



AGE RELATED HRCT CHEST - CT SEVERITY SCORES IN COVID19 POSITIVE CASES

Radiodiagnosis

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ABSTRACT

OBJECTIVE: To know the HRCT chest changes in COVID 19 positive patients in different age groups

MATERIAL AND METHODS: The present study was conducted in the department of Radiology, government general hospital, Guntur for a period of 4 months from May 2020 to August 2020 on COVID 19 positive for whom HRCT chest was done. All the scans are performed with GE 16 slice CT scan machine.

RESULTS: A total of 50 HRCT chest cases were studied of which 22 were above 50 yrs age of which 7 were showing severe CT severity score, 5 were showing moderate CT severity score, 10 were showing mild severity score. 14 were between 40 to 50 yrs age group of which 4 were showing severe CT severity score, 3 were showing moderate CT severity score, 7 were showing mild CT severity score. 10 were between 30 to 40 yrs age group of which 2 were showing severe CT severity score, 2 were showing moderate CT severity score, 6 were showing mild CT severity score. 4 are between 20 to 30 yrs age group of which 1 showed moderate CT severity score, 3 were showing mild CT severity score.

CONCLUSION: More CT severity score is noted in older age group compared to younger age group.

KEYWORDS

COVID 19, age group, CT severity score, ground glass opacities

INTRODUCTION:

In December 2019, a lower respiratory tract febrile illness of unknown origin was reported in a cluster of patients in Wuhan City, Hubei Province, China. A novel strain of coronavirus isolated from the bronchoalveolar lavage of the patients was determined to be responsible for the outbreak. The pulmonary syndrome was later named coronavirus disease 2019 (COVID-19) by the World Health Organization. Despite the imposition of strict quarantine rules and travel restrictions, the virus transmitted rapidly out of China with a number of confirmed cases reported in Europe, the United Kingdom, United States, India and all over the world. The global number of confirmed cases has surpassed 3 crores, with more than 9.5 lakh virus-related deaths as of August 2020. COVID-19 is a viral disease also known as SARS-CoV-2 or severe acute respiratory syndrome coronavirus 2. COVID-19 usually presents with fever (85%), cough (70%) and shortness of breath (43%), but abdominal and other symptoms are possible and the disease can be asymptomatic. The severity and outcome of coronavirus disease 2019 (COVID-19) largely depends on a patient's age. Adults over 65 years of age represent 80% of hospitalizations and have a 23-fold greater risk of death than those under 65. The diagnosis is made by a positive PCR test, which is highly specific. CT has a higher sensitivity but lower specificity and can play a role in the diagnosis and treatment of the disease.

1. METHOD/APPROACH

OBJECTIVES

The objective of the present study is to know the CT chest severity in different age groups in COVID positive patients.

STUDY DESIGN

The present study was a hospital based retrospective study conducted during the period of 4 months from May 2020 to August 2020 at

Department of Radio Diagnosis, Government general hospital, Guntur.

SOURCE OF DATA

All COVID-19 positive cases coming for HRCT chest in Department of Radio Diagnosis, Government general hospital, Guntur.

SAMPLE SIZE

Fifty(50) cases of COVID-19 positive cases of different age groups undergoing HRCT chest.

SELECTION CRITERIA

- INCLUSION CRITERIA**
 - COVID 19 positive patients coming for HRCT chest.
- EXCLUSION CRITERIA**
 - All pregnant women.
 - Seriously ill patients on ventilator support.

TECHNIQUE

All the scans were performed with GE 16 slice CT scan machine. Scanning parameters were identical to the manufacturers standard recommended pre-setting for a thorax routine. Images were reconstructed with a 1-mm slice thickness in all cases using the classic filtered back-projection method with a soft tissue kernel of B20 and a lung kernel of B60. Coronal and sagittal multiplanar reconstructions were also available in all cases.

Implementation of appropriate infection prevention and control measures were arranged in all suspected CT cases, consisting of prompt sanitation of CT facility and patient's isolation.

RESULTS:

- All the COVID 19 positive patients who came for HRCT chest were evaluated. The results were reviewed based on the CT severity scoring system.

CT SEVERITY SCORING

	< 5% involvement	5-25 % involvement	25-50% involvement	50-75% involvement	>75% involvement
RIGHT UPPER LOBE	1	2	3	4	5
RIGHT MIDDLE LOBE	1	2	3	4	5
RIGHT LOWER LOBE	1	2	3	4	5
LEFT UPPER LOBE	1	2	3	4	5
LEFT LOWER LOBE	1	2	3	4	5

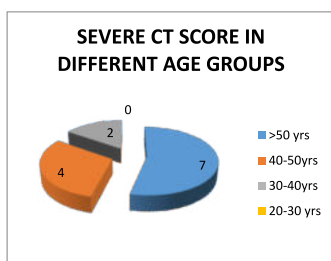
<8 - MILD
8-18 - MODERATE
>18 - SEVERE

Out of the 50 cases 32(64%) are males and 18(36%) are females . The results were evaluated age wise of which 22 cases(44%) were above 50 yrs , 14 cases(28%) were between 40-50yrs , 10(20%) were between 30- 40 yrs and 4(8%) were between 20 – 30 yrs.

