"A STUDY TO CORRELATE CLINICAL SEVERITY WITH HRCT THORAX FINDINGS IN COVID 19 PATIENTS - ONE YEAR CROSS SECTIONAL STUDY AT KLES DR. PRABHAKAR KORE HOSPITAL & MRC".

BY

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Sub: Institutional Ethical Clearance for the study.

With reference to the above, we wish to inform you that your proposed research project titled **"A STUDY TO CORRELATION CLINICAL SEVERITY WITH HRCT THORAX FINDINGS IN COVID- 19 PATIENTS – ONE YEAR CROSS SECTIONAL STUDY AT KLES DR. PRABHAKAR KORE HOSPITAL & MRC ",** is ethical and justifiable. The proposed research project has been cleared by the JNMC Institutional Ethics Committee on Human Subjects Research.

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ABSTRACT

Introduction:

The present study was conducted in department of General Medicine, KLES Dr. Prabhakar Kore Hospital and Medical Research Centre in the study period from January 2021 to December 2021 was undertaken to study the corelation of clinical severity with HRCT Thorax findings in Covid 19 patients.

Material and Methods:

The study included inpatients of Dr. Prabhakar Kore Hospital and MRC, Belagavi. Positive covid 19 patients with fulfilment of the inclusion criteria and exclusion criteria were included in the study after obtaining an informed consent. Patients were subjected to thorough history taking and clinical examination. After staging the clinical severity, it is compared with the CT severity score.

Observation and Conclusion:

In our study, clinical severity was more observed with advancing age, male sex, clinical symptom especially breathlessness, comorbidity like type II diabetes mellitus as well as other comorbidities, oxygen supplementation was required in patients who were in severe groups, the clinical severity correlated with CT severity findings, the clinical parameters like pulse rate, respiratory rate, oxygen saturation abnormality was more in severe groups. Diffuse CT abnormality was observed in severe groups.

LIST OF ABBREVIATIONS USED

CT	:	COMPUTERIZED TOMOGRAPHY
HRCT	:	HIGH RESOLUTION COMPUTERIZED TOMOGRAPHY
CORADS	:	CORONAVIRUS DISEASE 2019 REPORTING AND DATA SYSTEM
RAAS	:	RENIN ANGIOTENSIN ALDOSTERONE SYSTEM
LDH	:	LACTATE DEHYDROGENASE
GGO	:	GROUND GLASS OPACITIES
IHD	:	ISCHEMIC HEART DISEASE
CKD	:	CHRONIC KIDNEY DISEASE
O2	:	OXYGEN
SARS	:	SEVERE ACUTE RESPIRATORY SYNDROME
ARDS	:	ACUTE RESPIRATORY DISTRESS SYNDROME
MERS	:	MIDDLE EAST RESPIRATORY SYNDROME
CFR	:	CASE FATALITY RATE
ACE	:	ANGIOTENSIN-CONVERTING ENZYME
WBC	:	WHITE BLOOD CELLS
COPD	:	CHRONIC OBSTRUCTIVE PULMONARY DISEASE
CAD	:	CORONARY ARTERY DISEASE
T2DM	:	TYPE II DIABETES MELLITUS
SBP	:	SYSTOLIC BLOOD PRESSURE
DBP	:	DIASTOLIC BLOOD PRESSURE
RTPCR	:	REAL-TIME REVERSE TRANSCRIPTASE-POLYMERASE CHAIN REACTION
HCOV	:	HUMAN CORONAVIRUS

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INTRODUCTION

Severe acute respiratory syndrome coronavirus 2 (SARSCoV-2) was initially described in a group of 41 people who presented with pneumonias of unknown causes in Wuhan, China, in December 2019.[1] The disease it causes was named Coronavirus Disease 2019 (COVID-19) by WHO in February 11, 2020. SARS-CoV-2 belong to β-coronavirus, which is a typical RNA virus.[2] Since the first observation, SARS-CoV2 infection epidemic has developed into a rare global healthcare emergency that has lately met the epidemiological requirements to be classified as a pandemic by the World Health Organization. Symptoms resulting from COVID-19 infection in the prodromal phase include fever, dry cough, and malaise which are nonspecific. Some patients may not even have obvious symptoms.[3] For patients with COVID-19, chest computed tomography (CT) has been widely practiced as a non-invasive tool for lung condition assessment and because CT has been shown to be very sensitive investigation in SARS-CoV-2-infected patients, it is frequently employed to assist with patient care. Therefore, chest computed tomography (CT), in particular high-resolution computed tomography (HRCT) represent valuable tools identifying patients with COVID-19 infections in an early stage when clinical symptoms may be unspecific or sparse.[3]

Most patients with COVID-19 demonstrate mild symptoms with a good prognosis, while some severe patients rapidly develop to acute respiratory distress syndrome (ARDS), acute respiratory failure and other serious complications that eventually lead to critical outcomes. There is currently no specific anti-coronaviral therapy for critically ill patients, and further confirmation is needed as to whether remdesivir is associated with significant clinical benefit in severe COVID-19. The case fatality rate for these patients is almost 20 times greater than that of non-severe

patients, and they frequently require extensive medical resource consumption. Thus, it is crucial for clinical purposes to identify patients as soon as possible who are at risk of developing serious COVID-19 problems. [4]

Given that CT score and illness severity are closely connected, using it to expedite the diagnostic process in symptomatic cases may be advantageous. There are only few clinical studies examining the relationship between clinical and CT severity in patients of COVID-19 in India.

OBJECTIVES

- To determine the correlation between clinical severity with HRCT Thorax findings in covid 19 patients.

REVIEW OF LITERATURE

Coronaviruses have emerged as major diseases in both humans and animals.[5] At the end of 2019, coronavirus was discovered to be the cause of a number of pneumonia cases in Wuhan, a city in China's Hubei province. It rapidly spread, causing an epidemic in China and an increasing number of instances in other countries throughout the world.[6] The World Health Organization (WHO) classified the disease as COVID-19, which is short for coronavirus disease 2019, in February 2020. The virus that causes COVID-19 is known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2); it was formerly known as 2019-nCoV. On March 11, 2020, the WHO declared COVID-19 a pandemic.[7]

Epidemiology

The first case of SARS CoV-2 infection was reported on 31st December 2019 in Wuhan, Hubei Province, China.

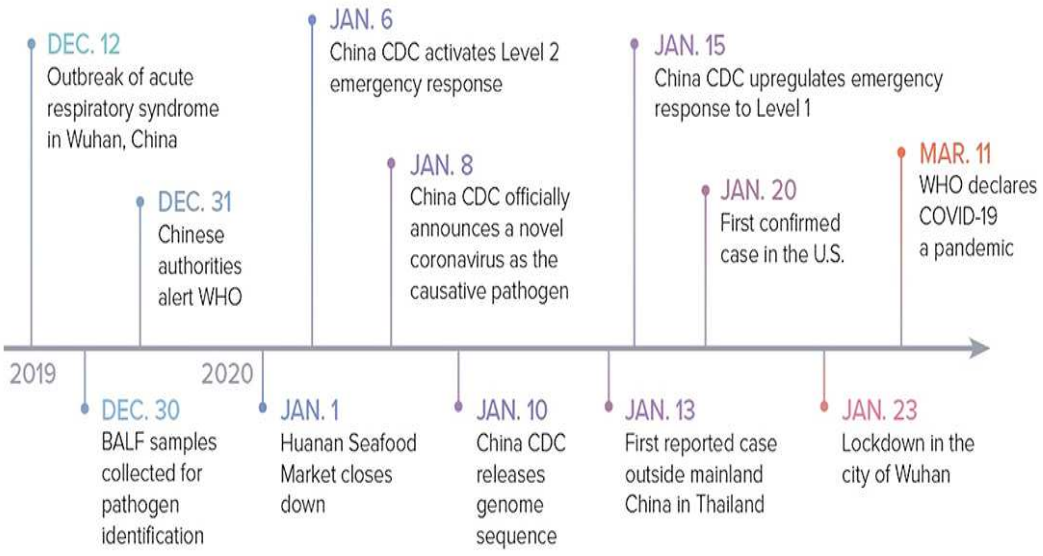


Figure 1: Timeline of COVID-19[8]

Following this, as of 23rd April 2020, it had spread quickly both domestically and globally, affecting approximately 185 nations, resulting in the present global pandemic. COVID-19 was labelled a Public Health Emergency of International Concern by the World Health Organization on 30thJanuary 2020, and it was recognized as a pandemic on 11 March 2020.

The extremely contagious nature is shown by the SARS CoV-2 basic reproduction number (R0), which is estimated to be between 1.4 and 3.9. In public gathering places like cruise ships, religious, political, academic, and corporate congregations, the R0 might even be higher, and hospitals that do not adhere to personal safety precautions. Similar to SARS CoV and MERS CoV, the incubation time and serial interval for SARS CoV-2 are anticipated to be 5–6 days and 8 days, respectively.[9] The case-fatality rate (CFR) for the pandemic was anticipated to range between 0.9 and 3 percent early on, which was lower than that of previous HCoVs (SARS CoV (6 percent –17 percent) and MERS CoV (20 percent –40 percent). However, by the 24th of May 2020, many countries' CFR had increased exponentially.

Unlike SARS CoV many SARS CoV-2 infected individuals exhibit no symptoms or mild symptoms, allowing them to avoid identification and become potential carriers.[10] It is critical to emphasise that not all close contacts have an infection, implying that individual genetic susceptibility plays a role.[11,12] The virus normally enters humans through the upper aerodigestive tract. Recently, SARS CoV-2 was found to be isolated from patient faeces, suggesting that fecal-oral transmission may occur.[13,14]

Pregnant women who have SARS CoV-2 infection run a higher risk of vertical transmission. Vertical transmission was ruled unlikely, however due to the lack of virus in swabs taken from the amniotic fluid, cord blood, neonate pharynx, and breast milk of the six pregnant women who were infected.[15] Long-distance airborne transmission was also hypothesized, This depends on the dynamics of the viral flow from the affected person as well as the area's ventilation.[16] Furthermore, mapping techniques like as cartograms can be used to depict the dissemination and expansion of COVID-19.[17] Understanding the pathways of transmission of SARS CoV-2 will allow for the use of appropriate containment measures.

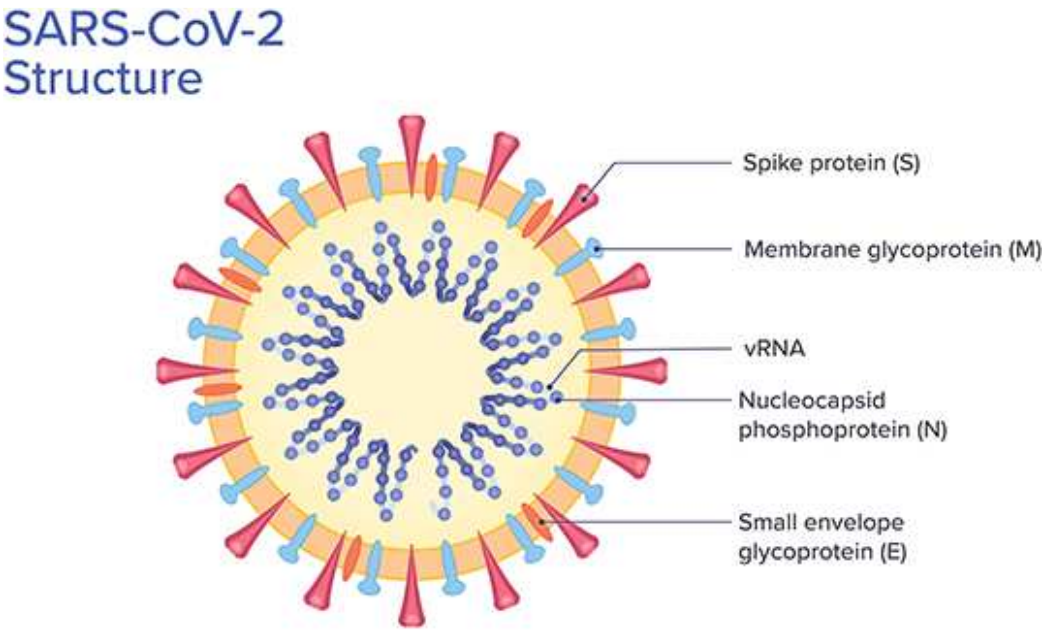


Figure 2: COVID-19 virus structure[8]

Despite the fact that all age groups are susceptible to SARS CoV-2 infection, Children have a lower mortality rate and disease severity. [18] Women are less typically impacted than males in adulthood due to higher plasma ACE2 levels.[19] The older population, in particular, with co-morbid conditions such diabetes, hypertension, a history of stroke, and a chronic lung, heart, or kidney ailment, due to diminished

bodily immunity and underlying organ system breakdown brought on by ageing, is particularly vulnerable to severe infections.[20,21]A recent study found that, similar to SARS CoV, non-O blood groups, notably group A, lacked protective anti-A IgM antibodies, which led to higher rates of infection and death from COVID-19. Many uncertainties remain in the SARS CoV-2 epidemiology, particularly the virus-host interaction, including the host vulnerability and epidemic evolution.[22,23]

The corona viruses (CoVs) are divided into the following categories: α and β (found in mammals including humans); γ and δ (seen in avian species) [36]. They get their name from their electron-microscopically observed similarity to crowns (coronam in Latin), which is caused by the presence of spike protein on their envelope. They can infect mammals and birds, including humans, with infections of the respiratory, digestive, hepatic, and central nervous systems.

According to estimates, approximately 2% of the population carries CoVs in a healthy state, and these viruses are thought to be the source of 5%–10% of acute respiratory illnesses. [39]. According to a theory, these viruses undergo quick mutation and recombination as they move from natural hosts to humans via an intermediary amplifying host, giving rise to new CoVs that are dangerous and cause human disease. In the recent few decades, novel CoVs have produced severe acute respiratory syndrome (SARS - SARS CoV) at China (2002–2003) and the Middle East respiratory syndrome (MERS - MERS CoV) in Saudi Arabia (2012), culminating in pandemics with pulmonary and extra-pulmonary signs. CoVs often co-infect children with other respiratory viral infections, but in children with underlying chronic diseases, they can be the only pathogen causing infection. As a result, CoVs have emerged as significant pathogens in rising respiratory illness outbreaks.

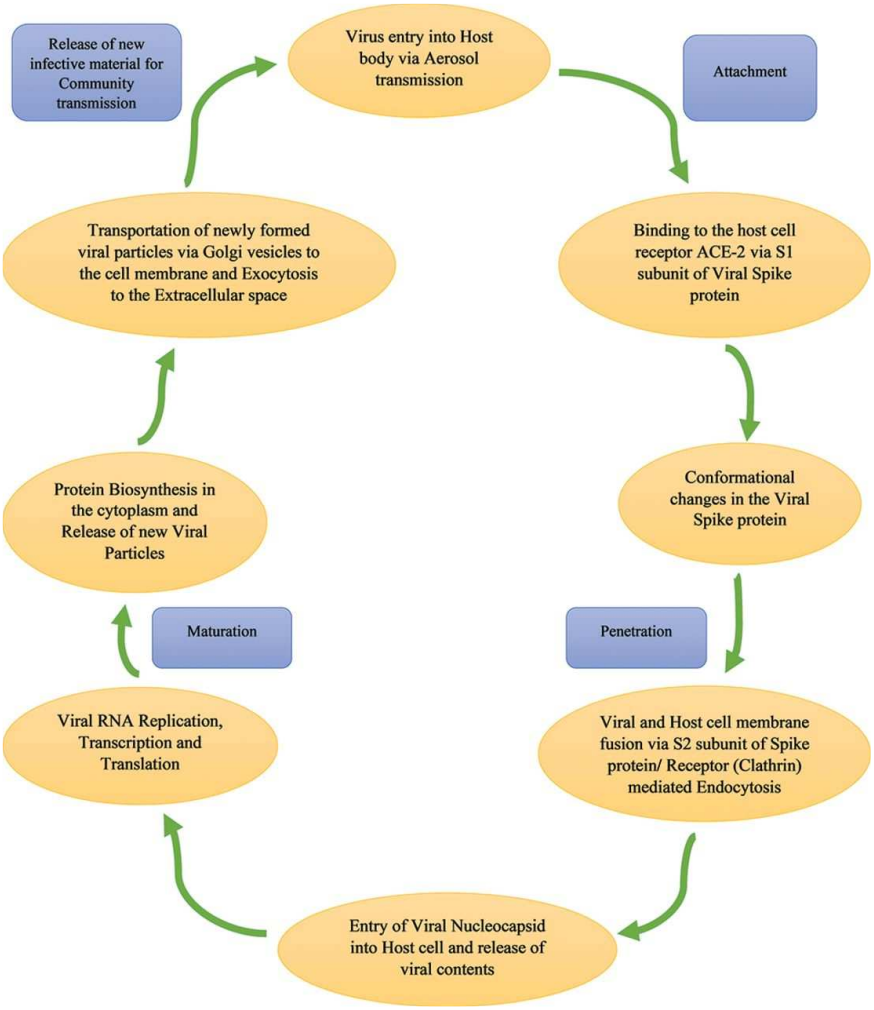


Figure 3: Life cycle of the Corona virus[24]

Pathogenesis:

Because of its similarities to SARS CoV, SARS CoV-2 is thought to affect human cells via Its highly glycosylated spike (S) proteins S1 fraction with receptor binding domain (RBD) and interacts to the ACE-2 R with 10–20 times more affinity than SARS CoV does.[25] ACE-2 R is found primarily in human alveolar epithelial cells (type II > type I).[26–28] Endothelial cells, gastrointestinal (esophageal and intestinal) epithelium, and cardiac myocytes all express the ACE-2 R.[29] After the virus binds to this receptor, Transmembrane protease serine (TMPRSS) which is a serine protease

that is expressed on host cells that recognises the virus's specific polybasic S1/S2 protease cleavage site with SPRR insertion on the spike protein. This site allows the virus to reveal the fusion protein (S2 fraction), which allows the viral and host cell membranes to fuse. It has been demonstrated that upper esophageal epithelium, absorptive enterocytes, and type 2 pneumocytes all considerably co-express TMPRSSs and ACE-2 R, suggesting that SARS CoV-2 can enter the host through these tissues in addition to alveolar epithelium. [9]

As a result, potential SARS CoV-2 target tissues will express both ACE-2 R and TMPRSSs. This membrane fusion allows viral RNA to be internalized into the host cell cytoplasm, where it is replicated and translated to generate new viral proteins. Viral assembly, which occurs just before virions are released from infected cells, is the last step before virions may infect other cells. During this stage, nucleocapsid (N) proteins bind to RNA molecules before being encased in an envelope and membrane protein. [9]

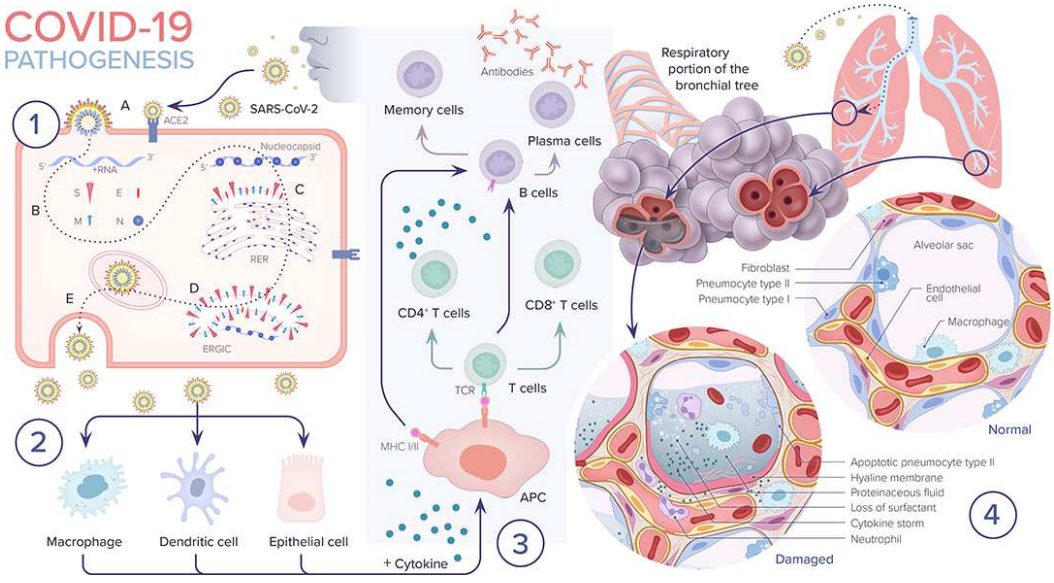


Figure 4: Pathogenesis of COVID-19 infection[8]

