



ORIGINAL RESEARCH PAPER

General Medicine

ASSESSMENT OF DISEASE SEVERITY AND PROGNOSIS IN COVID-19 PATIENTS BASED ON LUNG INVOLVEMENT IN TERTIARY CARE HOSPITALS IN CHENNAI

KEY WORDS: COVID-19, SARS-CoV-2, Viral pneumonia, ARDS

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ABSTRACT

Background: Corona virus disease 2019 (COVID 19) is caused by severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) infection. This disease, which is quickly spreading worldwide, has high potential for infection and causes rapid progression of lung lesions, resulting in a high mortality rate. This study aimed to assess the severity and prognosis in COVID-19 patients based on lung involvement (CT-Chest). **Methods:** All lab confirmed cases of Covid 19 (RT-PCR positive) 369 patients admitted in Government Kilpauk medical college who were on follow up from october to november 2020, in Chennai were included. All patients underwent complete laboratory data including imaging studies- X-ray and CT- chest. **Results:** Among 369 of the admitted patients, 67% were males, 38% in 20-40 years 36% in 40-60 years of age. Among that 280 (75.9%) had non severe disease, 89(24.12%) had severe disease. Regarding diseases outcome 38(10.3%) died and 331(89.7%) are alive. Compared to the patients with the stages of COVID-19:

Asymptomatic (no lung involvement) - 28.4%
 Mild – Stage I (score I to II – 5 to 25% area involved) -36.3%
 Moderate – Stage II (score II to IV – 25 to 50% area involved) - 22.5%
 Severe – Stage III (score IV to V - more than 50% area involved) – 12.7%
 12.7% of patients need ICU admission & mechanical ventilation and 10.3% of patients succumbed to death.

Conclusion:

INTRODUCTION:

Covid-19 is mainly a respiratory disease caused by SARS-CoV-2 (corona virus). The disease can spread via respiratory droplets when patient coughs or sneezes. Virus enters into respiratory system and binds with ACE II receptors in type II pneumocytes in the respiratory system and increases the inflammatory mediators and cytokines. This causes interstitial edema and increases the work of breathing and hypoxia. The clinical presentation of COVID-19 is asymptomatic to severe disease. Common symptoms include fever, cough, fatigue, loose stools, breathlessness. Rarely patient presents with anosmia, loss of taste, vomiting, abdominal pain ,stroke and chest pain. ACE II receptors also present in the kidney, cardiovascular system, gastro intestinal system so the patients may also develop ARDS, AKI, thromboembolic events, shock were reported. In this context one of the most common complication is ARDS. clinically severity assessed by saturation, pulse rate, respiratory rate. laboratory markers such as NLR, deranged electrolytes, CRP levels associated with worse prognosis. Severity also assessed by imaging techniques such as Xray chest, CT chest, ultrasound chest.

STAGES OF COVID-19:

1. Asymptomatic: No symptoms, SPO₂ > 96% in room air, CT Chest findings (no lung involvement)
2. Mild – Stage I: Mild clinical symptoms - Fever respiratory tract and other symptoms, SPO₂ > 94% in room air, CT Chest findings (score I to II – 5 to 25% area involved)
3. Moderate – Stage II: Respiratory distress, respiratory rate >30/min, SPO₂ < 94% – 90% in room air, CT Chest findings (score II to IV – 25 to 75% area involved)
4. Severe – Stage III: Respiratory failure requiring mechanical ventilation, shock and other organ failure, SPO₂ < 90% in room air, CT Chest findings (score IV to V - more than 50% area involved)

CT CHEST FINDINGS:

Typical: Ground glass opacities, Consolidation, Interstitial thickening, Crazy-paving

Ground glass opacities with or without consolidation usually of multi-focal, bilateral involvement, are noticed in the peripheral or subpleural distribution, posterior part or lower lobe predilection.