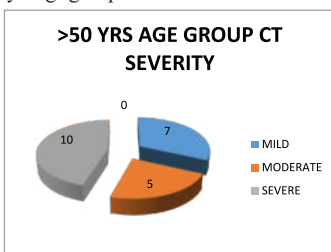
AGE WISE CT SEVERITY IN COVID-19 POSITIVE CASES

AGE GROUP	MILD	MODERATE	SEVERE	TOTAL
>50	10	5	7	22
40-50	7	3	4	14
30-40	6	2	2	10
20-30	3	1	0	4
TOTAL	26	11	13	50

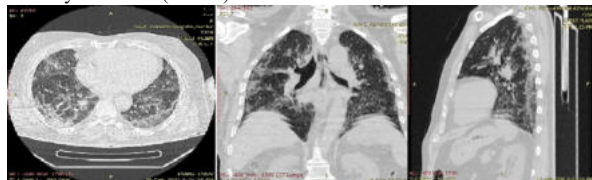
Coming to the CT severity score 26 cases(52%) had mild severity , 11 cases (22%) had moderate severity , 13 cases(26%) had severe severity score .



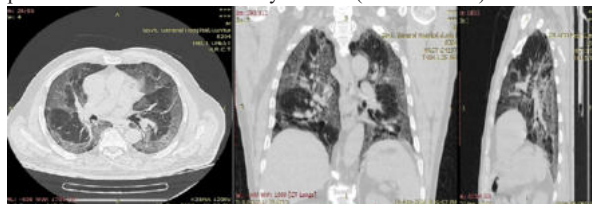
Severe score is shown by 7 cases(53%) above 50 yrs , 4 cases(32%) between 40- 50yrs , 2 cases (15%)between 30-40yrs and no cases between 20- 30 yrs age group.



32 yr old male patient showing bilateral focal ground glass opacities and sub pleural fibrosis in right postero-basal segment with CT severity score of 5 (MILD).



53 yrs old male patient showing bilateral ground glass opacities , sub-pleural fibrosis with CT severity score 11 (MODERATE).

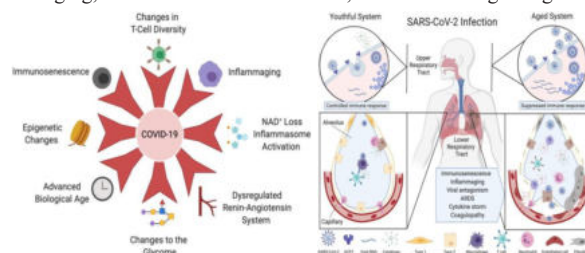


65yrs old male patient showing ground glass opacities involving all

lobes with CT severity score of 20 (SEVERE).

DISCUSSION

- The severity and outcome of coronavirus disease 2019 (COVID-19) largely depends on a patient's age. Adults over 65 years of age represent 80% of hospitalizations and have a 23-fold greater risk of death than those under 65.
- The main reasons for this is the aging immune system(Immunosenescence),increased inflammatory and cytokine storms in the aged, Dysregulation of epigenomes with age , Dysregulated Renin Angiotensin system, Changes in glycosylation during aging, decreased sirtuins and NAD⁺, increased biological age .



- CT has a higher sensitivity but lower specificity and can play a role in the diagnosis and treatment of the disease. Initial CT-findings in COVID-19 cases include bilateral, multilobar ground glass opacification (GGO) with a peripheral or posterior distribution, mainly in the lower lobes and less frequently in the middle lobe .
- Consolidation superimposed on GGO as the initial imaging presentation is found in a smaller number of cases, mainly in the elderly population.
- Septal thickening, bronchiectasis, pleural thickening, and subpleural involvement are some of the less common findings, mainly in the later stages of the disease.
- Pleural effusion, pericardial effusion, lymphadenopathy, cavitation, CT halo sign, and pneumothorax are some of the uncommon but possible findings seen with disease progression.
- CT can play a role in Triage of patients, Prediction of worsening, Prediction of improvement-Problem solver.
- These CT findings in COVID-19 are attributed to infection of type II alveolar epithelial cells via ACE2 receptors by the SARS-CoV virus. The virus replicates and triggers cellular apoptosis in alveolar cells. Pathological changes in COVID-19 resemble those of severe acute respiratory syndrome (SARS) and Middle Eastern respiratory syndrome (MERS). The viral particles released from the cell infect other cells, inducing the release of pro inflammatory cytokines and causing widespread alveolar epithelial damage. This leads to exudation into the alveolar space with diffuse alveolar damage and fibrin-rich hyaline membranes. This produces the ground glass opacities and consolidations encountered on CT. Aberrant healing mechanisms are triggered which cause scarring of the epithelium causing fibrosis at resolution .Because of the factors in old age as described above the alveolar damage is more which cause severe ct severity score .
- The CO-RADS classification is a standardized reporting system for patients with suspected COVID-19 infection developed for a moderate to high prevalence setting. Based on the CT findings, the level of suspicion of COVID-19 infection is graded from very low or CO-RADS 1 up to very high or CO-RADS 5 and the severity and stage of the disease is determined with remarks on comorbidity and a differential diagnosis.

CO-RADS*		
	Chance of COVID-19	CT findings
CO-RADS 1	Highly unlikely	normal or non-infectious abnormalities
CO-RADS 2	Unlikely	abnormalities consistent with infections other than COVID-19
CO-RADS 3	Equivocal	unclear whether COVID-19 is present
CO-RADS 4	Probable	abnormalities suspicious for COVID-19
CO-RADS 5	Highly likely	typical COVID-19
CO-RADS 6	PCR proven	

CONCLUSION

The present retrospective study shows more cases are seen in males(64%) compared to females(36%) , more cases are seen in > 50 yrs age group (44%)compared to other age groups and more cases of severe CT severity score is seen in > 50 yrs age group (53%).

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