Type II pneumocytes (responsible for tissue healing and surfactant biosynthesis) are destroyed as a result of SARS CoV-2 infection, resulting in increased surface tension and dyspnoea. Furthermore, because of excessive cytokine production and release (cytokine storm) by activated inflammatory cells brought on by an accumulation of angiotensin II, these damaged type II pneumocytes disrupt the alveolar immunologic balance function, causing a cascade of local and systemic inflammatory responses.[9]

RAAS Inhibitors and COVID-19:

The renin-angiotensin-aldosterone system (RAAS) is altered by SARS-CoV and SARS-CoV-2 through the enzyme ACE2, which serves as a receptor for both viruses and also physiologically inhibits RAAS activity[40]. Angiotensin I is changed into angiotensin II within the RAAS by ACE. Through the angiotensin II type 1 receptor, angiotensin II exerts its vasoconstrictive and pro-inflammatory actions (AT1R). Angiotensin II is changed by ACE2 into angiotensin I-7, which binds to the MAS receptor and promotes a variety of processes, including vasodilation and anti-inflammatory actions. Angiotensin I is also transformed by ACE2 to angiotensin I-9, which is then changed into angiotensin I-7 by ACE. By destroying it and causing the production of angiotensin I-7, ACE2 restricts the harmful vasoconstrictor and pro-inflammatory effects of angiotensin II.[8]

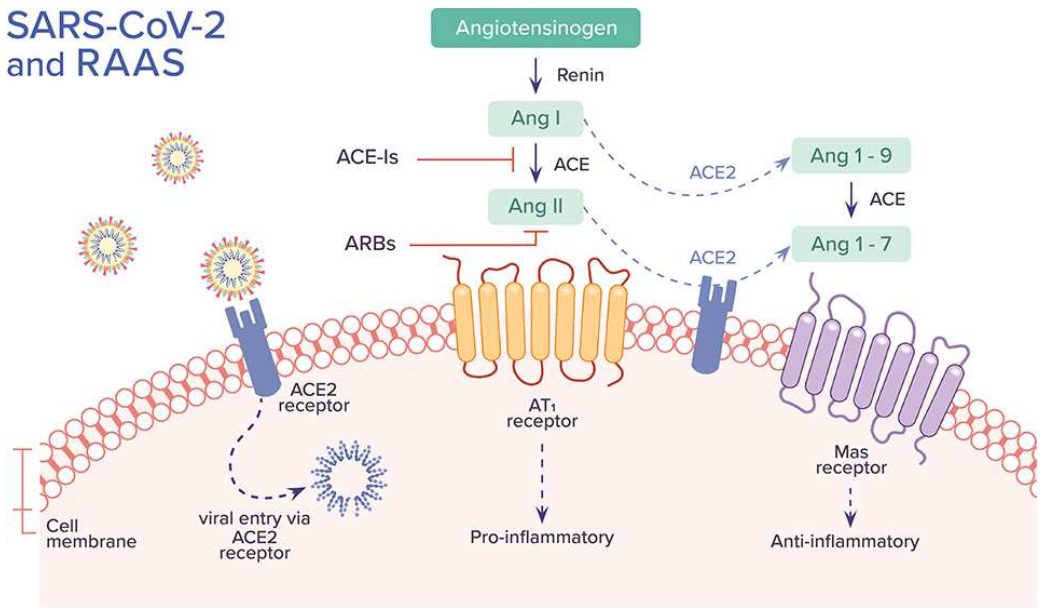


Figure 5: Relation of RAAS and SARS-CoV-2[8]

Transmission:

Before the emergence of variations, the secondary attack rate ranged from 4 to 57 percent in observational studies of household transmission.[30–35] The secondary attack rate among adult contacts was 30%, according to a meta-analysis of 87 research on home transmission encompassing 1,249,163 household links from different countries. More transmissible variations improve household transmission rates. Adults experienced secondary attacks at a rate of 90% according to a study of familial clusters during the dominant circulation of the Alpha (B.1.1.7 lineage variation).[36,37]

A case-control study found that SARS-CoV-2 infection in adults and adolescents was associated with close contact with people infected with COVID-19 (typically a household member), having visitors, and going to events with people from outside the home (such as social functions or activities with other infected family members).[38]

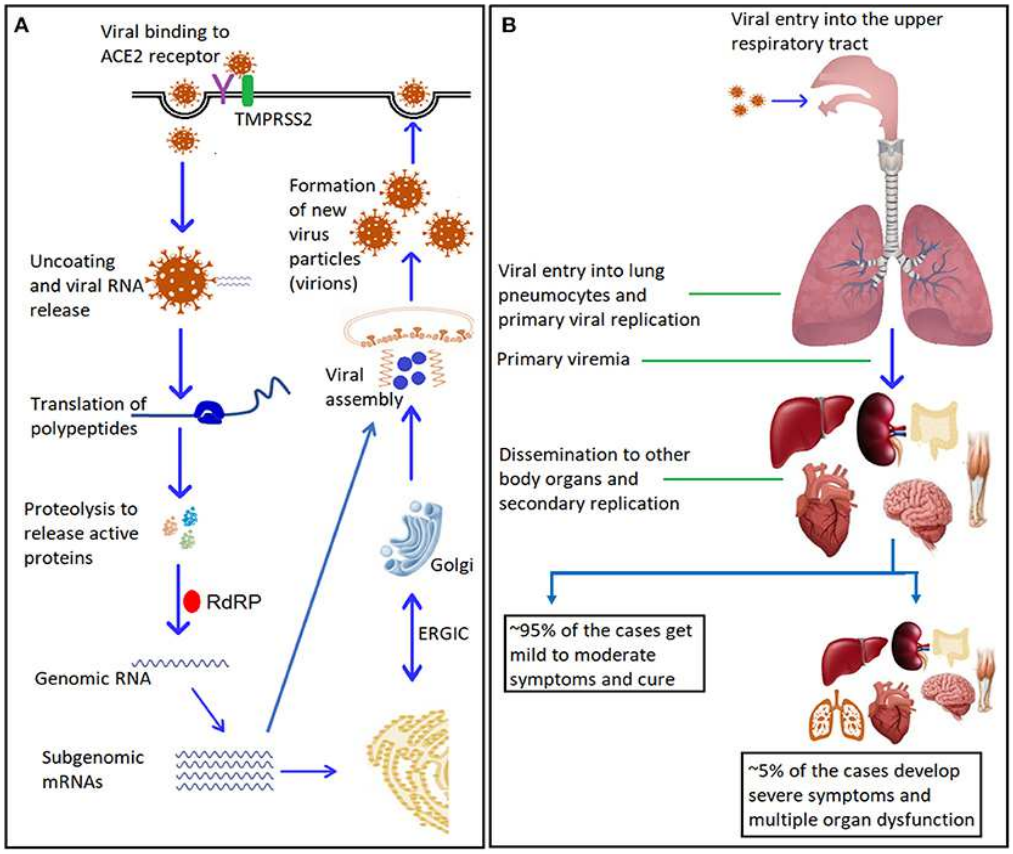


Figure 6: Transmission and entry of COVID-19[39]

There have also been reports of epidemics linked to health care, as well as instances of possible transmission between students and from instructors or other school personnel to children, in the context of schools.[40–43] SARS-CoV-2 infection was connected to irregular mask wearing at school in a case-control study, but not to regular attendance.[38]

SARS-CoV-2 transmission to household contacts with verified asymptomatic SARS-CoV-2 has been described, despite the fact that nothing is known regarding transmission by truly asymptomatic (as opposed to presymptomatic) SARS-CoV-2.[44] Additionally, there have been cases of familial clusters involving asymptomatic as well as likely transfer from asymptomatic people to persons outside their family.[44–47] According to these reports, asymptomatic patients may contribute to role in transmission.[48,49] Adults asymptomatic transmission is also well documented.

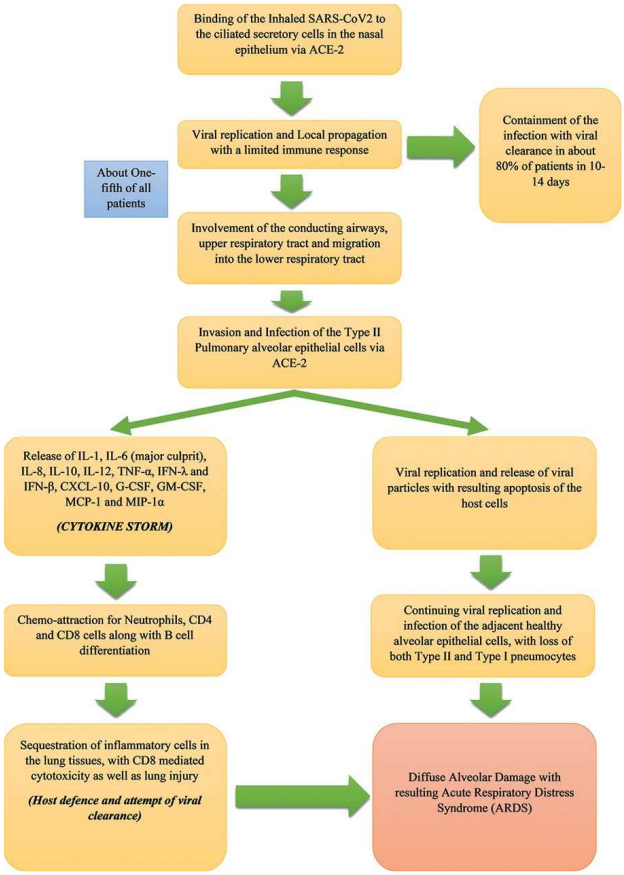


Figure 7: Pathophysiology of COVID-19[24]

Clinical features

The most prevalent reported symptoms among patients with symptomatic COVID-19 include cough, myalgia and headache. Other features include the presence of diarrhoea, sore throat, smell or taste abnormalities. Pneumonia is the most frequent serious manifestation of infection, characterized primarily by fever, cough, dyspnoea, and bilateral infiltrates on chest imaging.

Severe complications:

The complications described as

- Respiratory failure
- Cardiac and cardiovascular complications
- Thromboembolic complications
- Neurologic complications
- Inflammatory complications
- Secondary infections

Infection fatality rate

Only the mortality rate among cases that have been documented is shown by the case fatality rate. The infection fatality rate (i.e., the estimated mortality rate among all individuals with infection) has been estimated in some analyses of unvaccinated individuals to be between 0.15 and 1 percent, with substantial heterogeneity by location and across risk groups, because many severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infections are asymptomatic and many mild infections do not get diagnosed.[50]

In a systematic review and meta-analysis of 27 studies from resource-rich settings, the infection fatality rate was projected to rise exponentially with age (0.002 percent at age 10, 0.01 percent at age 25, 0.4 percent at age 55, 1.4 percent at age 65, 4.6 percent at age 75, 15 percent at age 85, and >25 percent at age 90 years). These studies calculated the total number of community infections through seroprevalence

surveys or comprehensive tracing programmes up to September 2020. These age-related variances appeared to account for the majority 0f the geographic variation in infection mortality rates reported (i.e., locations with a higher median population age reported higher fatality rates).[51]

Risk factors for severe illness

Even otherwise healthy people can have severe illness, although those over the age of 65 or those with certain underlying medical issues are more likely to experience it. Additionally, there are links between some demographic factors and abnormal test results and severe sickness.

On the basis of epidemiologic, clinical, and laboratory features, several prediction tools have been proposed to identify patients who are more likely to have severe illness; however, the majority of studies evaluating these tools are constrained by the risk of bias and they have not been sufficiently validated for clinical management.

- Increasing age
- Comorbidities
- Socioeconomic background and gender

Laboratory findings

The findings of laboratory are variable. In meta-analysis, the data of following laboratory abnormalities were noted down

- Elevated C-reactive protein: 54%
- Elevated serum ferritin: 47%

- Elevated lactate dehydrogenase: 37%
- Elevated D-dimers: 35%
- Elevated procalcitonin: 21%
- Elevated erythrocyte sedimentation rate: 19%
- Elevated leukocytes: 20%
- Lymphocytopenia: 19%
- Lymphocytosis: 8%
- Elevated serum aminotransferases: 30%
- Elevated creatine kinase myocardial bands: 25%

Table 1: Diagnostic tests for COVID 19

Test category	Primary clinical use	Specimen type	Performance characteristics	Comments
NAATs (including RT-PCR)	Diagnosis of current infection	Respiratory tract specimens	High analytic sensitivity and specificity in ideal settings. Clinical performance is influenced by the specimen's kind and quality as well as the patient's current state of health. Depending on the test employed, reported false-negative rates range from 5 to 40%.	Time to perform the test ranges from 15 minutes to 8 hours. Turnaround time is influenced by the test used and laboratory workflow. Specimens that are mailed in can be collected at home for some assays.

Serology (antibody detection)	Diagnosis of prior infection (or infection of at least 3 to 4 weeks duration)	Blood	Sensitivity and specificity are highly variable. The development of detectable antibodies typically takes several days to weeks; IgG usually develops by 14 days after onset of symptoms. Cross-reactivity with other coronaviruses has been reported. Serologic tests with high specificity nevertheless have a poor positive predictive value, therefore individual results should be regarded with caution in environments with low seroprevalence.	Time to perform the test ranges from 15 minutes to 2 hours. Turnaround time is influenced by the test used and laboratory workflow. It remains uncertain whether a positive antibody test indicates immunity against future infection.
Antigen tests	Diagnosis of current infection	Nasopharyngeal or nasal swabs	Antigen tests are generally less sensitive than nucleic acid tests. Within 5 to 7 days after the beginning of symptoms, sick people are most sensitive.	Time to perform the test is <1 hour.

Laboratories features associated with severe COVID-19 infection[20,21,52,53]

Abnormality	Possible threshold
Elevations in:	
LDH	>245 units/L (normal range: 110 to 210 units/L)
Ferritin	>500 mcg/L (normal range: females 10 to 200 mcg/L; males 30 to 300 mcg/L)
D-dimer	>1000 ng/mL (normal range: <500 ng/mL)
CPK	>2 times the upper limit 0f normal (normal range: 40 to 150 units/L)
CRP	>100 mg/L (normal range: <8.0 mg/L)
Troponin	>2 times the upper limit 0f normal (normal range for troponin T high sensitivity: females 0 to 9 ng/L; males 0 to 14 ng/L)
Decrease in:	
Absolute lymphocyte count	<800/microL (normal range for age ≥21 years: 1800 to 7700/microL)

IMAGING FINDINGS

Chest radiographs:

In the early phases of disease, chest radiographs may be normal. 20% of 64 COVID-19 patients studied retrospectively in Hong Kong had no abnormalities on chest radiographs at any point in the disease, according to the research. The bilateral, peripheral, and lower lung zones all had distributions of consolidation and ground-glass opacities, which were common abnormal radiological findings; lung involvement progressed during the course of the disease, with a peak in severity 10 to 12 days after symptom start.

Chest CT

Although chest computed tomography (CT) may be more sensitive than chest radiograph and some chest CT findings may be characteristic of COVID-19, no finding can completely rule in or rule out the possibility of COVID-19.

Most frequently, ground-glass opacification with or without consolidative abnormalities is seen on chest CT in COVID-19 patients, which is consistent with viral pneumonia. For example, the following anomalies were discovered in a systematic evaluation of studies analysing the chest CT results in over 2700 individuals with COVID-19.[54]

Ground-glass opacifications – 83 percent

Ground-glass opacifications with mixed consolidation – 58 percent

Adjacent pleural thickening – 52 percent

Interlobular septal thickening – 48 percent

Air bronchograms – 46 percent

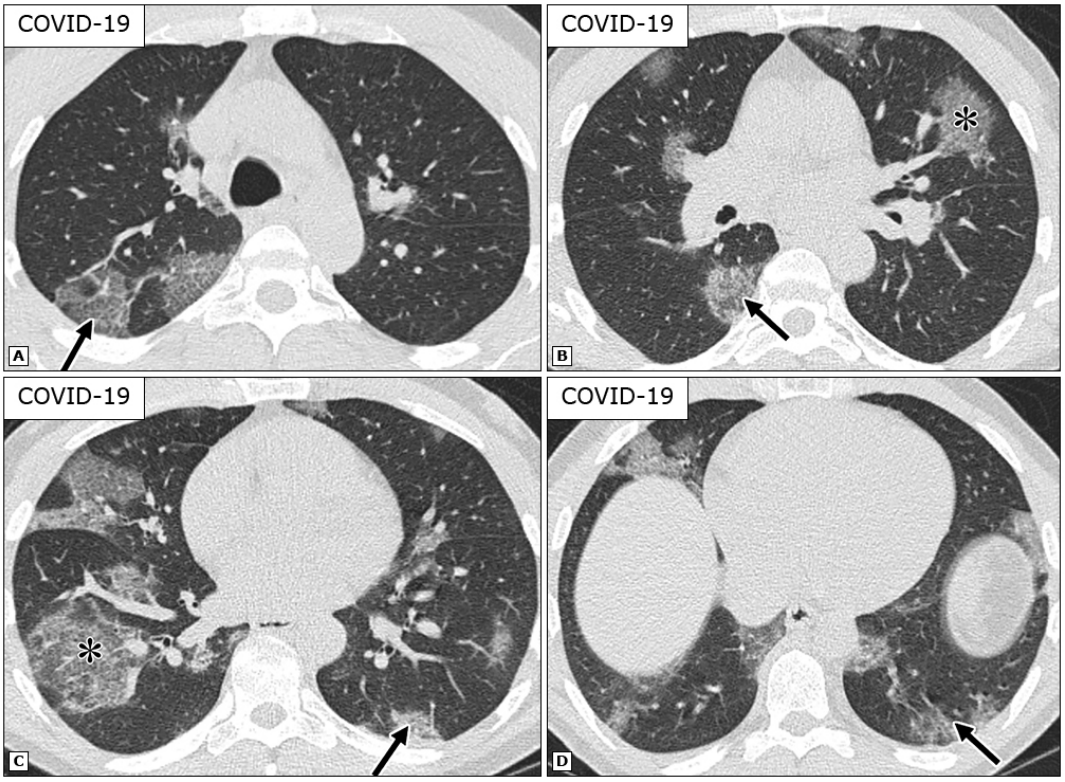


Figure 8: Chest CT findings related to COVID-19[55]

Figure 8 illustrates typical COVID-19 CT imaging characteristics. The lungs of a 52-year-old man with a positive RT-PCR are obvious in unenhanced thin-section axial images (A to D) as having bilateral, multifocal rounded (asterisks) and peripheral GGO with superimposed interlobular septal thickening and discernible intralobular lines ("crazy-paving"). Most professional organisations including the US Centre for Disease Control and Prevention do not currently advise routine CT screening for the diagnosis or exclusion of COVID-19.[55]

Other less common abnormalities were bronchiectasis, pleural effusion, pericardial effusion, lymphadenopathy, and a crazy paving pattern (ground-glass opacifications with superimposed septal thickening). In COVID-19, abnormalities on chest CT frequently include the lower lobes, are bilateral, and have a peripheral distribution.

