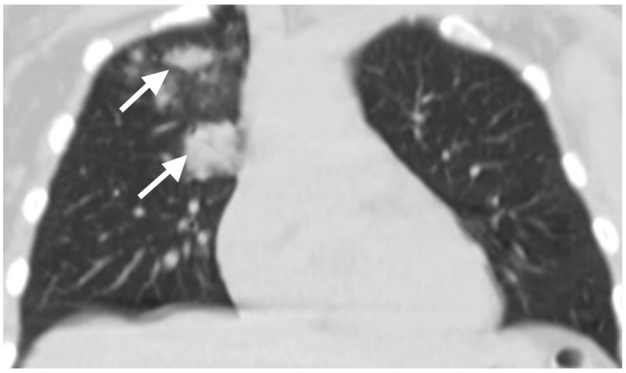

Fig. (3): Non contrast coronal CT images in 43 year sold woman imaged 8 days from symptoms onset (late phase), shows multi-focal, unilateral consolidations seen in the RT upper lung lobe, COR-ADS 4.

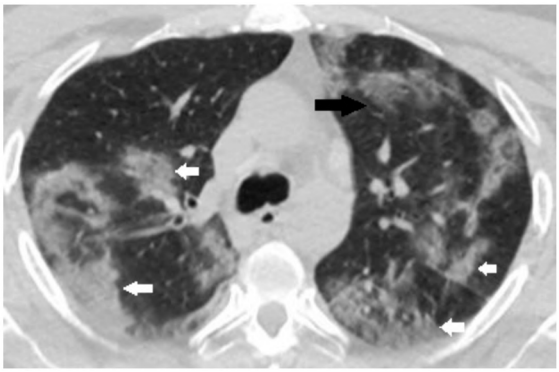

Fig. (4): Axial CT image obtained without intravenous contrast material in a 55-year-old man imaged 10 days from symptom onset (late phase) with CORADS 5, shows bilateral consolidative opacities (white arrows), and GGO (black arrow) with a peripheral and central distribution of the lesions and multilobar affection.

Discussion

The increasing frequency of confirmed COVID-19 cases is striking, but the worst scenario is the continually increasing number of confirmed and suspected cases of COVID 19 which is greater than the capabilities of the medical staff service. The RT-PCR tests have become the standard tool for the diagnosis of COVID-19 pneumonia, but owing to the shortage of the supply of these kits and its false negative results which often require repeated samples, the National Health Commission of the People's Republic of China has encouraged diagnosis of the COVID 19 based on chest CT and clinical findings alone **[17]**.

The CT features such as GGO, consolidative opacities or both findings were noted in 70.3% of the patients. This pattern of disease, dovetails with the archetypal response to acute lung injury, as the initial acute insult (mostly inflammatory or infectious) causes GGO that may coalesce into dense consolidative lesions **[18]**. Early radiology investigative results (Bernheim et al., Pan et al., and Yu et al.) **[3,8,19]**. Largely concur with the findings of our work which reported that GGO and consolidation with peripheral (32.8%) or both peripheral and central (35.5%) distribution of the lesions, multilobar affection (55.5%), bilateral lung involvement (60.7%), and lower lung lobe predominance (61.7%), insofar is the chest CT hallmark of COVID-19 infection. Interestingly, we found that most patients had bronchial wall thickening (73.4%) and vascular enlargement (54.5%) that might have been caused by the acute inflammatory response.

The difference between the early and late phase of the disease regarding the basic clinical and CT features was analysed. The patients in the late phase were significantly older than those with early disease (p<0.001), which also reported by a previous study that was done by Yu et al., **[19]**. Headache was substantially higher among patients with early disease as it manifested in 76.8% of them, while patients in the late phase had a significantly higher frequency of fever (91.2%), cough (67.2%) and dyspnea (46.9%). Our investigative efforts have demonstrated that the frequency of CT findings is related to infection time course; seventy-eight (54.5%) of the 143 patients imaged in the early phase of the disease had a normal CT scan with complete absence of GGO and consolidation (as opposed to eight (5.4%) patients imaged in the late phase), these data are greatly consistent with the results of the previous study that was done by-Bernheim et al., which reported that 56% of patients imaged in early phase had a normal chest CT compared to 4% imaged in the late phase **[3]**. These results should remain the clinicians of the importance of inquiring about the details of the mild symptoms (e.g headache) when seeing young age patients <37 years in an outpatient clinic and also pay the attention of the radiologist not to be fooled by the normal CT chest to exclude the COVID 19; subsequently CT chest cannot standalone to rule out COVID-19 infection in early phase of illnesses. Therefore the real-time RT-PCR is mandatory in the identification of patients in the early phase of the disease with mild clinical symptoms and normal CT chest, as early isolation of these patients to reduce human to human transmission is necessary.

It is noteworthy that, the presence of GGO alone is the second most frequent chest CT findings after normal chest in the early phase of illness compared to the late phase of the disease which

show increasing both GGO and consolidation in 74.1% of these patients. These results largely concur with the data of the previous study that was done by Pan et al., [8].

Also, the presence of unilateral lung affection with a peripheral distribution of the opacities and uni or bilobar lung involvement in chest CT also encourages the radiologists to diagnose early phase of illness. These data are consistent with a description in a study of the previous literature that was done by Han et al., [19], which reported that the early chest CT findings were mostly GGO in one or two lobes with peripheral distribution in the lung.