Atypical: Pleural effusion, Lymphadenopathy, fibrosis, Bronchiectasis, Nodules, Pericardial effusion, hallow sign, calcification, cavitation, pleural thickening, bronchial wall thickening.

According to CT Chest results, 4 stages in Covid 19 patients.

- (1) Early stage - 0-4 days,
- (2) Progressive stage - 5-8 days,
- (3) Peak stage - 8-13 days,
- (4) Absorption stage - after 2 weeks of symptoms.

METHODS:

STUDY DESIGN AND PARTICIPANTS:

Retrospective study of lab confirmed RT-PCR positive 369 patients in Government Kilpauk medical college were conducted between October to November 2020.

DATA SOURCES AND COLLECTION:

Demographic data, encounter data, laboratory measurements, radiological studies, vital signs were collected from the hospital records and documented in a pre-structured proforma and statistical analysis was done.

RESULTS:

Vital signs and imaging of patients infected with SARSCoV 2

| SATURATION | ALL PATIENTS N - 369 | NON-SEVERE N-280 | SEVERE N-89 |
|------------|-------------------------|---------------------|----------------|
| >94 % | 299 (81%) | 255 (85.3%) | 44 (14.7%) |

| | | | |
|---------|------------|------------|------------|
| 80-94 % | 56 (15.1%) | 25 (44.6%) | 31 (55.3%) |
| 70-80 % | 9 (2.4%) | 0 | 9 |
| <70 % | 5 (1.3%) | 0 | 5 |

| IMAGING CT-CHEST | ALL PATIENTS N - 369 | NON-SEVERE N-280 | SEVERE N-89 |
|---------------------|----------------------|------------------|-------------|
| No lung involvement | 105(28.4%) | 96(34.3%) | 9(10.1%) |
| 1-25 % | 134(36.3%) | 118(42.1%) | 16(17.9%) |
| 25-50 % | 83(22.5%) | 64(22.9%) | 19(21.35%) |
| 50-75 % | 39(10.6%) | 2(0.7%) | 37(41.6%) |
| >75 % | 8(2.1%) | 0 | 8(8.9%) |

| Oxygen support | ALL PATIENTS N - 369 | NON-SEVERE N-280 | SEVERE N-89 |
|----------------------|----------------------|------------------|-------------|
| Without O2 | 129 (34.9%) | 127 (45.4%) | 2 (2.2%) |
| NRM | 106 (28.7%) | 91 (32.5%) | 15 (16.9%) |
| HFNO | 77 (20.9%) | 59 (21.07%) | 18 (20.2%) |
| NIV | 48 (13%) | 3 (1.07%) | 45 (50.6%) |
| Invasive ventilation | 9 (2.4%) | 0 | 9 (10.1%) |
| Death | 38 (10.3%) | 2 (5.3%) | 36 (94.7%) |

(NRM - Non-Rebreathing Mask, HFNO - High Flow Nasal O2, NIV - Non-Invasive Ventilation)

DISCUSSION:

In our study which enrolled 369 patients conducted between October and November 2020, in kilpauk medical college were categorised as non severe in 280(75.9%) and severe in 89(24.12%). patients with severe diseases had co morbidities such as old age, uncontrolled diabetes ,systemic hypertension, coronary artery diseases.

CT chest shows I-25% lung involvement in most of the patients .Among the patients most of them fall into >94% saturation, and without requiring oxygen supplement. 34.9% patients were not requiring oxygen. 28.7% patients were in need of non rebreathing mask ventilation. Most of the patients fall in between mild to moderate stages.

According to CT involvement the treatment also varies.this include, use of antibiotics, steroids, antivirals, anticoagulation needed for moderate to severe stages of COVID 19.

Patients with more lung involvement were 35.2% are stage IV needs invasive ventilation among them 15.4% requires ICU admission . out of them 89.7% discharged as alive,10.3% subcumed to death.