Lung ultrasound:

When other imaging resources are not easily accessible, point-of-care lung ultrasonography has been documented for the assessment of lung involvement in patients with suspected COVID-19. Patients with COVID-19 have shown lung ultrasonography abnormalities such as thickening, discontinuing, and interrupting of the pleural line, discrete, multifocal or confluent B lines visible under the pleura, patchy, strip, and nodular consolidations, as well as air bronchogram signals in the consolidations.[56,57] Despite the fact that ultrasonography seems to be somewhat sensitive for diagnosing COVID-19, other investigations have found that it is not very specific. The pooled sensitivity and specificity in a systematic evaluation of five investigations were 86 and 55 percent, respectively. [58]

In a retrospective single-centre analysis study by Marco Francone et al., on 130 symptomatic SARS-CoV-2 patients, they showed that early-phase illness (7 days after symptoms first appeared) is defined by ground glass opacities, while late-phase disease (> 7 days) is characterised by crazy-paving pattern, consolidation, and fibrosis. Critical and severe stages had considerably higher CT scores than mild stages, while late-phase patients had higher CT scores than early-phase patients. CRP and D-dimer levels were substantially linked with CT score. A CT score of ≥ 18 was associated with an increased mortality risk and was found to be predictive of death both in univariate and multivariate analysis.[1]

In a retrospective study by Xiong Y.et al., which included 42 patients with COVID-19 who had been admitted, 35 individuals (83%) were found to have a progressive process according to CT characteristics in the initial stages after commencement. In comparison to the first CT, the follow-up CT results revealed

increasing opacifications, consolidation, interstitial thickening, fibrous strips, and air bronchograms. There is a moderate connection between the days from beginning and the total score of opacifications prior to routine treatments. The severity of pneumonia as determined by the first CT revealed a significantly positive connection with the C-reactive protein, erythrocyte sedimentation rate, and lactate dehydrogenase. The advancement of opacifications on subsequent CTs was substantially correlated with the greatest temperature and the severity of opacifications measured on the initial CT.[3]

In a retrospective multicentre study by Zhichao Feng et al., which included 247 patients, they discovered that the CT severity score is related to the amount of inflammation and that older age, a higher neutrophil-to-lymphocyte ratio (NLR), and the CT severity score upon admission are all independent risk factors for rapid short-term progression. In the derivation and validation cohorts, the nomogram based on these risk variables exhibits good calibration and discrimination. These findings have implications for estimating COVID-19 pneumonia patients likelihood of progression at the time of admission. Risk classification and admission timing may be aided by a CT scan.[4]

In a retrospective, single-centre case series analysis of 108 individuals who had been hospitalised for COVID-19 done by Jie Zhang et al., In addition to elevated levels of C-reactive protein (CRP), erythrocyte sedimentation rate (ESR), procalcitonin, chest CT score, and a reduced lymphocyte count, they discovered that all patients displayed symptoms of substantial systemic inflammation. White blood cell (WBC) count, CRP, ESR, procalcitonin, and impaired coagulation function all demonstrated positive correlations with chest CT score, whereas lymphocyte count

had a negative correlation. A glucocorticoid regimen enhanced coagulation function, decreased the CT score and CRP level, and boosted lymphocyte count. More active areas of the lung are more susceptible to SARS-CoV-2 virus damage.[59]

Bhandari S et al., (2020) conducted a study to evaluate the clinico-radiological assessment and the relationship between the development of COVID-19 illness and CT chest imaging at SMS Hospitals in Jaipur, 80 patients who had their COVID-19 test positive by RT-PCR laboratory verified were evaluated. With an average age of 50.40 years, the majority of the patients with confirmed cases were young adults in their fifth and sixth decades of life. There were more men than women (59% men and 41% women). 39 patients (48.75%) of the total examined patients were symptomatic, with fever (79.47%), cough (74.35%), shortness of breath (36%) and sore throat (17.94%) being the most frequent clinical symptoms to present. 12.82% of patients additionally had other symptoms as headache, chest discomfort, abdominal pain, changed sensation, etc. 54% of the sample population's patients had a co-morbid condition. Diabetes mellitus (56%), hypertension (48.83%), COPD/K-chest (12%), CAD (9.32%), and others (11.62%) such hypothyroidism, anaemia, CVA etc. were the most common comorbidities. By giving a CT severity score and using HRCT imaging, the lung pathological alterations were assessed. In 50% of the patients, we found typical COVID findings; in 11%, indeterminate; in 11%, atypical; and in 28% of the patients, negative CT chest for COVID. The CT severity score was related to patient’s clinical conditions, with mild cases exhibiting a score of 15/25 in 45.83% of patients and severe cases eliciting a score of >15/25 in 87.50% of patients. The length and progression of the illness affected the CT's characteristics. In the early stages of the illness, proportional GGO was greater (59.37%) than it was in the later stages (12.5%). The COVID-19 symptoms ranged widely and included fever, coughing,

dyspnoea, sore throat, etc. Significant concomitant conditions were CAD, COPD/K-Chest, hypertension, diabetes mellitus, and hypertension. Patients with co-morbid condition were found to present with COVID-19 symptoms more frequently, especially if they were many. Because symptomatic individuals and patients with co-morbid conditions had higher rates of positive CT findings, HRCT chest in COVID-19 patients had a substantial diagnostic and prognostic importance. Clinical symptoms of patients and the CT severity score were directly connected. It was discovered that CT imaging was helpful in predicting a patient's clinical recovery or illness progression. [60]

In a study by Zhou S et al., (2020) to assess the features of Coronavirus disease pneumonia in 62 patients, patients with COVID-19 pneumonia who underwent CT scan revealed a complex and varied pattern with involvement of both the lung parenchyma and the interstitium. On the first CT scan, the presence of GGO and a solitary lesion suggested early-phase illness. Advanced-phase illness had both aggravation and repair indications on the CT scan. In the intermediate and lower lung areas, as well as in the posterior lung area, lesions manifested with a typical multifocal pattern. The most frequent test results were a decreased lymphocyte count and a raised hsCRP (high-sensitivity C-reactive protein level). [61]

In a study by Colombi D et al., (2020) to assess the well aerated lung on admission with chest CT to predict the adverse outcome of COVID-19 pneumonia, all the three quantitative models have shown good diagnostic performance (AUC = 0.86 for all models) as compared to clinical models that solely contained clinical factors (AUC = 0.83). When compared to models that contained solely clinical factors, those with V-WAL less than 73% and VOL-WAL less than 2.9 L performed better (P =.04

for both models). Visual or software measurement of the severity of CT lung abnormality was a predictor of intensive care unit admission or mortality in individuals with confirmed coronavirus illness 2019 pneumonia. [62]

In a study by Saeed GA et al., (2021) to assess the correlation between the chest CT severity score and the clinical parameters in COVID-19 pneumonia patients, the median age was 44.2±11.9 years, with 14.7% of women and 85.3% of men. The correlation between the CT severity score and lymphopenia, elevated serum CRP, d-dimer, and ferritin levels was shown to be positive (p: 0.0001). With an increase in scan intensity came an increase in oxygen needs and hospital stay duration. The COVID-19 clinical severity and the 25-point CT severity score have a good correlation. Study findings indicate that the COVID-19 illness prognosis may be predicted with the use of the chest CT scoring system, which has a strong relationship with laboratory results and oxygen consumption. [63]

In a study by Sharma S et al., (2022) to evaluate the relationship between the COVID-19 lung disease clinical characteristics and the chest CT severity score in a tertiary care hospital, 150 individuals with COVID-19 disease were evaluated in total. The research group's median age was 54.46 years, with 62.7% men and 37.3% women. Diabetes mellitus which has been found to be in 17.3% of patients, was the comorbidity that was most often found in the study group. Age of the patient significantly influenced how serious the illness was. Raised serum ferritin, CRP and D-dimer levels were strongly linked with lymphopenia and the CT severity score. The degree of CT severity and patient survival were shown to be statistically significantly correlated. This extensive study, conducted in a tertiary care hospital in India, gathered information from 150 COVID-19 pneumonia patients to characterise the

relationship between the CT severity score and several clinical and laboratory indicators. Chest CT severity score has a good correlation with laboratory variables and can help predict the course of COVID-19 illness.[64]

MATERIALS AND METHODS

Source of data: Patients attending the casualty and admitted at KLES Dr. Prabhakar Kore Hospital, Belagavi.

Study Design: A cross sectional study.

Study Period: January 2021 to December 2021.

Sample Size:

Sample size was estimated by using the optimal CT-SS threshold for identifying severe COVID-19 was 19.5 (area under curve, 0.892), with 83.3% sensitivity and 94% specificity from the study by Ran Yanget al. using the formula

$$\mathbf{n = [Z\alpha^2 * Sn * (100 - Sn)]/ (d^2 * p)}$$

Z = Standard normal value at 95% Confidence level

Sn = Sensitivity = 83.3%

100 – Sn = 16.7%

d = desired absolute precision = 5%

p = assumed prevalence = 5%

$n = 5341 / 5^2 * 5$

By considering above values

n = 43 subjects with Covid 19 will be included in the study

Considering a non-response rate of 10%, 43 + 4.3 = 48 subjects will be included in the study.

To get confirmative results the sample size will be increased to 100.

Sample Method: Cross sectional study, all consecutive patients fulfilling the inclusion criteria were included in the study, statistical analysis was done by SPSS using descriptive analysis and chi-square test.

Inclusion Criteria

- RT-PCR /CBNAAT/RAT Positive for SARs CoV-2.

Exclusion Criteria

- < 18 years of age
- Pregnant Women
- Lactating Mothers

METHODOLOGY

- A one-year Hospital based cross sectional
- Study from January 2021 to December 2021 at KLE's Prabhakar Kore Hospital and Medical Research Centre, Belagavi.
- An informed consent was obtained from all the subjects .
- RT-PCR /CBNAAT/ RAT Positive covid 19 patients with fulfilment of the inclusion criteria and exclusion criteria were included in the study.
- Patients were subjected to thorough history taking and clinical examination.
- After staging the clinical severity, it is compared with the CT severity score.
- **Clinical Severity Stages** (Clinical management protocol: Covid 19 Government of India ministry of health and family welfare)

Clinical Severity	Clinical Parameters
Mild	No Breathlessness or Hypoxia (normal saturation
Moderate	Dyspnoea and/or hypoxia, fever, cough, SpO2 (range 90-94%) on room air, Respiratory rate more or equal to 24 per minute
Severe	Pneumonia plus one of - Respiratory rate >30 breaths / min - Severe respiratory distress - SpO2 <90%

CT Severity score

Total score	CT Severity
<8	Mild
8-15	Moderate
16-25	Severe

Investigations performed on the patient are

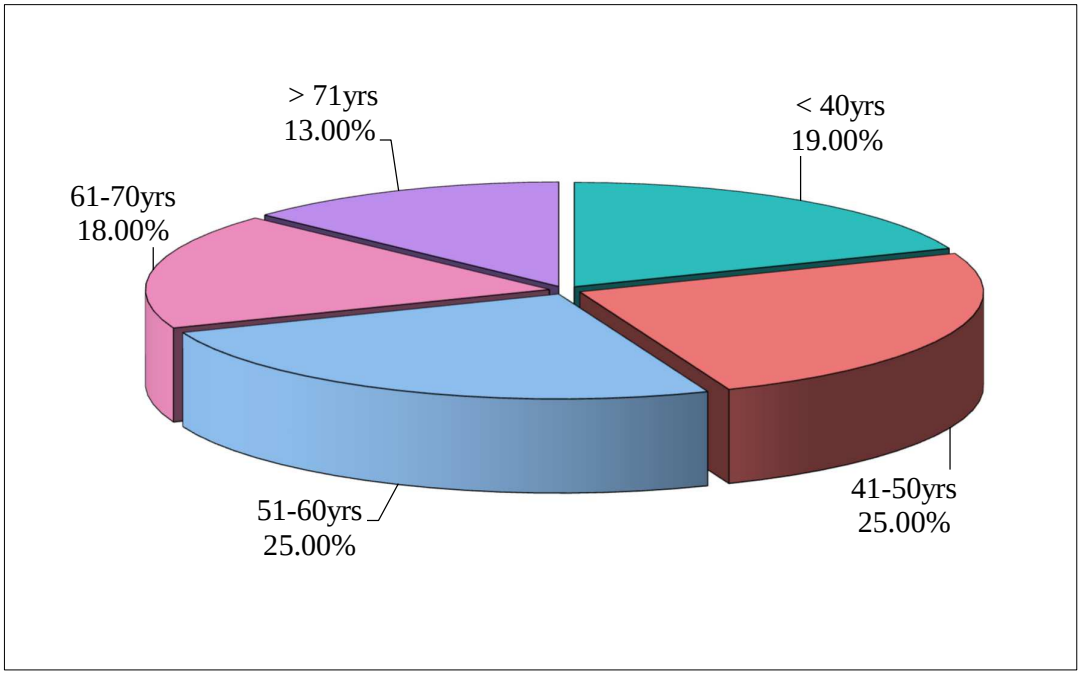
1. RTPCR / CBNAAT / RAT for SARS COVID-19
2. HRCT Thorax

RESULTS

Table No.2: Age wise distribution of patients

Age groups	No of patients	% of patients
< 40yrs	19	19.00
41-50yrs	25	25.00
51-60yrs	25	25.00
61-70yrs	18	18.00
>71yrs	13	13.00
Total	100	100.00
Mean age	53.61	
SD age	14.28	

Graph No.1: Age wise distribution of patients

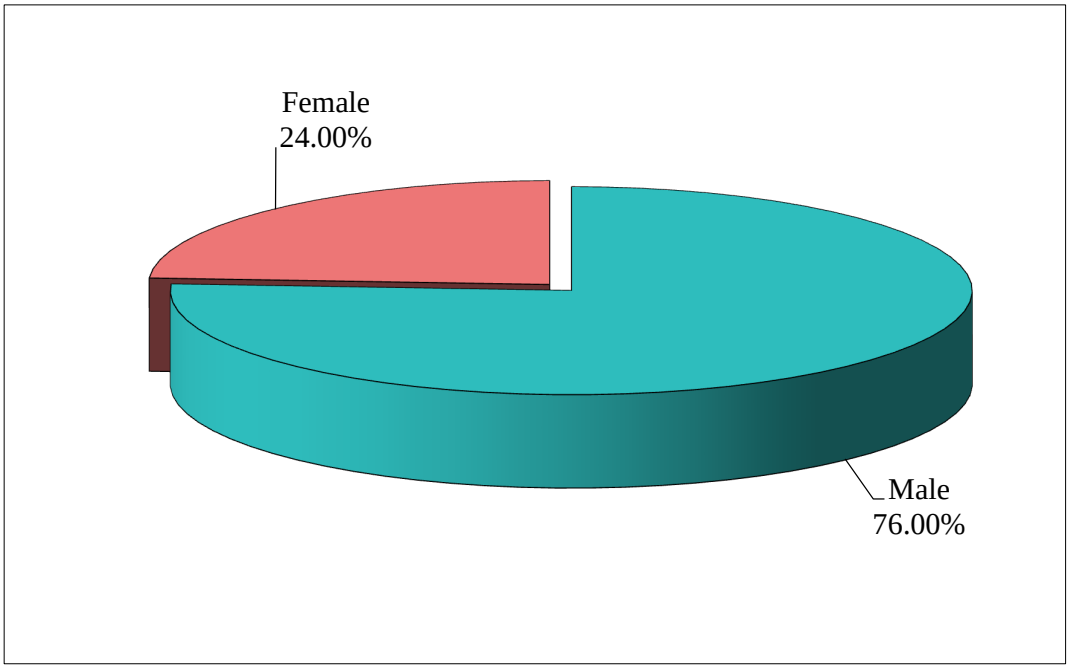


In the present study of 100 patients, the age of patients ranged from 27-87 years. i.e., youngest was 27 years old. Oldest was 87 years old. There were almost 50 patients within the age of 41-60 years, 19 patients were less than 40 years, 18 patients between 61-70 years and 13 patients within age group of >71 years with mean age group of 53.61 ± 14.28.

Table 3: Sex wise distribution of patients

Gender	No of patients	% of patients
Male	76	76.00
Female	24	24.00
Total	100	100.00

Graph No.2: Sex wise distribution of patients

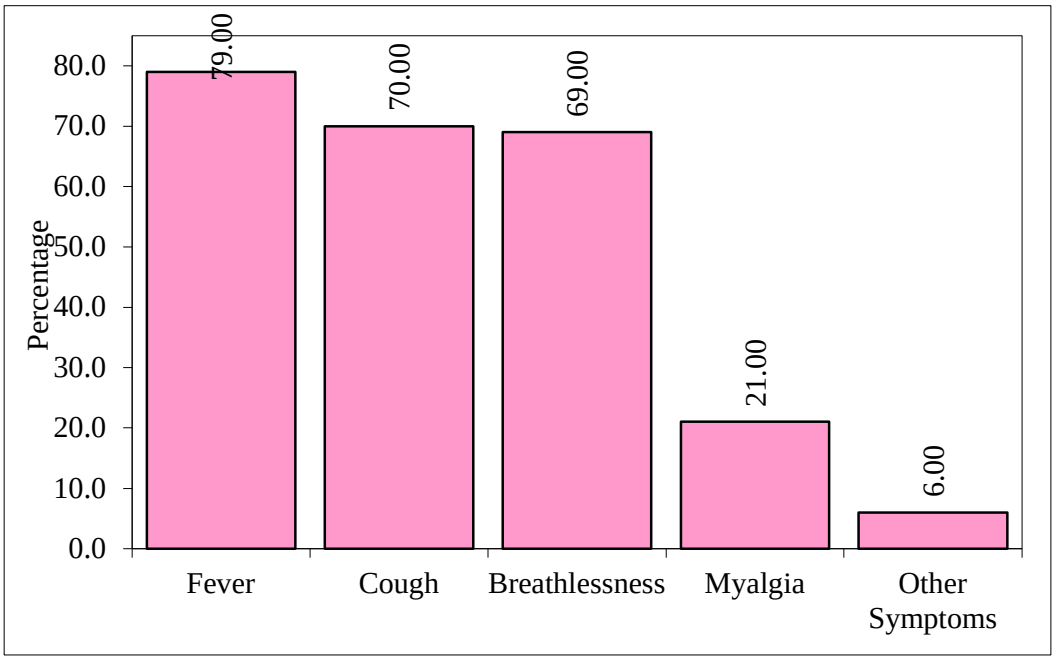


There were 76 male patients in our study, remaining 24 were females. There was male preponderance observed in our study with ratio of male: female 3.17:1

Table 4: Clinical presentation of patients (Symptom wise)

Symptoms	No of patients	% of patients
Cough		
Absent	30	30.00
Present	70	70.00
Fever		
Absent	21	21.00
Present	79	79.00
Myalgia		
Absent	79	79.00
Present	21	21.00
Breathlessness		
Absent	31	31.00
Present	69	69.00
Other Symptoms		
Absent	94	94.00
Present	6	6.00
Total	100	100.0

Graph No.3: Pictorial representation of clinical presentation of patients (Symptom wise)

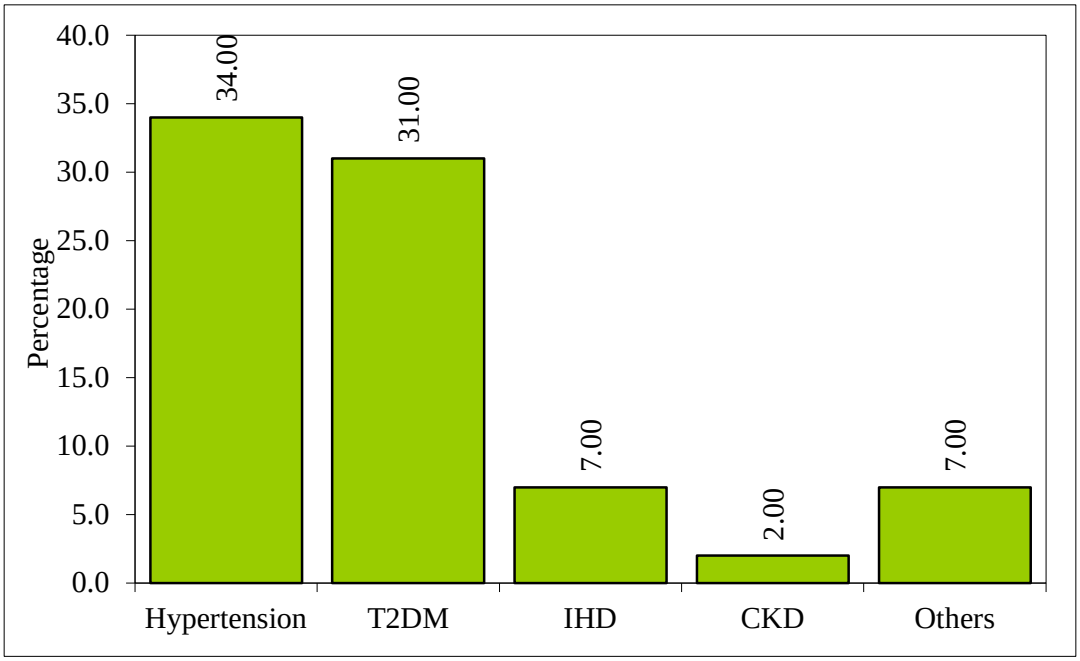


Patients presented with various symptoms of Covid-19. In our present study, the commonest symptom was Fever (79%), Cough (70%), Dyspnoea (69%), Myalgia (21%) and other symptoms like altered sensorium, diarrhoea, vomiting etc. Many patients had overlapping of symptoms.