As the patients symptoms onset were ≥5 days (late phase), lung parenchymal opacities eventually, spread to a central area to involve both the peripheral and central lung zones with bilateral lung involvement and multilobar affection (≥3 lobes), that shows significant difference between the two groups in our study. Bronchial wall thickening, vascular enlargement, pleural thickening and septal thickening, which may reflect the virulence of COVID 19 and viral load, were also statistically significantly higher in patients later in the course of the disease, these results largely consistent with previous studies that was done by Han et al., and Li et al., [20,21]. Pleural effusion, lung cavitation and intrathoracic lymphadenopathy, were a rare features in our study that require further validation. These results encourage the radiologists to suggest the COVID 19 infection as a possible diagnosis especially in the case of a global epidemic of COVID 19, in addition to a shortage of the RT-PCR kits supply.

Also this study reported that early phase of COVID 19 has lower CO-RADS score (≤3) than in late phase with a significant difference between the two groups (p<0.001), this is due to little exudation causing minimal alveolar wall oedema and the alveoli is not totally replaced by exudate. Late phase of the disease have high CO-RADS score (≥4), as the disease progress the alveolar inflammatory exudation spreads more giving larger, bilateral and multiple lung patches [14].

More symptomatic patients have higher CO-RADS score than less symptomatic patients and this concomitant with the previous literature that done by previous investigators [22]. CO-RADS is safer used in patients with respiratory symptoms than patients with flu like symptoms or with no respiratory involvement.

There are several limitations to our study. First, the confirmed cases of COVID 19 were only included; infection with other viruses and negative results were not included in the analysis. Second, we did not evaluate the follow-up chest CT of the patients in the early phase of the disease with normal CT chest to explore and monitor the CT changes in this group late in the disease. Lastly, we did not analyze the CT features of the children as a separate entity.

Conclusion:

Real-time PCR is mandatory for the diagnosis of patients suspected to have COVID 19 in the early phase of illness with normal CT chest or low CO-RADS score ≤3. In late phase of the disease or high CO-RADS score ≥4, the radiologists promote to suggest COVID 19 as a possible diagnosis with confidence in the global pandemic without the need for additional RT-PCR in the presence of the following chest CT features; bilateral GGO and/or consolidative opacities with peripheral and central lesion distribution and multilobar affection. The CORADS is not significantly reliable during the early stage of the disease.

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Conflicts of interest: There is no conflicts of interest.

Recommendation: Large sample size and multicenter studies are recommended.

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القيمة المضافة لميزات التصوير المقطعى للصدر فى تشخيص مرضى فيروس كورونا ٢٠١٩ (COVID-19) فى المرحلة المبكرة والمتأخرة من المرض مع تقييم CO-RADS

الهدف تقييم فائدة ميزات التصوير المقطعى المحوسب للصدر فى تشخيص المرضى فى المرحلة المبكرة والمتأخرة من عدوى COVID-19 مع تقييم هذه الميزات باستخدام CORADS وتحديد علاقة CORADS ومرحلة المرض.

المرضى والطرق: تمت مراجعة التصوير المقطعى للصدر لـ ٢٩٠ مريضاً أكدوا إصابة المختبر بواسطة RT-PCR بفيروس COVID-19 بأثر رجعى للحصول على نتائج التصوير المقطعى المحوسب الشائعة، ثم قمنا بفحص العلاقة بين الفحص الأولى بالأشعة المقطعية وبداية الأعراض (مبكراً، ٠–٤ أيام العدد = ١٤٣، متأخر، ٥–١٢ يوماً العدد=١٤٧). بعد ذلك قمنا بتقييم هذه الميزات فى ارتباط بـ CO-RADS.

النتائج: بلغ عدد مجموعة المرحلة المبكرة ١٤٣ (٤٩.٣٪) بينما كانت مجموعة المرحلة المتأخرة ١٤٧ (٥٠.٧٪) مريضاً. فيما يتعلق بفئة CO-RADS، كان هناك ٤٥ و٤٧ و١٨ و١١ و١٦٩ مريضاً لديهم فئة CO-RADS١ و ٢ و ٣ و ٤ و٥ على التوالى. ثمانية وسبعون (٥٤.٥٪) من المرضى الذين تم تصويرهم فى المرحلة المبكرة كان لديهم فحص بالأشعة المقطعية طبيعى، فى حين أن نتائج التصوير المقطعى المحوسب مثل الزجاج الأرضى المختلط (GGO) وعتامة التوحيد (٧٤.١٪) مع التوزيع المحيطى والمركزى، مشاركة الرئة الثنائية (٩٣.٢٪)، والعاطفة متعددة الفصوص (٩١.٨٪)، كانت ذات دلالة إحصائية فى مجموعة المرحلة المتأخرة (p<٠.٠٠١). المرضى الذين يعانون من المرحلة المتأخرة من COVID-19 لديهم درجة أعلى بكثير من ٤≥) CO-RADS من أولئك فى المرحلة المبكرة. كما كانت الحمى والسعال وضيق التنفس (أعراض الجهاز التنفسى) شائعة فى درجة CO-RADS العالية (٤≤) عنها فى درجة CO-RADS المنخفضة.

الخلاصة: يعتبر RT-PCR إلزامياً لتشخيص المرضى المشتبه فى إصابتهم بـ COVID-19 فى مرحلة مبكرة من المرض بصدر مقطعى طبيعى أو درجة منخفضة من 3≤ CORADS حيث أن عتامة الزجاج الأرضى والتعتيم التوحيدى للرأتين مع الانتشار فى أطراف ومنتصف أكثر من فص للرأتين، فى التصوير المقطعى للصدر، للمرضى الذين تم تصويرهم فى مرحلة متأخرة من المرض أو درجة عالية من 4≥ RADS-CO تشجع أطباء الأشعة على اقتراح COVID-19 كتشخيص محتمل مع الثقة فى حالة جائحة عالمى ونقص فى إمدادات مجموعات تفاعل البو ليميراز المتسلسل.