CONCLUSION:

From this study, we have assessed the patient severity by using ct chest involvement in covid 19 patients were RTPCR positive. according to this study pt had more severe the lung involvement had fall in saturation, needs invasive ventilation and ICU admission. More severe the disease had worse prognosis and disease outcome. Therefore assessing CT chest in the early stage of the disease is to halting the disease progression and severity.

REFERENCES:

1. Zu ZY, Jiang MD, Xu PP, Chen W, Ni QQ, Lu GM, Zhang LJ. Coronavirus Disease 2019 (COVID-19): A Perspective from China. *Radiology*. 2020 Aug;296(2):E15-E25. doi: 10.1148/radiol.2020200490. Epub 2020 Feb 21. PMID: 32083985;PMCID:PMC7233368.
2. Cheng Z, Lu Y, Cao Q, Qin L, Pan Z, Yan F, Yang W. Clinical Features and Chest CT Manifestations of Coronavirus Disease 2019 (COVID-19) in a Single-Center Study in Shanghai, China. *AJR Am J Roentgenol*. 2020 Jul;215(1):121-126. doi: 10.2214/AJR.20.22959. Epub 2020 Mar 14. PMID: 32174128.
3. Ufuk F, Savaş R. Chest CT features of the novel coronavirus disease (COVID-19). *Turk J Med Sci*. 2020 Jun 23;50(4):664-678. doi: 10.3906/sag-2004-331. PMID: 32394687;PMCID:PMC7374927.
4. Lyu P, Liu X, Zhang R, Shi L, Gao J. The Performance of Chest CT in Evaluating the Clinical Severity of COVID-19 Pneumonia: Identifying Critical Cases Based on CT Characteristics. *Invest Radiol*. 2020 Jul;55(7):412-421. doi: 10.1097/RLI.0000000000000689. PMID: 32304402;PMCID:PMC7173027.

6. Tang Z, Zhao W, Xie X, Zhong Z, Shi F, Ma T, Liu J, Shen D. Severity assessment of COVID-19 using CT image features and laboratory indices. *Phys Med Biol*. 2021 Jan 26;66(3):035015. doi: 10.1088/1361-6560/abf9e. PMID: 33032267.
7. Feng Z, Yu Q, Yao S, Luo L, Zhou W, Mao X, Li J, Duan J, Yan Z, Yang M, Tan H, Ma M, Li T, Yi D, Mi Z, Zhao H, Jiang Y, He Z, Li H, Nie W, Liu Y, Zhao J, Luo M, Liu X, Rong P, Wang W. Early prediction of disease progression in COVID-19 pneumonia patients with chest CT and clinical characteristics. *Nat Commun*. 2020 Oct 2;11(1):4968. doi: 10.1038/s41467-020-18786-x. PMID: 33009413; PMCID: PMC7532528.
8. Liu F, Zhang Q, Huang C, Shi C, Wang L, Shi N, Fang C, Shan F, Mei X, Shi J, Song F, Yang Z, Ding Z, Su X, Lu H, Zhu T, Zhang Z, Shi L, Shi Y. CT quantification of pneumonia lesions in early days predicts progression to severe illness in a cohort of COVID-19 patients. *Theranostics*. 2020 Apr 27;10(12):5613-5622. doi: 10.7150/thno.45985. PMID: 32373235;PMCID:PMC7196293.
9. Bhandari S, Rankawat G, Bagarhatta M, Singh A, Singh A, Gupta V, Sharma S, Sharma R. Clinico-Radiological Evaluation and Correlation of CT Chest Images with Progress of Disease in COVID-19 Patients. *J Assoc Physicians India*. 2020 Jul;68(7):34-42. PMID: 32602679.
10. Islam MN, Dipi RM, Mostafa SN, Datta A. Progression of Disease in COVID-19 Patients Evaluated by Chest CT Imaging and Correlated with Clinical Parameters. *Mymensingh Med J*. 2021 Jan;30(1):182-188. PMID: 33397872.