Table 5: Distribution of patients with co morbidities

Co morbidity	No of patients	% of patients
Hypertension		
Absent	66	66.00
Present	34	34.00
T2DM		
Absent	69	69.00
Present	31	31.00
IHD		
Absent	93	93.00
Present	7	7.00
CKD		
Absent	98	98.00
Present	2	2.00
Others		
Absent	93	93.00
Present	7	7.00
Total	100	100.00

Graph No.4: Pictorial representation of distribution of patients with co morbidities

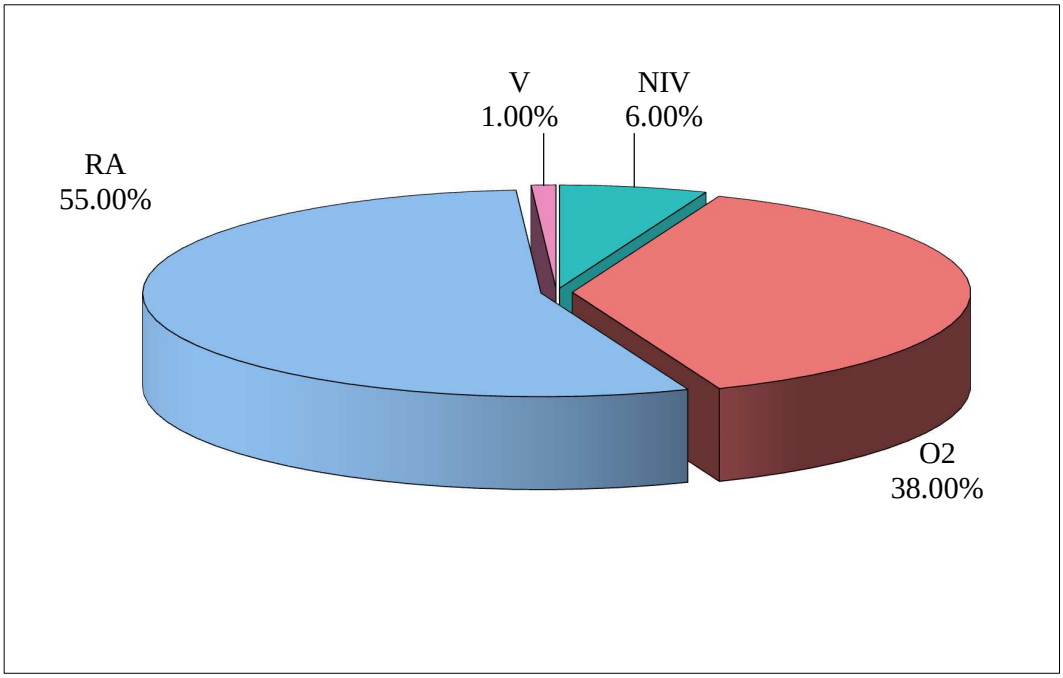


The most common comorbidity which was observed in our present study was hypertension which was 34%, diabetes mellitus in 31%, 7 patients with ischemic heart disease, 2 patients were with chronic kidney disease, 7 patients had other comorbidities (Hypothyroid, Seizure disorder, Cerebrovascular accident etc.)

Table 6: Distribution of patients based on oxygen need (by different modes)

Oxygen modality	No of patients	% of patients
Non-invasive ventilation	6	6.00
Oxygen by nasal / face mask	38	38.00
Room air	55	55.00
Ventilatory support	1	1.00
Total	103	100.00

Graph no.5: Distribution of patients based on oxygen need (by different modes)



In our present study we observed more than 55 patients did not require oxygen supplementation and maintained saturation at room air. 38 % patients required varying degrees of oxygen support by simple nasal face mask, 6 patients on Non-invasive ventilation and only1 patient required ventilatory support.

Table 7: Categorization of patients based on clinical severity of Covid-19

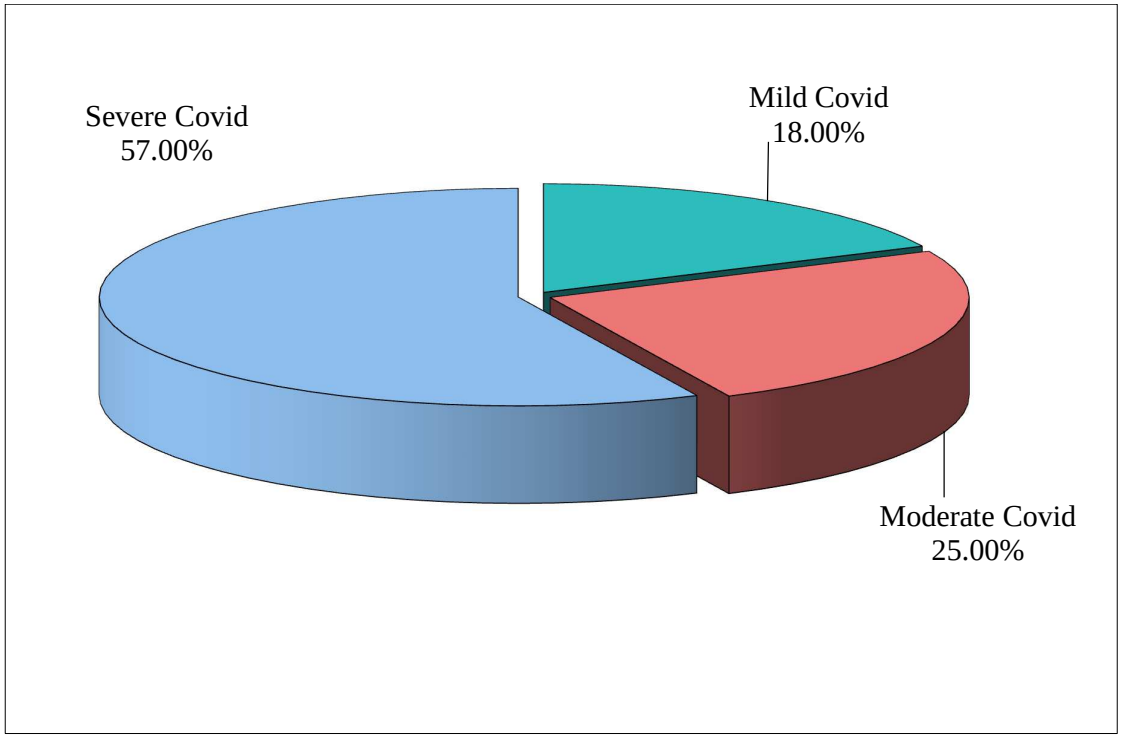
Clinical Severity	**Clinical Parameters**
Mild	No Breathlessness or Hypoxia (normal saturation
Moderate	Dyspnoea and/or hypoxia, fever, cough, SpO2 (range 90-94%) on room air, Respiratory rate more or equal to 24 per minute
Severe	Pneumonia plus one of - Respiratory rate >30 breaths / min - Severe respiratory distress - SpO2 <90%

Further we categorised our patients based on clinical severity according to guidelines given by Government of India, Ministry of Health and Family Welfare, Directorate General of Health Services. The patients were categorised into three groups mild, moderate and severe.

Table 8: Distribution of patients based on clinical severity in Covid-19

Clinical Severity COVID	No of patients	% of patients
Mild Covid	18	18.00
Moderate Covid	25	25.00
Severe Covid	57	57.00
Total	100	100.00

Graph No.6: Distribution of patients based on clinical severity in Covid-19



Further we categorised our patients based on mild, moderate and severe covid-19 infection as shown above (Table No.8).

Table No.9: Severity of patients based on HRCT scoring

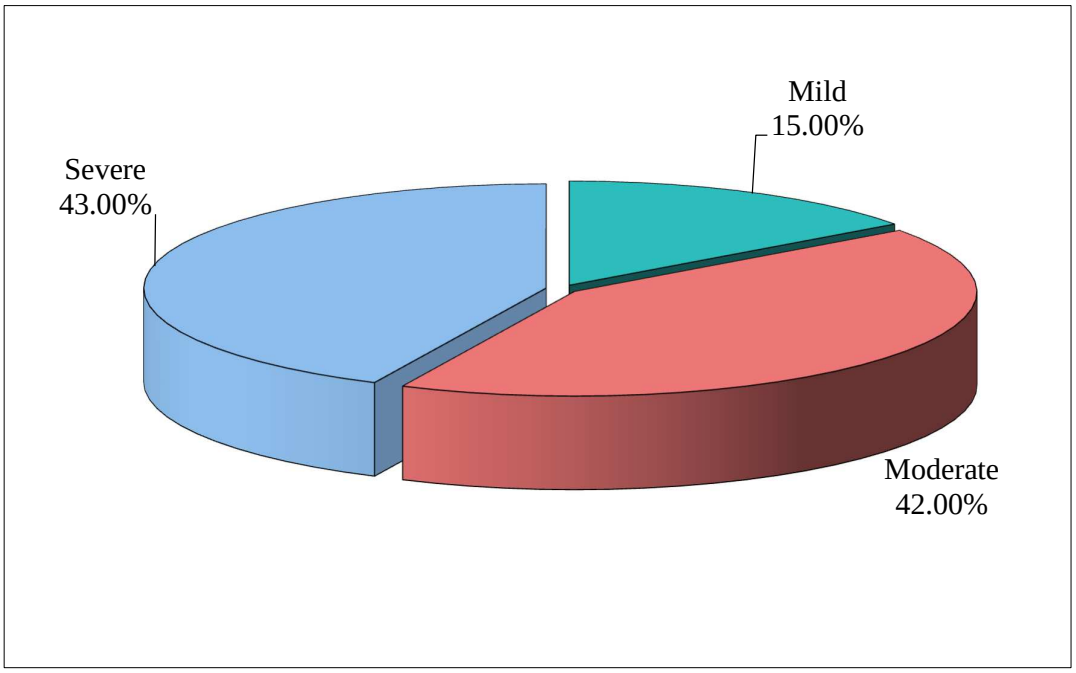
Total score	CT Severity
<8	Mild
8-15	Moderate
16-25	Severe

Based on HRCT thorax observation the scoring was deployed for these patients and we categorised them into mild, moderate and severe based on CT scoring. Mild patients were those whose scoring was <8, moderate 8-15 and 16-25 as severe.

Table No.10: Distribution of patients based on CT scoring.

CT Severity	No of patients	% of patients
Mild	15	15.00
Moderate	42	42.00
Severe	43	43.00
Total	100	100.00

Graph No.7: Distribution of patients based on CT scoring.

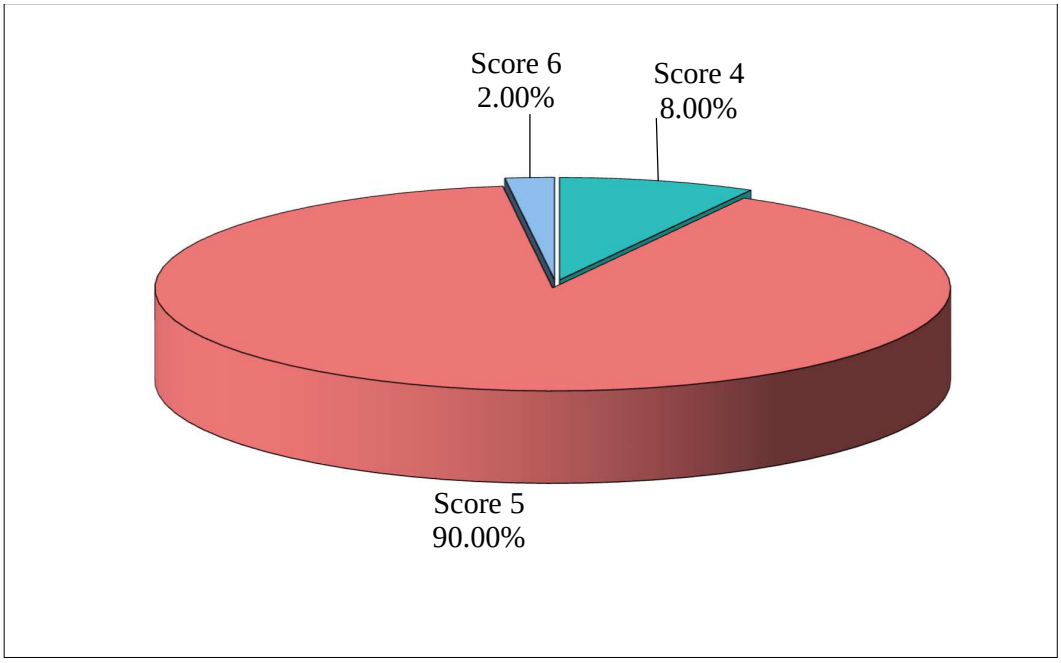


All our 100 patients were subjected for HRCT thorax, based on CT findings we found mild were 15 patients, moderate 42 patients and severe 43 patients.

Table No.11: Severity based on CORADS scoring.

CORADS scores	No of patients	% of patients
Score 4	8	8.00
Score 5	90	90.00
Score 6	2	2.00
Total	100	100.00

Graph No.8: Severity based on CORADS scoring.

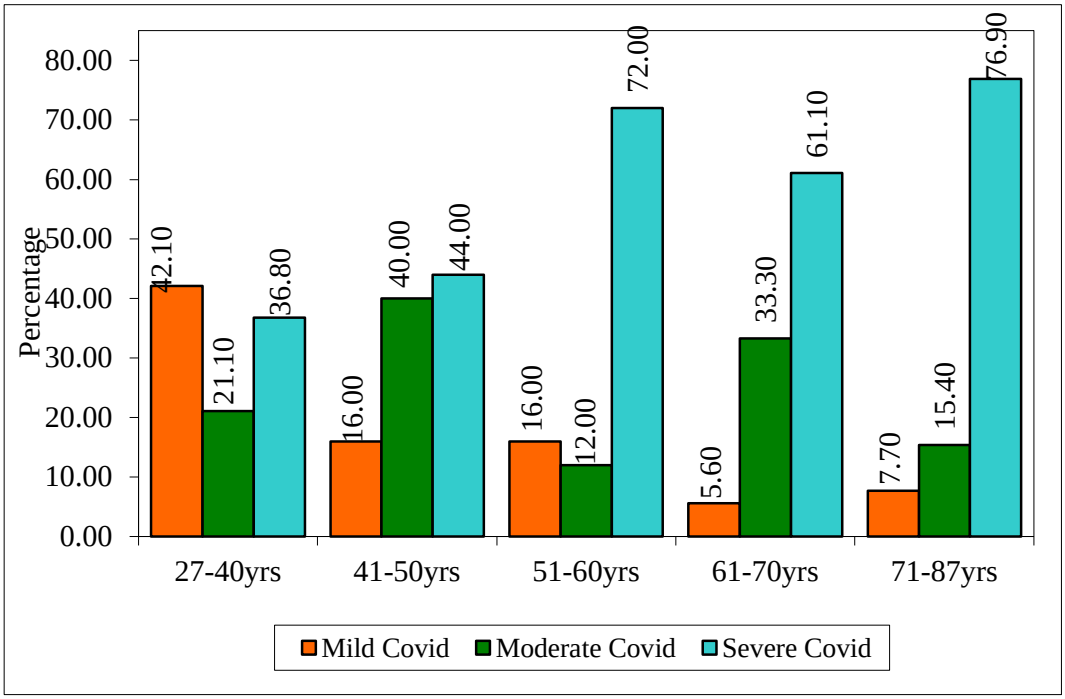


All our patients further we analysed by CORADS scoring and found to have 90% had score of 5. 8 patients were of score of 4 and only 2 patients were found in score of 6.

Table No.12: Comparison of Clinical Severity COVID (mild, moderate and severe) with age.

Age groups	Mild Covid	%	Moderate Covid	%	Severe Covid	%	Total	%
27-40yrs	8	42.11	4	21.05	7	36.84	19	19.00
41-50yrs	4	16.00	10	40.00	11	44.00	25	25.00
51-60yrs	4	16.00	3	12.00	18	72.00	25	25.00
61-70yrs	1	5.56	6	33.33	11	61.11	18	18.00
71-87yrs	1	7.69	2	15.38	10	76.92	13	13.00
Total	18	18.00	25	25.00	57	57.00	100	100.00
Mean age	44.78		52.96		56.68		53.61	
SD age	12.80		14.18		13.77		14.28	
Chi-square= 17.6410, p=0.0240								

Graph No.9: Comparison of Clinical Severity COVID (mild, moderate and severe) with age.

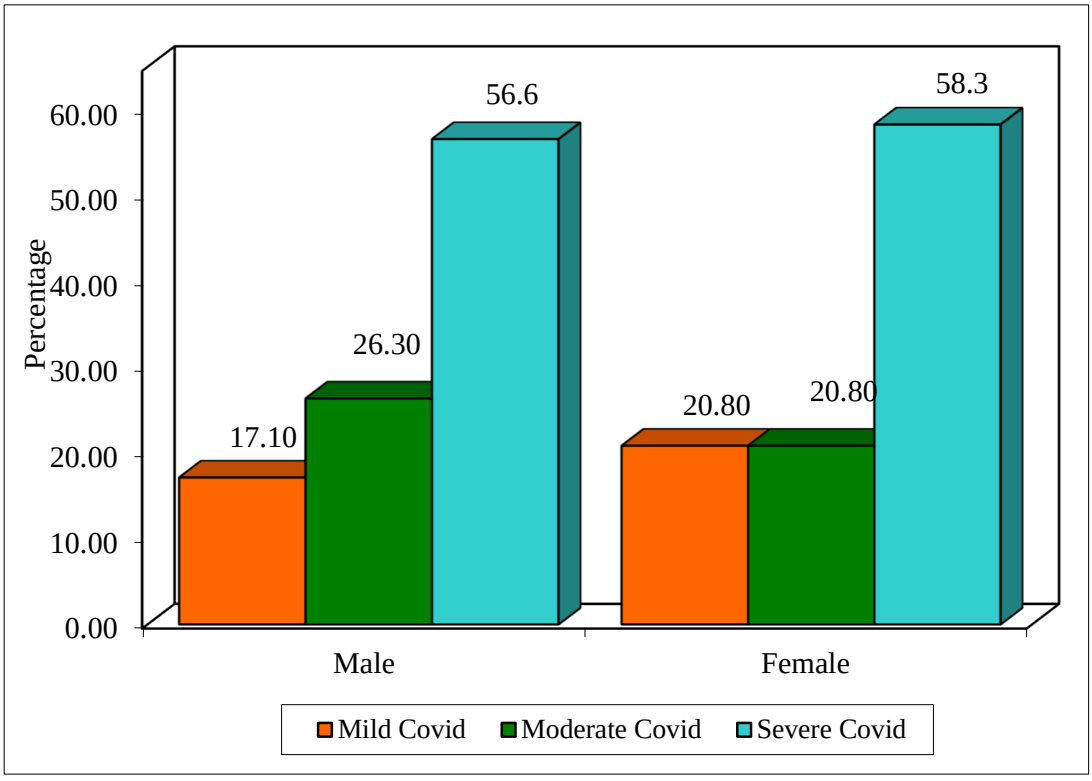


We attempted to compare the clinical severity (mild, moderate and severe) with age and the observation we made was, there were 8 patients in the mild group between the age group of 27-40 years; 10 patients between 41-50 years with moderate covid infection and 18 patients in the age group of 51-60 years in the severe covid infection. The other observations are depicted in table 12. P value was significant (P = 0.0240)

Table No.13: Comparison of Clinical Severity COVID 19 infection (mild, moderate and severe) with sex

Gender	Mild Covid	%	Moderate Covid	%	Severe Covid	%	Total	%
Male	13	17.11	20	26.32	43	56.58	76	76.00
Female	5	20.83	5	20.83	14	58.33	24	24.00
Total	18	18.00	25	25.00	57	57.00	100	100.00
Chi-square=0.3700, p=0.8310								

Graph No.10: Comparison of Clinical Severity COVID 19 infection (mild, moderate and severe) with sex



Similarly, we tried to compare the clinical severity gender wise and the observation made was in all the three groups (mild, moderate and severe) the male patients were more, compared to counterpart female patients.

P value was statistically insignificant (P =0.8310)

Table No.14: Comparison of Clinical Severity COVID (mild, moderate and severe) with symptomatology

Symptoms	Mild	%	Moderate	%	Severe	%	Total	%	χ^2	p-value
Cough										
Absent	5	16.67	4	13.33	21	70.00	30	30.00	3.6460	0.1620
Present	13	18.57	21	30.00	36	51.43	70	70.00		
Fever										
Absent	2	9.52	6	28.57	13	61.90	21	21.00	1.3090	0.5200
Present	16	20.25	19	24.05	44	55.70	79	79.00		
Myalgia										
Absent	12	15.19	20	25.32	47	59.49	79	79.00	2.0760	0.3540
Present	6	28.57	5	23.81	10	47.62	21	21.00		
Breathlessness										
Absent	10	32.26	10	32.26	11	35.48	31	31.00	9.6700	0.0080*
Present	8	11.59	15	21.74	46	66.67	69	69.00		
Other Symptoms										
Absent	17	18.09	24	25.53	53	56.38	94	94.00	0.2880	0.8660
Present	1	16.67	1	16.67	4	66.67	6	6.00		
Total	18	18.00	25	25.00	57	57.00	100	100.0		

*$p<0.05$

Graph No.11: Comparison of Clinical Severity COVID (mild, moderate and severe) with symptomatology

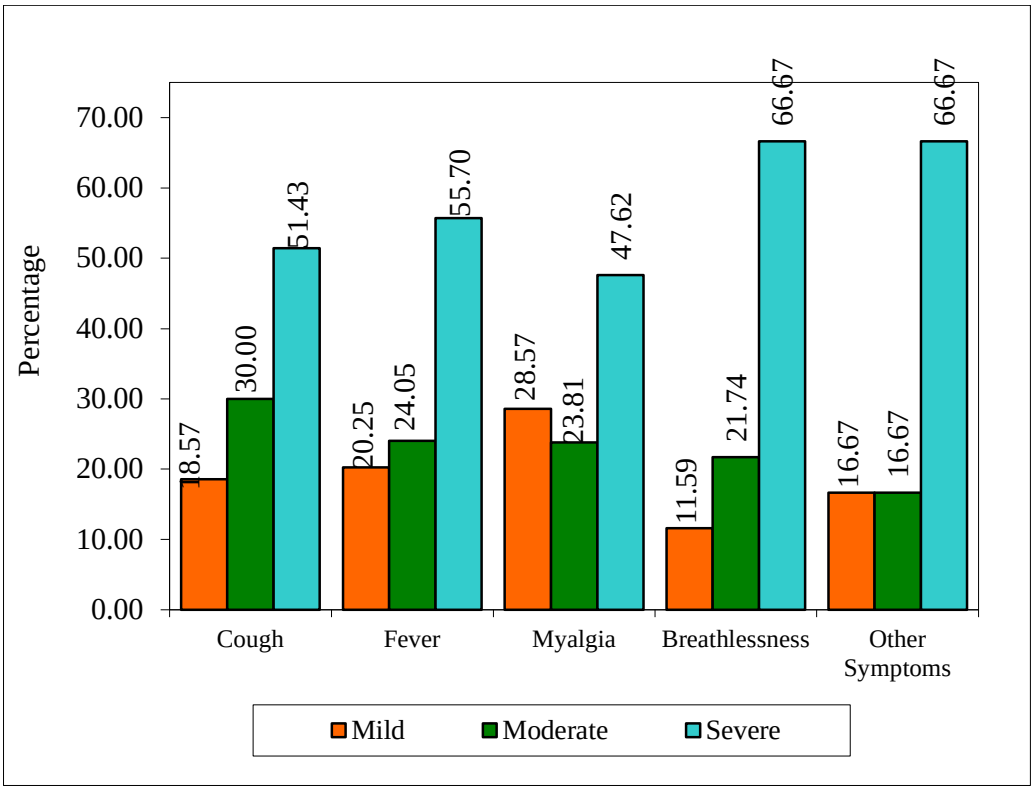


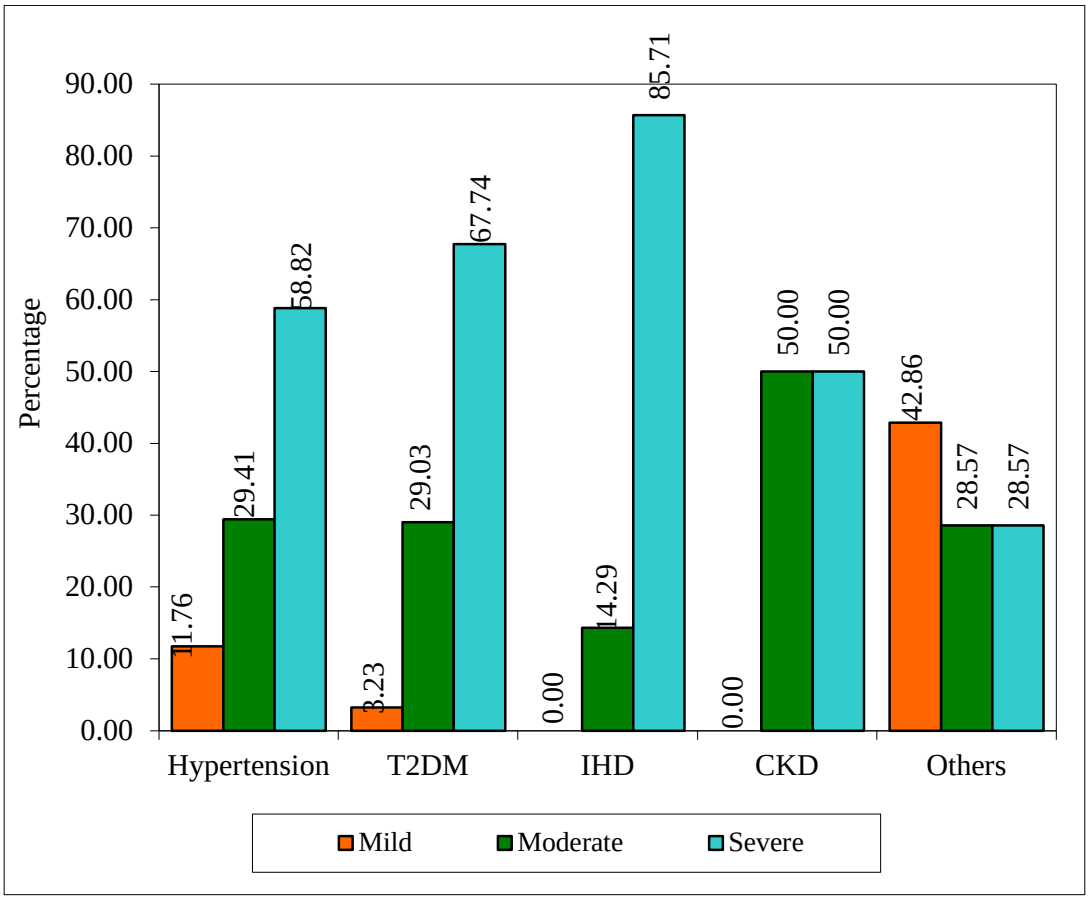
Table 14 depicts various symptoms patients presented with, same was compared with severity of covid 19 infection, fever (79%) in all the 3 groups was more observed, followed by cough (70%) breathlessness (69%); though there was overlapping of symptoms, the comparison of symptoms with severity revealed significant corelation with severity of infection. P value was statistically significant (P <0.05)

Table No.15: Comparison of Clinical Severity COVID 19 (mild, moderate and severe) with Co morbidities

Co morbidity	Mild	%	Moderate	%	Severe	%	Total	%	χ^2	p-value
Hypertension										
Absent	14	21.21	15	22.73	37	56.06	66	66.00	1.5440	0.4620
Present	4	11.76	10	29.41	20	58.82	34	34.00		
T2DM										
Absent	17	24.64	16	23.19	36	52.17	69	69.00	6.6500	0.0360*
Present	1	3.23	9	29.03	21	67.74	31	31.00		
IHD										
Absent	18	19.35	24	25.81	51	54.84	93	93.00	2.7890	0.2480
Present	0	0.00	1	14.29	6	85.71	7	7.00		
CKD										
Absent	18	18.37	24	24.49	56	57.14	98	98.00	0.8950	0.6390
Present	0	0.00	1	50.00	1	50.00	2	2.00		
Others										
Absent	15	16.13	23	24.73	55	59.14	93	93.00	3.6890	0.1580
Present	3	42.86	2	28.57	2	28.57	7	7.00		
Total	18	18.00	25	25.00	57	57.00	100	100.00		

*$p<0.05$

Graph No.12: Comparison of Clinical Severity COVID 19 (mild, moderate and severe) with Co morbidities



Analysing further and comparing clinical severity with the patient's comorbidities, hypertension was the most common comorbidity and these patients were present in all the three groups (mild n = 04, moderate n = 10 and severe n = 20 total - 34), However, there were more patients of hypertension in severe group (n = 20). Similarly, even diabetes was more in number (total – 31), mild -1, moderate - 9, severe - 21. P value was significant (P = 0.0360) for diabetes, more patients were in severe group (n = 21).

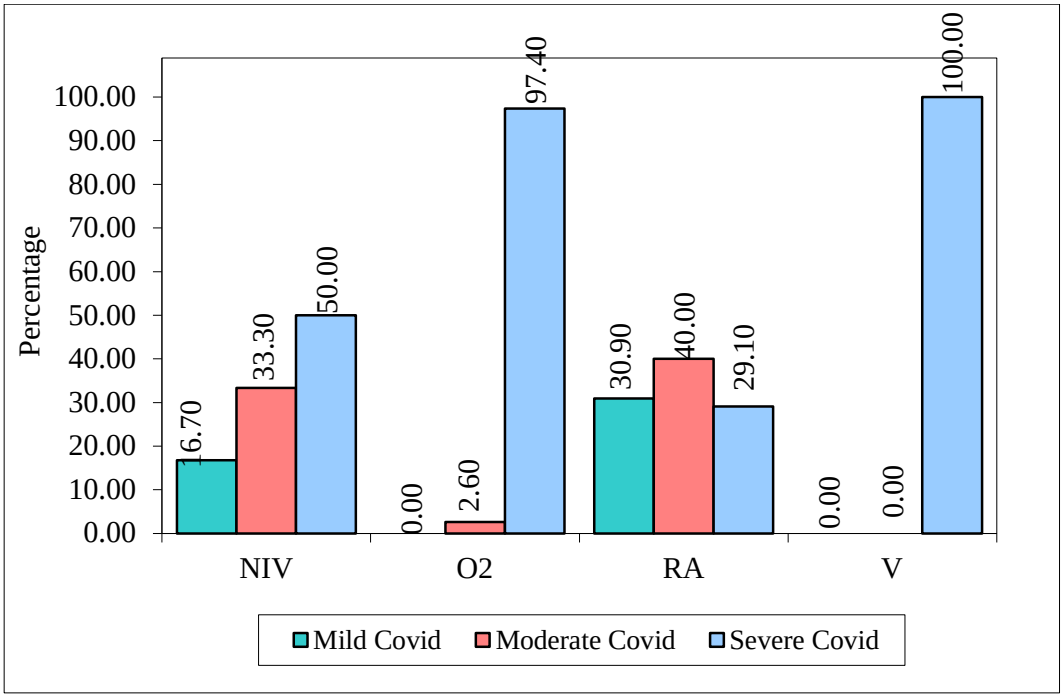
Table No.16: Comparison of Clinical Severity COVID

(mild, moderate and severe) with oxygen need (by different modalities)

O2 modality	Mild Covid	%	Moderate Covid	%	Severe Covid	%	Total	%
Non-invasive ventilation	1	16.67	2	33.33	3	50.00	6	6.00
O2 by nasal / face mask	0	0.00	1	2.63	37	97.37	38	38.00
Room air	17	30.91	22	40.00	16	29.09	55	55.00
Ventilatory Support	0	0.00	0	0.00	1	100.00	1	1.00
Total	18	18.00	25	25.00	57	57.00	100	100.00
Chi-square=3.8460, p=0.0001								

Graph No.13: Comparison of Clinical Severity COVID

(mild, moderate and severe) with oxygen need (by different modalities)



We compared clinical severity of Covid -19 with need of oxygen supply by different modalities and found 37 patients in severe group required oxygen supply by simple nasal mask. 3 patients required non-invasive ventilation in severe group, only 1 patient required mechanical ventilatory support in severe group. Rest of the observations are depicted in table 16. P value was statistically significant (P = 0.0001)

Table No.17 A: Comparison of Clinical Severity COVID

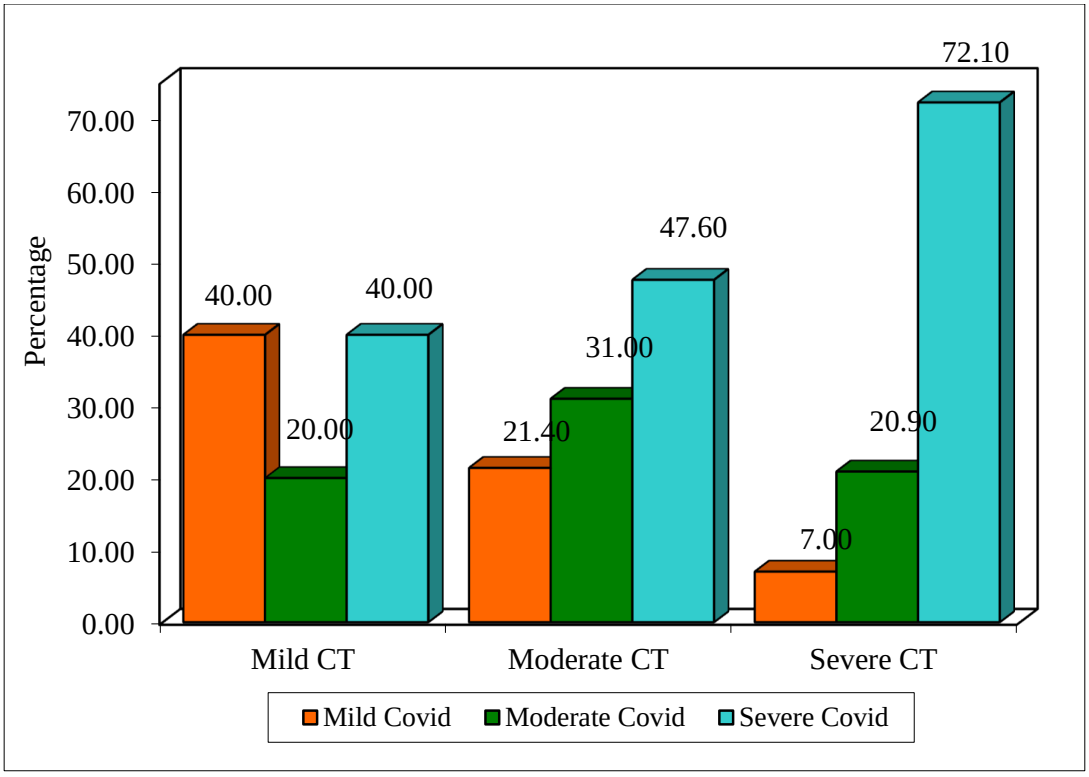
(mild, moderate and severe) with HRCT thorax

CT Severity	Mild Covid	%	Moderate Covid	%	Severe Covid	%	Total	%
Mild	6	40.00	3	20.00	6	40.00	15	15.00
Moderate	9	21.43	13	30.95	20	47.62	42	42.00
Severe	3	6.98	9	20.93	31	72.09	43	43.00
Total	18	18.00	25	25.00	57	57.00	100	100.00
Chi-square=11.3600, p=0.0230*								

*p<0.05

Graph No.14: Comparison of Clinical Severity COVID

(mild, moderate and severe) with HRCT thorax



All our patients were compared with HRCT findings and clinical severity. There were more number of patients who had severe CT thorax findings, who belonged to severe covid 19 group (n=31). Even in moderate clinical severity there was a correlation between CT and clinical severity. P value was statistically significant (P=0.0230)

Table No.17 B: Comparison of Clinical Severity COVID

(mild, moderate and severe) with HRCT thorax by one way ANOVA

Parameters	Mild Covid		Moderate Covid		Severe Covid		Total		F-value	p-value
	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
CT Severity	10.72	5.19	13.60	4.44	15.47	5.48	14.15	5.44	5.9177	0.0003*

*p<0.05

Graph No.15: Comparison of Clinical Severity COVID

(mild, moderate and severe) with HRCT thorax (one way ANOVA)

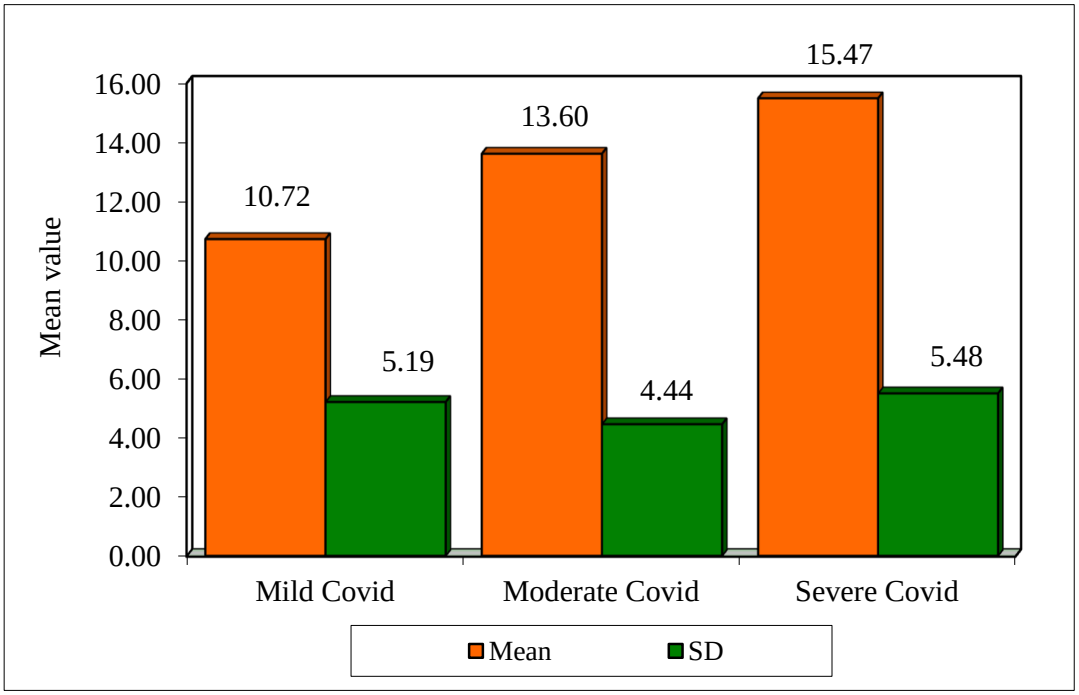


Table 17-B depicts the comparison by one way ANOVA method and the result obtained was a positive correlation between clinical severity and CT severity.

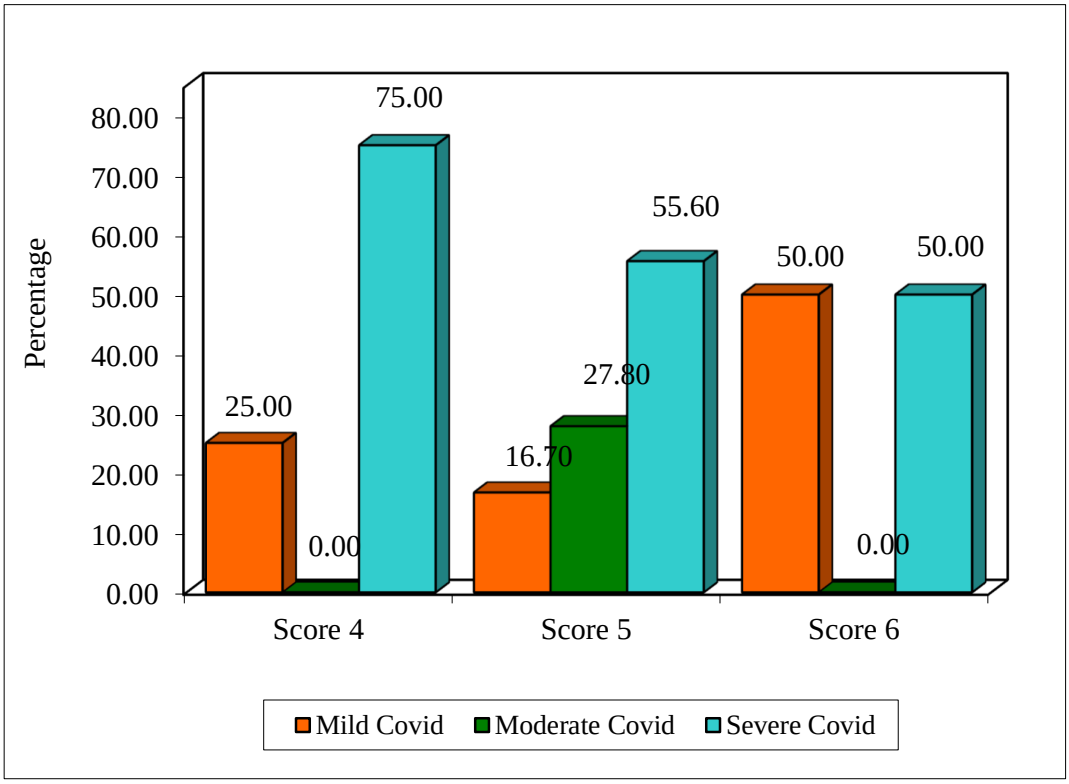
Table No.18: Comparison of Clinical Severity COVID

(mild, moderate and severe) with CORADS scores

CORADS scores	Mild Covid	%	Moderate Covid	%	Severe Covid	%	Total	%
Score 4	2	25.00	0	0.00	6	75.00	8	8.00
Score 5	15	16.67	25	27.78	50	55.56	90	90.00
Score 6	1	50.00	0	0.00	1	50.00	2	2.00
Total	18	18.00	25	25.00	57	57.00	100	100.00
Chi-square=4.7270, p=0.3160								

Graph No.16: Comparison of Clinical Severity COVID

(mild, moderate and severe) with CT by CORADS scores

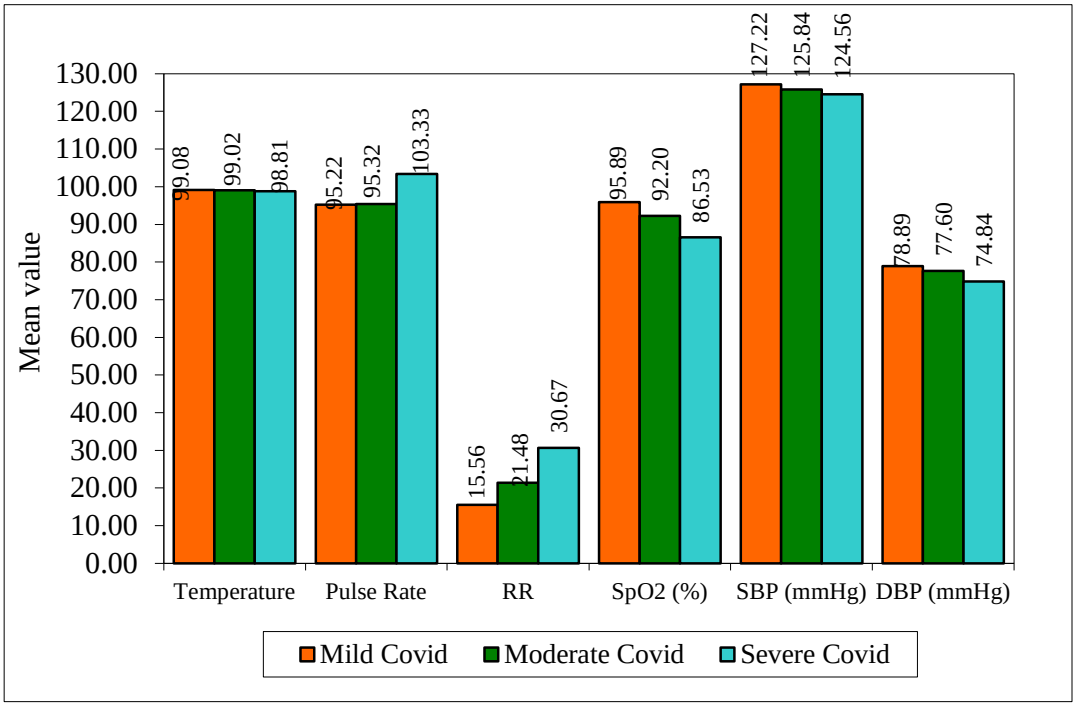


CT scoring system by CORADS with clinical severity was attempted, there was no correlation between CORADS score and clinical severity. P value was statistically insignificant (P = 0.3160) (Table 18)

Table No.19: Comparison of Clinical Severity COVID (mild, moderate and severe) with clinical parameters by one way ANOVA

Parameters	Mild Covid		Moderate Covid		Severe Covid		Total		F-value	p-value
	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
Temperature	99.08	0.94	99.02	0.63	98.81	0.61	98.91	0.69	1.4801	0.2327
Pulse Rate	95.22	14.24	95.32	14.68	103.33	15.61	99.87	15.52	3.4637	0.0352
RR	15.56	2.23	21.48	4.91	30.67	2.91	25.65	6.99	157.9238	0.0001
SpO2 (%)	95.89	0.76	92.20	1.58	86.53	10.34	89.63	8.69	11.3593	0.0001
SBP (mmHg)	127.2	16.02	125.8	15.14	124.5	18.13	125.3	16.93	0.1793	0.8361
DBP (mmHg)	78.89	11.32	77.60	9.26	74.84	9.06	76.26	9.60	1.5587	0.2156

Graph No.17: Comparison of Clinical Severity COVID (mild, moderate and severe) with clinical parameters

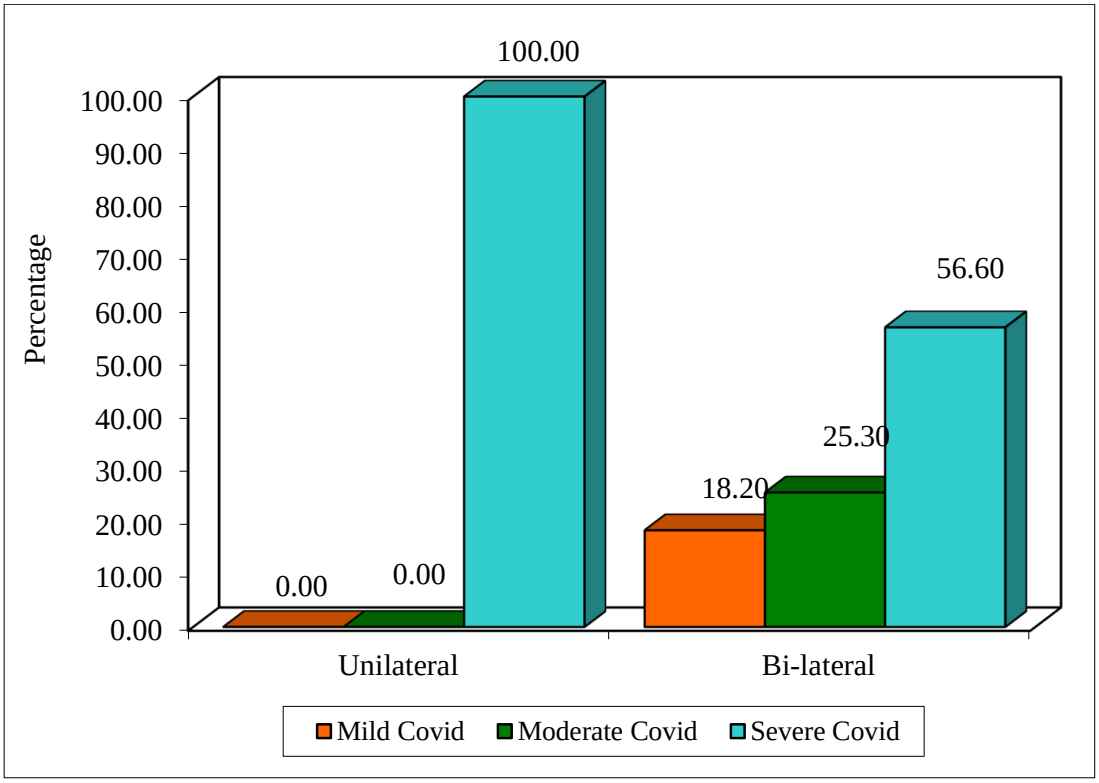


The clinical parameters like heart rate, respiratory rate, temperature, oxygen saturation and blood pressure were compared with ANOVA method and there was positive correlation observed in severe covid groups as far as oxygen saturation was concerned, respiratory rate was concerned and heart rate, as depicted in Table 19 and depiction by the same in bar diagram.

Table No.20: Comparison of Clinical Severity COVID (mild, moderate and severe) with Lung region distribution

Lung region distribution	Mild Covid	%	Moderate Covid	%	Severe Covid	%	Total	%
Unilateral	0	0.00	0	0.00	1	100.00	1	1.00
Bi-lateral	18	18.18	25	25.25	56	56.57	99	99.00
Total	18	18.00	25	25.00	57	57.00	100	100.00
Chi-square=0.7620, p=0.6830								

Graph No.18: Comparison of Clinical Severity COVID (mild, moderate and severe) with Lung region distribution

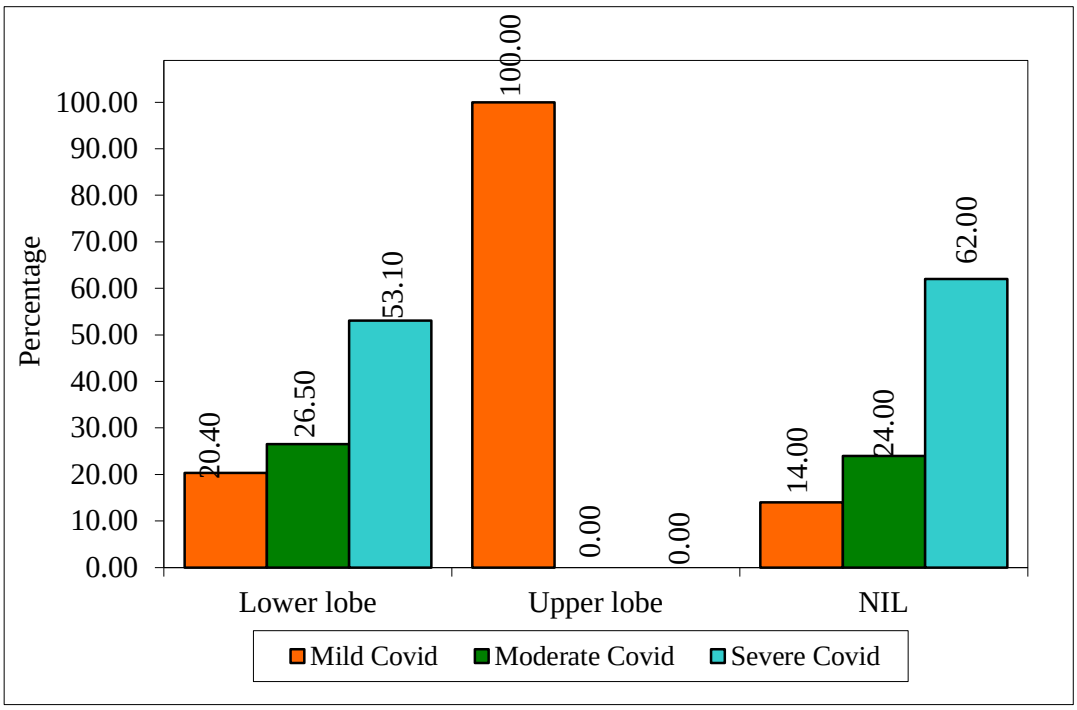


According to involvement of lung parenchyma based on HRCT observation most of our patients in all the three groups mild, moderate and severe covid infection, the involvement was seen in the bilateral lung fields, however only one patient in severe covid 19 infection had unilateral lung involvement. P value was statistically insignificant.

Table No.21: Comparison of Clinical Severity COVID (mild, moderate and severe) based on HRCT thorax by craniocaudal view

Craniocaudal distribution	Mild Covid	%	Moderate Covid	%	Severe Covid	%	Total	%
Lower lobe	10	20.41	13	26.53	26	53.06	49	49.00
Upper lobe	1	100.00	0	0.00	0	0.00	1	1.00
Both Upper & Lower Lobe	7	14.00	12	24.00	31	62.00	50	50.00
Total	18	18.00	25	25.00	57	57.00	100	100.00
Chi-square=5.5760, p=0.2330								

Graph No.19: Comparison of Clinical Severity COVID (mild, moderate and severe) based on HRCT thorax by craniocaudal view



We observed the involvement of both upper and lower lobes was more in all the three groups followed by lower lobe in all the three groups. Only one patient had involvement of upper lobe and that too in mild group (Table 21). P value was statistically insignificant.

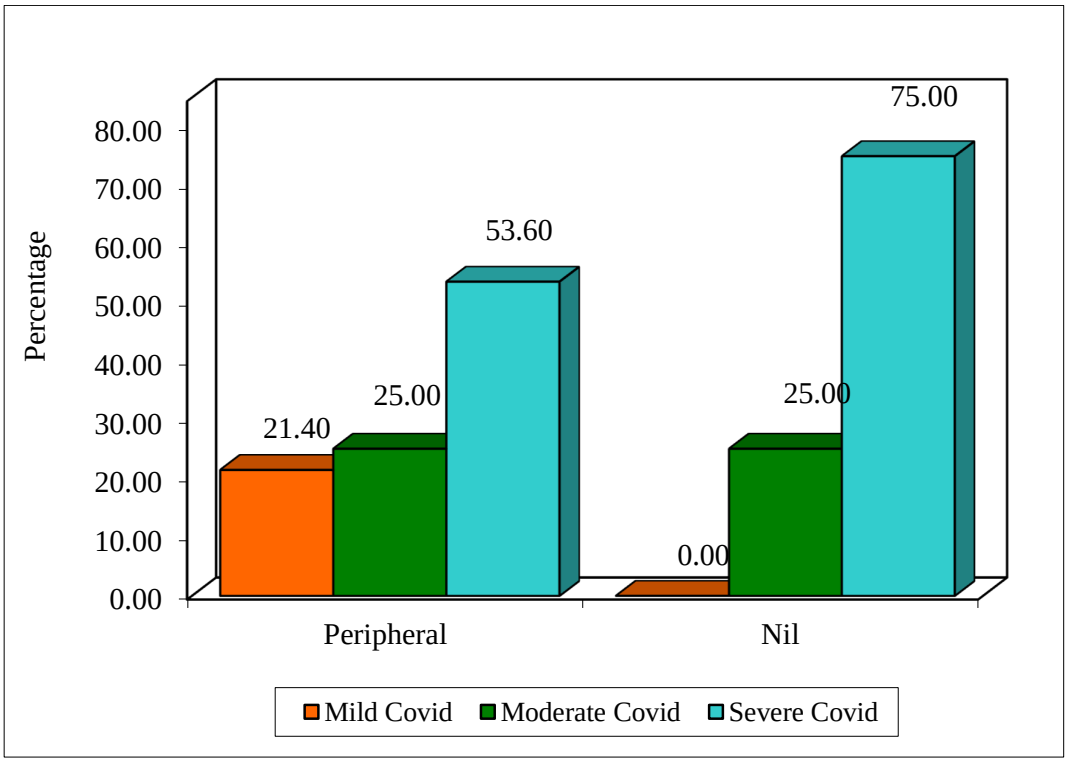
Table No.22: Comparison of Clinical Severity COVID

(mild, moderate and severe) based on HRCT thorax by Transverse view

Transverse distribution	Mild Covid	%	Moderate Covid	%	Severe Covid	%	Total	%
Peripheral	18	21.43	21	25.00	45	53.57	84	84.00
Diffuse	0	0.00	4	25.00	12	75.00	16	16.00
Total	18	18.00	25	25.00	57	57.00	100	100.00
Chi-square=4.5110, p=0.1050								

Graph No.20: Comparison of Clinical Severity COVID

(mild, moderate and severe) based on HRCT thorax by Transverse view



By transverse view comparison the peripheral distribution was more observed in all the groups as compared to diffuse distribution which was seen only in moderate and severe groups. P value was statistically insignificant (P = 0.1050). (Table 22)

Table No.23: Comparison of Clinical Severity COVID (mild, moderate and severe) by Scattered distribution

Scattered distribution	Mild Covid	%	Moderate Covid	%	Severe Covid	%	Total	%
Diffuse	0	0.00	0	0.00	13	100.00	13	13.00
Focal	1	16.67	0	0.00	5	83.33	6	6.00
Multi focal	17	20.99	25	30.86	39	48.15	81	81.00
Total	18	18.00	25	25.00	57	57.00	100	100.00
Chi-square=14.6720, p=0.0050, S								

Graph No.21: Comparison of Clinical Severity COVID (mild, moderate and severe) based on HRCT thorax by Scattered distribution

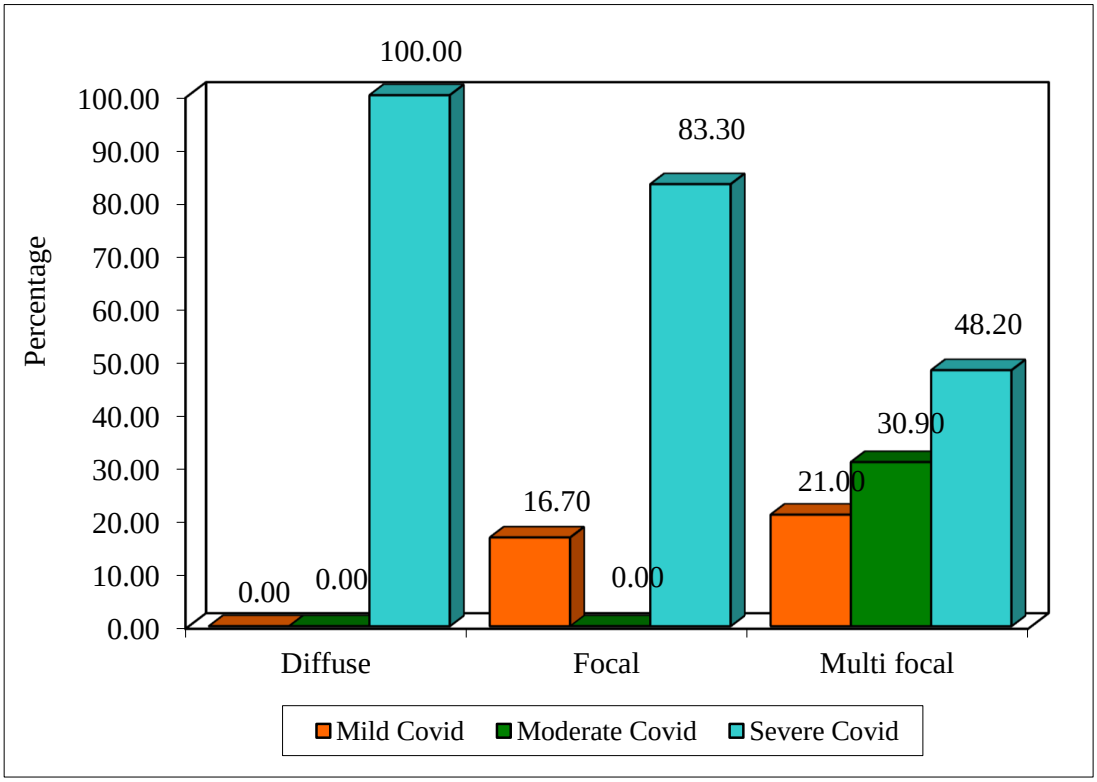


Table 23 depicts the distribution of lung lesion by scattered means. P value was statistically significant (P = 0.0050)

Table No.24: Comparison of Clinical Severity COVID (mild, moderate and severe) with Main Pattern

Main Pattern	Mild Covid	%	Moderate Covid	%	Severe Covid	%	Total	%
Consolidation	0	0.00	0	0.00	2	100.00	2	2.00
Crezy paving	2	10.00	4	20.00	14	70.00	20	20.00
GGO/CON	7	23.33	10	33.33	13	43.33	30	30.00
Ground glass opacity	9	18.75	11	22.92	28	58.33	48	48.00
Total	18	18.00	25	25.00	57	57.00	100	100.00
Chi-square=5.4170, p=0.4920								

Graph No.22: Comparison of Clinical Severity COVID (mild, moderate and severe) based on HRCT thorax with Main Pattern

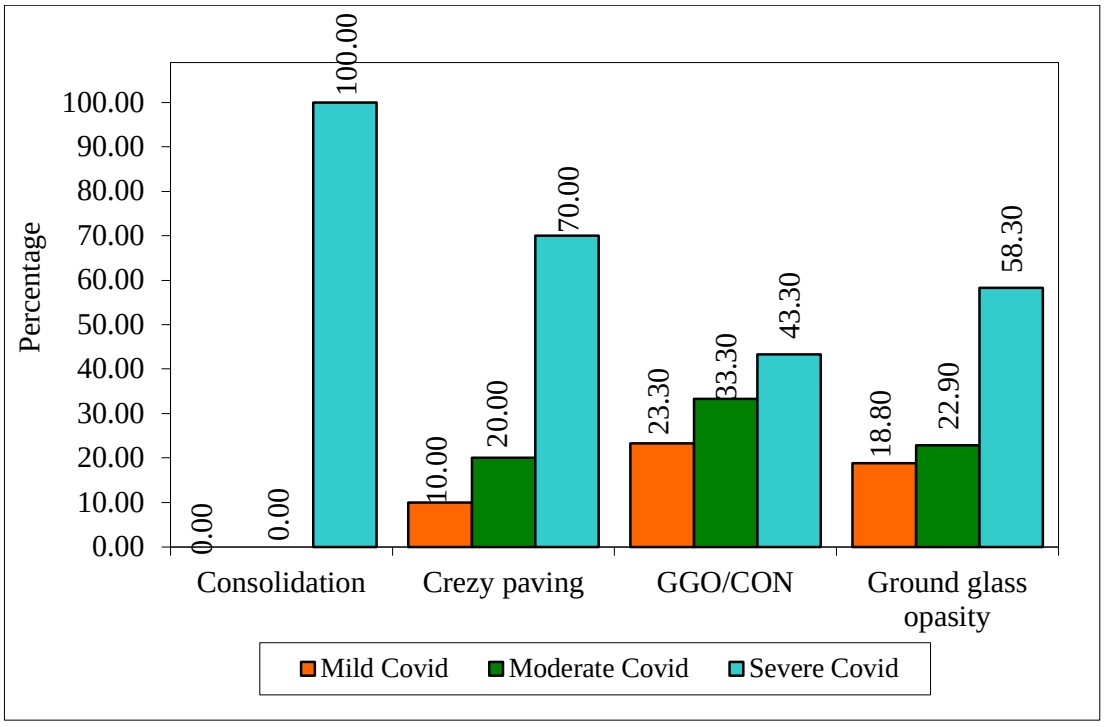


Table 24 depicts the different pattern observed by HRCT, which did not reflect any correlation as far as the clinical severity was concerned. P value was statistically insignificant (P = 0.4920).

Table No.25: Comparison of Clinical Severity COVID (mild, moderate and severe) with Related features

Related features	Mild Covid	%	Moderate Covid	%	Severe Covid	%	Total	%
Fibrosis	1	33.33	0	0.00	2	66.67	3	3.00
Fibrosis and lymphadenopathy	1	100.00	0	0.00	0	0.00	1	1.00
Lymphadenopathy	9	23.08	11	28.21	19	48.72	39	39.00
Pleural effusion	0	0.00	1	100.00	0	0.00	1	1.00
Pleural effusion and Lymphadenopathy	0	0.00	0	0.00	1	100.00	1	1.00
NIL	7	12.73	13	23.64	35	63.64	55	55.00
Total	18	18.00	25	25.00	57	57.00	100	100.00
Chi-square=6.6910, p=0.3500								

Graph No.23: Comparison of Clinical Severity COVID (mild, moderate and severe) based on HRCT thorax with Related features

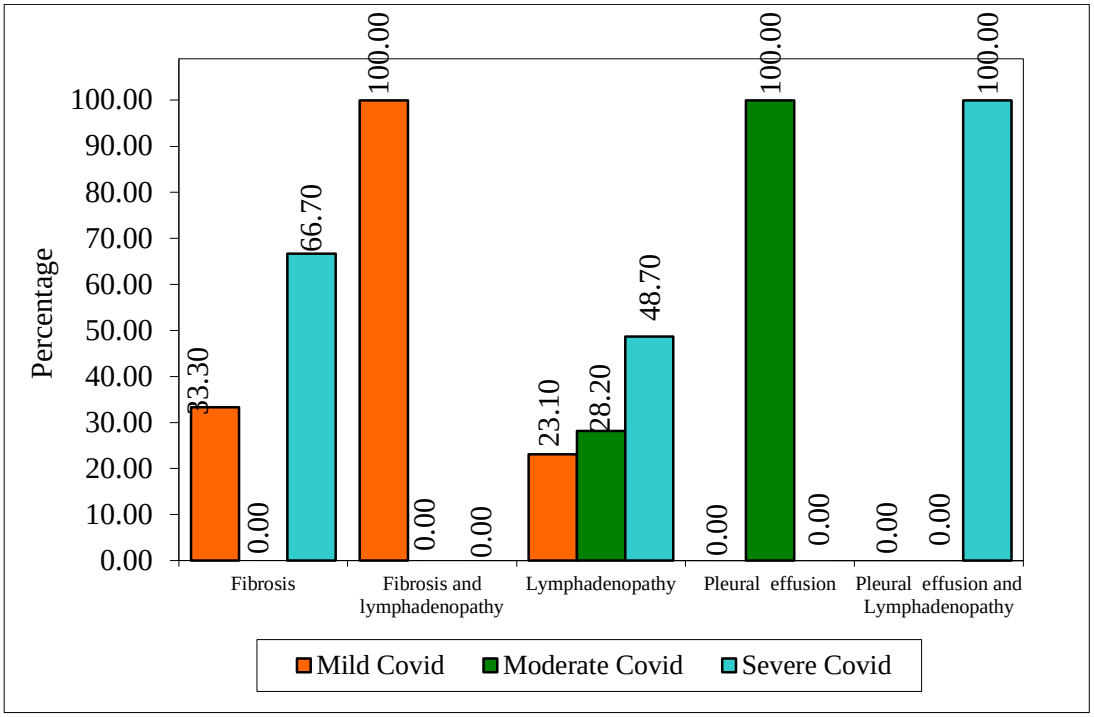


Table 25 depicts other additional HRCT findings observed and same was compared with clinical severity and found no significant correlation total n = 45. However, remaining 55 patients did not have additional CT findings as described in the above table, though they had different lung lesion as described in the earlier tables (Table 20 to 24).

DISCUSSION

In the present study of 100 patients with COVID 19 infection who were studied for clinical severity and comparison with HRCT thorax findings, the observation are as follows.

In our study, the patients age ranged from 27-87 years (youngest 27 and oldest 87), there were almost 50 patients between the age group of 41-60 years, 19 patients below the age group of 40, 18 patients between the age group of 61-70 years and 13 patients in more than 71 years age group. The mean age of our patients was 53.61±14.28 in our study population. Study by Zhao et al, [65] who observed 44 patients in the age group of 21-40, 41 between 41-60, 14 patients in the age group of more than 70 years. Another study by Saeed et al,[63] the mean age of the patients was 44.2 ± 11.9 in their study of 902 patients. Study by Gupta et al, [66] they also observed in their study population the mean age was 43.3 years and patient age ranged from 16-73 years their study population was very small (21).

In our present study there was male preponderance observed (n = 76) female (n = 24) with a ratio of male: female of 3.17:1. Study Zhao et al, [65] observed a slight male preponderance in their study group of 101 patients. Study Saeed et al, [63] observed male preponderance, almost 85% compared to 14.7% female patients in their study group of 902 patients. Another study by Gupta et al, [66] who observed male preponderance in their study 66.7%. Even in our study there was male preponderance observed accounting for almost 76% (M: F; 3.17:1) for obvious reasons we feel logically males are affected more than females. A study by Saeed et al, [63] have also found more number of males, that is 93.4% as compared to female patients, the probable reason for this could be the protective effect of oestrogen in female patients.

We further analysed all our 100 patients who presented with permutation and combination of symptoms. The commonest symptom being was fever (79%), cough (70%), dyspnoea (69%), myalgia (21%) and other symptoms which was observed in 6 patients was headache, vomiting, diarrhoea, seizures and confusional state. A study by Bhandari et al,[60] in their sample size of 80 patients. They also observed commonest symptom being fever, cough, myalgia and the other symptoms like headache, diarrhoea was seen in more than half of their patients. Study by Huang et al, [67] in their study population of 41 patients the commonest symptoms observed was fever, cough and dyspnoea. There was overlapping of symptoms in our study population.

We took comorbidities into consideration, in our study population the commonest comorbidity observed was Hypertension (n = 34), type II diabetes mellitus (n = 31), ischemic heart disease (n = 7), chronic kidney disease (n = 2) and Other associated comorbidities (Hypothyroidism, seizures, cerebrovascular accident etc. n= 7). Study by Bhandari et al,[60] with a sample size of 80 patients, the commonest comorbidity observed was type II diabetes mellitus, hypertension, ischemic heart disease in their group. Many literatures suggest that associated comorbidities like hypertension, type II diabetes mellitus, lung and coronary artery disease has increased risk of infection as well as poor outcome, the risk of infection also increases if there are more than one existing comorbidities. A study by Huang et al, [67] with a small study of 41 patients, the common comorbidities were type II diabetes mellitus, hypertension, ischemic heart disease and one patient of each in malignancy and chronic liver disease group.

The comorbidities especially type II diabetes mellitus, the severity of Covid19 infection in these patients maybe because of impaired immunity, upregulation of ACE and its changes in glycation of ACE. The Covid 19 virus attaches to ACE II in

pancreatic islet cells and results in damage and may lead to acute hypoglycaemia, it was also observed in these patients type II diabetes mellitus status worsens and those with type I diabetes mellitus may present with diabetes ketoacidosis. As a result of hyperglycaemia there could be changes in coagulation abnormality, endothelial dysfunction and release of inflammatory cytokines and may be the reason for increased severity and mortality. In patients of type II diabetes mellitus, the insulin resistance could lead to disordered glucose haemostasis which could be the reason for microvascular damage and interstitial fibrosis due to inflammation. [68]

All our 100 patients were analysed based on whether they required supplementation of oxygen by different modes, and found 55 patients did not require oxygen supplementation, 38 patients required oxygen by nasal/ face mask, six patients required non-invasive ventilation mode for maintaining saturation, only one patient required ventilatory support. A study by Saeed et al, [63] in their large sample size of 902 patients more than 71% patients did not require oxygen supplementation, however remaining patients required oxygen supplementation by different modes, 14% by simple nasal cannula, 3.5% face mask, 2.3% on non-invasive ventilation and almost 6.9% patients required ventilatory support. A study by Gupta et al, [66] a small sample size of 21 patients, none required oxygen support when they presented to hospital, only one patient during hospital stay developed breathlessness and was managed with simple oxygen supplementation.

Further, we categorised all our patients clinically into mild, moderate and severe based on Government of India, Ministry of Health and Family Welfare, Directorate General of Health Services (table 7). Most of the studies have done the categorisation in a similar fashion based on the above guidelines.

In our study of 100 patients there were 57 patients in severe groups, 25 in moderate group and mild group 18. The studies we have quoted by different authors have not shown split up like our study.

All our patients were taken into account by HRCT severity score based on grading/ scoring (table 9), mild as less than 8 score, moderate as 8-15 and severe between 16-25. Study by Sharma et al, [64] have also adopted this scoring system in their patients and found more than 58 patients were in the severity group (scoring of 16-25).

Table 12 depicts the comparison of clinical severity of infection with age and was statistically significant with p value of 0.024. There were 18 patients in the age group of 51-60 years age in severe group accounting for 72% in our study, 10 between 41-50 years in moderate group and there were 8 patients between 27-40 years in mild group. A study by Saeed et al, [63] have also observed more number of patients who were affected between the age of 50-59 years in the severe group, the factor which could determine the severity of infection could be the stage of pandemicity; when the study was carried out, comorbidities, health care system, nursing homes with elderly patients were disease could spread fast and may be because of advancing age, immunity could be a factor because of the reduced immunity with advancing age, both infection and severity could be more.

In our study comparison with gender with clinical severity the statistical p value was not significant, however in all the three groups (mild, moderate and severe) males were more in number compared to female patients, the reason for this as we have already stated females are protected by oestrogen in them. A study by Huang et al, [67] has observed more number of patients in all the three groups (mild, moderate and severe) there were more males compared to female patients and those who were

in severe category most of them were in intensive care unit settings. A study by Zhao et al, [65] also observed more number of patients in all categories with males as compared to females although p value was insignificant in their study group.

Comparison of clinical severity with symptomatology, overall, for all the symptoms patient presented in our group, p value was statistically significant more so with breathlessness. A study by Bhandari et al, [60] comparison of symptoms with clinical severity did not reflect significance as far as p value was concerned. A study by Huang et al, [67] the symptomatology as patient presented with cough and breathlessness had corelation with clinical severity, especially in patients with intensive care setting, p value was statistically significant in their study.

Comparison of clinical severity with comorbidity, further analysing our patients with comorbidities and comparing with clinical severity. Type II diabetes mellitus had a positive correlation with clinical severity. A study by Saeed et al. [63] found a corelation between clinical severity and comorbidity in their study.

Comparing clinical severity with need for oxygen supplementation, it was observed in most of our patients (55%) did not require oxygen supplementation in the three groups (mild, moderate and severe), 38% patients required oxygen supplementation, 6% required non-invasive support and only 1 patient required ventilatory support (table 16). A study by Huang et al, [67] they have observed most of their patients who were in severe category and present in the intensive care unit setting required non-invasive support for their patients (62%), 66% patients were maintaining saturation with simple nasal cannula.

Similarly, comparing patients with clinical severity and HRCT findings, there was corelation observed between clinical and HRCT findings (table 17 A). Same comparison with one way ANOVA method also reflected the p value statistically

being significant in these group of patients (table 17B). Most authors quoted in our study have not compared clinical severity with HRCT findings with one way ANOVA method.

Comparison of clinical severity with CORADS grading/scoring method (table 18) there was no statistical significance observed. Studies quoted in our discussion have not done this comparison.

The clinical parameters were similarly compared with one way ANOVA method and the observation made were comparison of clinical parameters (temperature, respiratory rate, heart rate, oxygen saturation, blood pressure) there was positive corelation between heart rate, respiratory rate and oxygen saturation which was observed, same is reflected by bar diagram. Different authors quoted in our study have not done this comparison.

Clinical comparison with HRCT findings based on involvement of the lung parenchyma which reflects the distribution of HRCT findings was more in patients with severe covid infection (that is bilateral lung field involvement) though there was no statistical significance observed (table 20). A study by Zhao et al, [(65)] involvement of lung field bilaterally was observed more in non-emergency groups as well as emergency groups in their study population.

Table 21 gives the spilt up of different view (cranio-caudal) in HRCT which did not have statistical significance. A study by Zhao et al, [(65)] have described cranio-caudal view by HRCT in their study group and found most of their study population the involvement was more in the lower lobes.

Similarly, comparison was done with transverse view by HRCT and findings observed are stated in table 22, there was no clinical significance though in 84% of patients the distribution was peripheral, remaining 16 the distribution was diffuse. A

study by Zhao et al, [65] they also observed peripheral distribution more in their study population.

Comparison with clinical severity with scattered distribution on HRCT (table 23). All the patterns were more observed in severe group followed by moderate group and least in mild group, there was statistical significance observed. This is in sharp contrast by Zhao et al, [65] who have observed 78% had diffuse pattern (our study 100%).

Similarly, we analysed our patients and compared the same with clinical severity and different pattern by HRCT and observation is depicted in table 24, p value was statistically not significant. A study by Zhao et al, [65] the most observed finding 86% was ground glass opacities in both emergency and non-emergency groups.

Finally, we took clinical severity and compared with additional findings on HRCT, though there was no statistical significance observed (table 25). A study by Zhao et al, [65] have also observed and compared it with emergency and non-emergency groups with additional findings on HRCT, they did not find any statistical significance in their study population.

We feel it is worth studying large number of patients addressing the confounding factors like age, sex, symptom, comorbidities at the time of presentation, which is equally important as there was not much understanding as this new pandemic was concerned, during the first wave the cases were more with severity and increased mortality, second wave though the severity of infection was observed but mortality rate had declined to a certain extent though negligible but yet it was significant. Now at present, though we are getting sporadic cases the clinical severity and CT severity is not that commonly observed as it was seen in the first and second wave, this could

be because of increased awareness and knowledge of infection, CT abnormalities, treatment, vaccination, all these have made a difference in the patient severity. Now to study large number of patients addressing these issues we may not be having the same virulent strain, now the strain may have been mutated and less virulent, however large number of patients studies is required to address these issues.

CONCLUSION

In our present study of 100 patients, we compared clinical severity with various factors and to our observation the prominent features are as mentioned follows.

- In our study the age of the patients ranged from 27-87 years, the youngest was 27 years old and oldest was 87 years, there was almost 50% of cases which belonged to 51-60 years, 18 patients belonged to 61-70 years and there were 13 patients who were above the age of 70. 19 patients were in the age group of 27-40 years. The infection and its severity were more observed in patients more than 50 years of age as immunity could decline with increasing age.
- We had a greater number of male patients i.e., 76 as compared to 24 female patients, the less number of female patients with infection as well as severity of infection could be because of oestrogen that could protect the female patients.
- The correlation of symptom of breathlessness was seen in severe cases as well as oxygen supplementation, non-invasive ventilation and in one patient even assisted ventilation was required in a patient who presented with breathlessness as predominant symptom.
- Overall comorbidities like hypertension, type II diabetes mellitus, ischemic heart disease would increase the risk of infection and severity, in our study the severity was more seen in patients with type II diabetes mellitus. It is also observed by many authors more than two existing comorbidities will increase the risk of infection and severity.

- Though more than half our patients did not require oxygen by different modalities, however patients who were in severe and moderate groups did require oxygen support by different modalities.
- The clinical severity was correlating with CT severity, the patients who were in severe group had also a severe HRCT finding.
- The clinical parameter like pulse rate, respiratory rate, oxygen saturation findings were correlating with clinical severity.
- Patients with severe covid 19 infection group were having more diffuse CT abnormality as compared to moderate and mild groups.

Finally, we conclude our discussion by saying factors like age, sex, symptoms like breathlessness, comorbidity presentation of the patient whether mild, moderate and severe at time of presentation did influence the clinical severity which corelated with HRCT abnormalities.

SUMMARY

In the present study of 100 patients admitted in the department of General Medicine KLES Dr. Prabhakar Kore hospital and MRC, Belagavi, the study period was from January 2021 till December 2021. It was carried out to compare clinical severity with HRCT severity, the clinical severity was more observed with advancing age, male sex, symptom especially breathlessness, comorbidity like type II diabetes mellitus as well as other comorbidities, oxygen supplementation was required in patients who were in severe groups, the clinical severity correlated with CT severity findings the clinical parameters like pulse rate, respiratory rate, oxygen saturation abnormality was more in severe groups. Diffuse CT abnormality was observed in severe groups.

BIBLIOGRAPHY

1. Francone M, Iafrate F, Masci GM, Coco S, Cilia F, Manganaro L, et al. Chest CT score in COVID-19 patients: correlation with disease severity and short-term prognosis. Eur Radiol. 2020;30(12):6808–17.
2. Yang R, Li X, Liu H, Zhen Y, Zhang X, Xiong Q, et al. Chest CT severity score: an imaging tool for assessing severe COVID-19. Radiol Cardiothorac Imaging. 2020;2(2):21–2.
3. Xiong Y, Sun D, Liu Y, Fan Y, Zhao L, Li X, et al. Clinical and high-resolution CT features of the COVID-19 infection: comparison of the initial and follow-up changes. Invest Radiol. 2020;
4. Feng Z, Yu Q, Yao S, Luo L, Zhou W, Mao X, et al. Early prediction of disease progression in COVID-19 pneumonia patients with chest CT and clinical characteristics. Nat Commun. 2020;11(1):1–9.
5. Weiss SR, Navas-Martin S. Coronavirus pathogenesis and the emerging pathogen severe acute respiratory syndrome coronavirus. Microbiol Mol Biol Rev. 2005;69(4):635–64.
6. World Health Organization. Director-General's remarks at the media briefing on 2019-nCoV on 11 February 2020 [Internet]. 2020. Available from: http://www.who.int/dg/speeches/detail/who-director-general-s-remarks-at-the-media-briefing-on-2019-ncov-on-11-february-2020
7. World Health Organization (WHO). WHO Director-General's opening remarks at the media briefing on COVID-19 -- 11 March 2020. 2020.
8. Chams N, Chams S, Badran R, Shams A, Araji A, Raad M, et al. COVID-19: A Multidisciplinary Review. Front Public Heal [Internet]. 2020;8:1–15. Available from: https://www.frontiersin.org/articles/10.3389/fpubh.2020.00383

9. Shanmugam C, Mohammed AR, Ravuri S, Luthra V, Rajagopal N, Karre S. COVID-2019 - A comprehensive pathology insight. Pathol Res Pract. 2020;216:153222.
10. Rothe C, Schunk M, Sothmann P, Bretzel G, Froeschl G, Wallrauch C, et al. Transmission of 2019-nCoV Infection from an Asymptomatic Contact in Germany. N Engl J Med. 2020;382(10):970–1.
11. Tsang KW, Ho PL, Ooi GC, Yee WK, Wang T, Chan-Yeung M, et al. A Cluster of Cases of Severe Acute Respiratory Syndrome in Hong Kong. N Engl J Med. 2003;348(20):1977–85.
12. Kim JY, Ko J-H, Kim Y, Kim Y-J, Kim J-M, Chung Y-S, et al. Viral Load Kinetics of SARS-CoV-2 Infection in First Two Patients in Korea. J Korean Med Sci. 2020;35(7).
13. Holshue ML, DeBolt C, Lindquist S, Lofy KH, Wiesman J, Bruce H, et al. First Case of 2019 Novel Coronavirus in the United States. N Engl J Med. 2020;382(10):929–36.
14. Poutanen SM, Low DE, Henry B, Finkelstein S, Rose D, Green K, et al. Identification of Severe Acute Respiratory Syndrome in Canada. N Engl J Med. 2003;348(20):1995–2005.
15. Chen H, Guo J, Wang C, Luo F, Yu X, Zhang W, et al. Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women: a retrospective review of medical records. Lancet. 2020;395(10226):809–15.
16. Morawska L, Tang JW, Bahnfleth W, Bluyssen PM, Boerstra A, Buonanno G, et al. How can airborne transmission of COVID-19 indoors be minimised? Environ Int. 2020;142:105832.

17. Gao P, Zhang H, Wu Z, Wang J. Visualising the expansion and spread of coronavirus disease 2019 by cartograms. Environ Plan A Econ Sp. 2020;52(4):698–701.
18. Zimmermann P, Curtis N. Coronavirus Infections in Children Including COVID-19: An Overview of the Epidemiology, Clinical Features, Diagnosis, Treatment and Prevention Options in Children. Pediatr Infect Dis J. 2020;39(5).
19. Ciaglia E, Vecchione C, Puca AA. COVID-19 Infection and Circulating ACE2 Levels: Protective Role in Women and Children. Front Pediatr. 2020;8.
20. Guan W, Ni Z, Hu Y, Liang W, Ou C, He J, et al. Clinical Characteristics of Coronavirus Disease 2019 in China. N Engl J Med. 2020;382(18):1708–20.
21. Wang D, Hu B, Hu C, Zhu F, Liu X, Zhang J, et al. Clinical Characteristics of 138 Hospitalized Patients With 2019 Novel Coronavirus–Infected Pneumonia in Wuhan, China. JAMA. 2020;323(11):1061–9.
22. Cheng Y, Cheng G, Chui CH, Lau FY, Chan PKS, Ng MHL, et al. ABO blood group and susceptibility to severe acute respiratory syndrome. Vol. 293, JAMA. United States; 2005. p. 1450–1.
23. Zhao J, Yang Y, Huang H, Li D, Gu D, Lu X, et al. Relationship between the ABO Blood Group and the COVID-19 Susceptibility. medRxiv. 2020;2020.03.11.20031096.
24. Parasher A. COVID-19: Current understanding of its pathophysiology, clinical presentation and treatment. Postgrad Med J. 2021;97(1147):312–20.
25. Wrapp D, Wang N, Corbett KS, Goldsmith JA, Hsieh C-L, Abiona O, et al. Cryo-EM structure of the 2019-nCoV spike in the prefusion conformation. Science. 2020;367(6483):1260–3.
26. Gui M, Song W, Zhou H, Xu J, Chen S, Xiang Y, et al. Cryo-electron microscopy

structures of the SARS-CoV spike glycoprotein reveal a prerequisite conformational state for receptor binding. Cell Res. 2017;27(1):119–29.

27. Tian X, Li C, Huang A, Xia S, Lu S, Shi Z, et al. Potent binding of 2019 novel coronavirus spike protein by a SARS coronavirus-specific human monoclonal antibody. Vol. 9, Emerging microbes & infections. 2020. p. 382–5.
28. Zhou P, Yang X-L, Wang X-G, Hu B, Zhang L, Zhang W, et al. A pneumonia outbreak associated with a new coronavirus of probable bat origin. Nature. 2020;579(7798):270–3.
29. Xiong T-Y, Redwood S, Prendergast B, Chen M. Coronaviruses and the cardiovascular system: acute and long-term implications. Eur Heart J. 2020;41(19):1798–800.
30. Somekh E, Gleyzer A, Heller E, Lopian M, Kashani-Ligumski L, Czeiger S, et al. The Role of Children in the Dynamics of Intra Family Coronavirus 2019 Spread in Densely Populated Area. Pediatr Infect Dis J. 2020;39(8):e202–4.
31. Laws RL, Chancey RJ, Rabold EM, Chu VT, Lewis NM, Fajans M, et al. Symptoms and Transmission of SARS-CoV-2 Among Children - Utah and Wisconsin, March-May 2020. Pediatrics. 2021;147(1).
32. Rosenberg ES, Dufort EM, Blog DS, Hall EW, Hoefer D, Backenson BP, et al. COVID-19 Testing, Epidemic Features, Hospital Outcomes, and Household Prevalence, New York State-March 2020. Clin Infect Dis. 2020;71(8):1953–9.
33. Bi Q, Wu Y, Mei S, Ye C, Zou X, Zhang Z, et al. Epidemiology and transmission of COVID-19 in 391 cases and 1286 of their close contacts in Shenzhen, China: a retrospective cohort study. Lancet Infect Dis. 2020;20(8):911–9.
34. Li W, Zhang B, Lu J, Liu S, Chang Z, Peng C, et al. Characteristics of Household Transmission of COVID-19. Clin Infect Dis. 2020;71(8):1943–6.

35. Grijalva CG, Rolfes MA, Zhu Y, McLean HQ, Hanson KE, Belongia EA, et al. Transmission of SARS-COV-2 Infections in Households - Tennessee and Wisconsin, April-September 2020. MMWR Morb Mortal Wkly Rep. 2020;69(44):1631–4.

36. Madewell ZJ, Yang Y, Longini IMJ, Halloran ME, Dean NE. Factors Associated With Household Transmission of SARS-CoV-2: An Updated Systematic Review and Meta-analysis. JAMA Netw open. 2021;4(8):e2122240.

37. Somekh I, Sharabi A, Dory Y, Simões EAF, Somekh E. Intrafamilial Spread and Altered Symptomatology of SARS-CoV-2, During Predominant Circulation of Lineage B.1.1.7 Variant in Israel. Pediatr Infect Dis J. 2021;40(8):e310–1.

38. Hobbs C V, Martin LM, Kim SS, Kirmse BM, Haynie L, McGraw S, et al. Factors Associated with Positive SARS-CoV-2 Test Results in Outpatient Health Facilities and Emergency Departments Among Children and Adolescents Aged <18 Years - Mississippi, September-November 2020. MMWR Morb Mortal Wkly Rep. 2020;69(50):1925–9.

39. Triggle CR, Bansal D, Ding H, Islam MM, Farag EABA, Hadi HA, et al. A Comprehensive Review of Viral Characteristics, Transmission, Pathophysiology, Immune Response, and Management of SARS-CoV-2 and COVID-19 as a Basis for Controlling the Pandemic. Front Immunol. 2021;12:1–15.

40. Brown NE, Bryant-Genevier J, Bandy U, Browning CA, Berns AL, Dott M, et al. Antibody Responses after Classroom Exposure to Teacher with Coronavirus Disease, March 2020. Vol. 26, Emerging infectious diseases. 2020. p. 2263–5.

41. Hains DS, Schwaderer AL, Carroll AE, Starr MC, Wilson AC, Amanat F, et al. Asymptomatic Seroconversion of Immunoglobulins to SARS-CoV-2 in a Pediatric Dialysis Unit. JAMA. 2020;323(23):2424–5.

42. Krass P, Zimbrick-Rogers C, Iheagwara C, Ford CA, Calderoni M. COVID-19 Outbreak Among Adolescents at an Inpatient Behavioral Health Hospital. J Adolesc Health. 2020;67(4):612–4.

43. Macartney K, Quinn HE, Pillsbury AJ, Koirala A, Deng L, Winkler N, et al. Transmission of SARS-CoV-2 in Australian educational settings: a prospective cohort study. Lancet Child Adolesc Heal. 2020;4(11):807–16.

44. Lopez AS, Hill M, Antezano J, Vilven D, Rutner T, Bogdanow L, et al. Transmission Dynamics of COVID-19 Outbreaks Associated with Child Care Facilities - Salt Lake City, Utah, April-July 2020. MMWR Morb Mortal Wkly Rep. 2020;69(37):1319–23.

45. Wong J, Jamaludin SA, Alikhan MF, Chaw L. Asymptomatic transmission of SARS-CoV-2 and implications for mass gatherings. Vol. 14, Influenza and other respiratory viruses. 2020. p. 596–8.

46. Jung J, Hong MJ, Kim EO, Lee J, Kim M-N, Kim S-H. Investigation of a nosocomial outbreak of coronavirus disease 2019 in a paediatric ward in South Korea: successful control by early detection and extensive contact tracing with testing. Vol. 26, Clinical microbiology and infection : the official publication of the European Society of Clinical Microbiology and Infectious Diseases. 2020. p. 1574–5.

47. Qiu H, Wu J, Hong L, Luo Y, Song Q, Chen D. Clinical and epidemiological features of 36 children with coronavirus disease 2019 (COVID-19) in Zhejiang, China: an observational cohort study. Lancet Infect Dis. 2020;20(6):689–96.

48. Huff H V, Singh A. Asymptomatic Transmission During the Coronavirus Disease 2019 Pandemic and Implications for Public Health Strategies. Clin Infect Dis. 2020;71(10):2752–6.

49. Kelvin AA, Halperin S. COVID-19 in children: the link in the transmission chain. Lancet Infect Dis. 2020;20(6):633–4.

50. Meyerowitz-Katz G, Merone L. A systematic review and meta-analysis of published research data on COVID-19 infection fatality rates. Int J Infect Dis. 2020;101:138–48.

51. Levin AT, Hanage WP, Owusu-Boaitey N, Cochran KB, Walsh SP, Meyerowitz-Katz G. Assessing the age specificity of infection fatality rates for COVID-19: systematic review, meta-analysis, and public policy implications. Eur J Epidemiol. 2020;35(12):1123–38.

52. Zhou F, Yu T, Du R, Fan G, Liu Y, Liu Z, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. Lancet (London, England). 2020;395(10229):1054–62.

53. Xie J, Tong Z, Guan X, Du B, Qiu H. Clinical characteristics of patients who died of coronavirus disease 2019 in China. JAMA Netw open. 2020;3(4):e205619–e205619.

54. Bao C, Liu X, Zhang H, Li Y, Liu J. Coronavirus Disease 2019 (COVID-19) CT Findings: A Systematic Review and Meta-analysis. J Am Coll Radiol. 2020;17(6):701–9.

55. McIntosh K, Hirsch MS, Bloom A. Coronavirus disease 2019 (COVID-19). UpToDate Hirsch MS Bloom. 2020;5(1).

56. Peng Q-Y, Wang X-T, Zhang L-N. Findings of lung ultrasonography of novel corona virus pneumonia during the 2019-2020 epidemic. Vol. 46, Intensive care medicine. 2020. p. 849–50.

57. Abrams ER, Rose G, Fields JM, Esener D. Point-of-Care Ultrasound in the Evaluation of COVID-19. J Emerg Med. 2020;59(3):403–8.

58. Islam N, Ebrahimzadeh S, Salameh J-P, Kazi S, Fabiano N, Treanor L, et al. Thoracic imaging tests for the diagnosis of COVID-19. Cochrane database Syst Rev. 2021;3(3):CD013639.

59. Zhang J, Meng G, Li W, Shi B, Dong H, Su Z, et al. Relationship of chest CT score with clinical characteristics of 108 patients hospitalized with COVID-19 in Wuhan, China. Respir Res. 2020;21(1):1–11.

60. Bhandari S, Rankawat G, Bagarhatta M, Singh A, Singh A, Gupta V, et al. Clinico-Radiological Evaluation and Correlation of CT Chest Images with Progress of Disease in COVID-19 Patients. J Assoc Physicians India. 2020;34–42.

61. Zhou S, Wang Y, Zhu T, Xia L. CT Features of Coronavirus Disease 2019 (COVID-19) Pneumonia in 62 Patients in Wuhan, China. AJR Am J Roentgenol. 2020;214(6):1287–94.

62. Colombi D, Bodini FC, Petrini M, Maffi G, Morelli N, Milanese G, et al. Well-aerated Lung on Admitting Chest CT to Predict Adverse Outcome in COVID-19 Pneumonia. Radiology. 2020;296(2):E86–96.

63. Saeed GA, Gaba W, Shah A, Al Helali AA, Raidullah E, Al Ali AB, et al. Correlation between Chest CT Severity Scores and the Clinical Parameters of Adult Patients with COVID-19 Pneumonia. Radiol Res Pract. 2021;2021:66–9.

64. Sharma S, Aggarwal A, Sharma RK, Patras E, Singhal A. Correlation of chest CT severity score with clinical parameters in COVID-19 pulmonary disease in a tertiary care hospital in Delhi during the pandemic period. Egypt J Radiol Nucl Med. 2022;53(1):166–72.

65. Zhao W, Zhong Z, Xie X, Yu Q, Liu J. Relation between chest CT findings and clinical conditions of coronavirus disease (covid-19) pneumonia: A multicenter study. American Journal of Roentgenology. 2020 May 1;214(5):1072–7.

66. Gupta N, Agrawal S, Ish P, Mishra S, Gaind R, Usha G, et al. Clinical and epidemiologic profile of the initial COVID-19 patients at a tertiary care centre in India. Monaldi Archives for Chest Disease. 2020;90(1):193–6.

67 Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. The Lancet. 2020 Feb 15;395(10223):497–506

68 Raghavendra C, Yuvabalakumaran G, Rajan R, Sidhesh RM, Mathavi S. Evaluation of covid severity in diabetic vs non-diabetic individuals using CT severity score. Indian Journal of Science and Technology. 2022;15(17):806–10.

ANNEXURE I

INFORMED CONSENT

Dear Mr./Mrs./Dr. _____, you are kindly requested to enroll yourself in a research study tilted, **"A study to correlate clinical severity with HRCT Thorax findings in covid 19 patients - one year cross sectional study at KLES Dr. Prabhakar Kore Hospital & MRC"** being conducted by REG NO: BG0120006, a post graduate student in M.D. General Medicine and the study will be carried out under the direct supervision and guidance of Dr. _____, Associate Professor, Department of General Medicine, Jawaharlal Nehru Medical College, Belgaum.

You have been requested to participate in this as you fit into the laid out criteria for a study 'subject'/ participant.

Your participation in study is voluntary. During the study you will be undergoing few routine blood investigations. Your decision whether or not to participate in the study will not affect your treatment in any form. If you decide to participate you are free to withdraw at any time.

TITLE OF THE STUDY:

"A study to correlate clinical severity with HRCT Thorax findings in covid 19 patients - one-year cross sectional study at KLES Dr. Prabhakar Kore Hospital & MRC"

PURPOSE OF THE STUDY:

To study the correlation between the clinical severity and radiological severity in Covid 19 patients.

PROCEDURES INVOLVED:

If you agree to enroll yourself in my study, you will be clinically examined in detail and investigated for the below said investigations accordingly.

Covid - RTPCR / CBNAAT / RAT

HRCT Thorax

RISKS AND BENEFITS:

There are no potential risks involved in this study.

Benefits of taking part in this research:

To establish a correlation between clinical staging and CT based severity scoring of covid 19 infection.

VOLUNTARY PARTICIPATION / WITHDRAWAL FROM THE STUDY:

Taking part in the study is voluntary. You may choose not to enroll yourself in this study and may choose to leave the study anytime in between.

ALTERNATIVES:

Your decision regarding participation in study will not change present or future health care services offered to you at KLES Dr. Prabhakar Kore Hospital and Medical Research Centre, Belgaum. You would simply be excluded from the study if you wish to, and all your details shall be kept confidential and you will get the routine line of management.

PRIVACY AND CONFIDENTIALITY:

All data collected or disclosed by you during the course of participation of study, will be kept fully confidential. If, however during the course it becomes necessary for the progress of the course to disclose the identity, it would be done so only after your informed & written consent.

The only people to know that you are a research subject are members of the research team. No information about you will be disclosed to other without your written permission except:

In emergency to protect your rights and welfare.

If required by law.

AUTHORIZATION TO PUBLISH RESULT:

The results of the study may be used to publish an article. When the results of research published or discussed, in a conference, no information will be displayed that would disclose your identity. Any information obtained in connection with this study and that can be identified with you will remain confidential.

FINANCIAL INCENTIVES FOR PARTICIPATION:

No additional costs shall be incurred upon you for the purpose of this study.

It is purely being done with the idea of research and all the cost of study will be borne by the investigator.

COMPENSATION:

In the event that you become injured as a result of taking part in this study, treatment will be offered to you at KLES Dr. Prabhakar Kore Hospital and Medical Research Centre, Belgaum, or you will be given information about where to receive medical care. However, no reimbursement, compensation or free medical care will be given.

QUESTIONS/CONTACT DETAILS:

You shall be free to contact the below mentioned name & addresses anytime during the study period for any clarification or help as you may desire for.

In case of the queries during study or in future you may contact following persons,

1. DR. HARSHA HEGDE
Chairperson,
IEC & Scientist D, ICMR,
National Institute of Traditional Medicine,
Ph: 9480422500

2. Dr. _____
Associate Professor,
Dept of General Medicine,
JNMC, Belagavi

3. Dr. REG NO: BG0120006
Investigator,
PG in General Medicine,
JNMC,Belagavi

CONSENT FORM

I voluntarily agree to take part in this study by signing below. I may withdraw at any time. I am not giving up any of my legal rights by signing this form. My signature below indicates that I have read this consent form, or it has been read to me, this consent form and have had all the questions answered

Signature / Left Thumb print of the Participant or legally authorized representative

Participant's name :……...

Signature / Left thumb impression :……...

of the participant

Name of the legally authorized :……...

representative / guardian

Signature / Left thumb impression :……...

Witness name :……...

Signature / Left thumb impression :……...

Investigator's name and signature :……...

Date:

Place:

ANNEXURE II – PROFORMA

CASE NO	
NAME	
IP NO	
AGE	**YEARS**
SEX	
ADDRESS	
OCCUPATION	

Presenting complaints

- Cough
- Fever
- Myalgia
- Breathlessness
- Head Ache
- Loss of taste
- Loss of smell
- Diarrhea
- Vomiting
- Other symptoms

Past history

- DM
- HTN
- IHD

- CKD
- CLD
- CVA
- COPD
- Malignancy
- Others

Vitals:

Temperature	
Pulse	
Respiratory Rate	
Blood Pressure	
SpO2	
O_2 modality	
O_2 rate	
FiO2	
PO2	

Investigations:

1) Covid - RTPCR / CBNAAT / RAT

2) HRCT Thorax.
   - CORADS Score
   - CT Severity Score
   - Main Pattern

Ground glass opacities
Crazy Paving
Consolidation

   - Related features

Pleural effusion
Fibrosis
Lymphadenopathy

   - Craniocaudal distribution

Upper lobe predominant
Lower lobe predominant
No craniocaudal distribution

   - Transverse distribution

Central distribution
Peripheral distribution
No transverse distribution

- Lung region distribution

Unilateral
Bilateral

- Scattered distribution

Focal
Multifocal
Diffuse

ANNEXURE III – KEY TO MASTER CHART

GENDER – M – MALE F – FEMALE

GGO- Ground Glass Opacities

CON- Consolidation

CP - Crazy Paving Pattern

L - Lymphadenopathy

PE - Pleural Effusion

FB - Fibrosis

P - Peripheral

B/L - Bilateral

MF - Multifocal

D - Diffuse

F - Focal

LL - Lower Lobe

RA – Room Air

NIV – Non-Invasive Ventilation

O2 - Oxygen

SL.NO	IP NO	DATE OF ADMISSION	Age (Years)	Gender	Cough	Fever	Myalgia	Breathlesness	Other Symptoms	Hypertension	T2DM	IHD	CKD	Others	Temprature	Pulse Rate	Respiratory Rate (CPM)	SpO2 (%)	Systolic BP (mmHg)	Diastolic BP (mmHg)	O2 modality	O2 rate	FiO2	Clinical Severity	CORADS Score	CT Severity Score	Main Pattern	Related features	Craniocaudal distribution	Transverse distribution	Lung region distribution
1	1049630	18-04-2021	38	F	Present	Present									100	98	24	93	110	70	RA			Moderate	5	4/25	GGO	L	LL	P	BL
2	1051066	30-04-2021	44	M		Present		Present	Myalgia		Present				98.6	100	26	84	120	80	O2	15L		Severe	5	15/25	GGO	NIL	LL	P	BL
3	1049099	14-04-2021	47	M					Altered S					CLD	98.6	80	12	96	110	70	RA			Mild	5	9/25	GGO / CON	L	LL	P	BL
4	1049362	16-04-2021	54	M	Present	Present		Present		Present	Present				98.6	82	25	92	170	90	RA			Moderate	5	8/25	GGO / CON	L	NIL	P	BL
5	1049581	17-04-2021	41	M	Present	Present		Present							98.6	80	14	95	130	80	RA			Mild	6	11/25	GGO / CON	L	LL	P	BL
6	1049657	18-04-2021	48	F	Present			Present		Present	Present				98.6	116	30	86	140	80	O2	15L		Severe	4	18/25	GGO	L	NIL	P	BL
7	1049841	19-04-2021	39	M	Present			Present							98.6	88	26	90	120	80	O2	5L		Severe	5	17/25	CON	F	LL	P	BL
8	1050202	22-04-2021	85	M	Present	Present		Present			Present				98.6	90	24	82	110	70	RA			Severe	5	19/25	GGO/CON	NIL	LL	P	BL
9	1050458	23-04-2021	50	M	Present	Present		Present			Present				98.6	114	22	91	130	80	RA			Moderate	5	12/25	GGO/CON	L	LL	P	BL
10	1050591	25-04-2021	45	M	Present	Present				Present				SEIZURE	98.6	112	22	92	136	70	RA			Moderate	5	10/25	GGO/CON	L	LL	P	BL
11	1050600	25-04-2021	50	M	Present			Present							98.6	108	20	88	120	80	O2	15L		Severe	4	10/25	GGO	NIL	NIL	P	BL
12	1050677	26-04-2021	53	M		Present		Present							101	116	26	62	130	70	RA			Severe	6	23/25	CP	L	LL	P	BL
13	1050725	26-04-2021	53	M		Present		Present		Present	Present			IHD	98.6	90	28	94	120	80	O2	5L		Severe	5	15/25	GGO	NIL	LL	P	BL
14	1050760	27-04-2021	42	M	Present	Present		Present							98.6	118	32	93	120	70	NIV			Severe	5	24/25	GGO	L	NIL	P	BL
15	1050909	28-04-2021	72	M				Present		Present	Present				98.6	164	36	96	160	70	O2	10L		Severe	5	22/25	GGO	NIL	LL	P	BL
16	1050948	28-04-2021	51	F	Present	Present		Present		Present					98.6	124	24	88	120	70	NIV			Severe	5	21/25	CP	L	NIL	P	BL
17	1051012	29-04-2021	53	M	Present	Present		Present		Present					98.6	118	18	96	170	110	NIV			Mild	4	2/25	GGO	NIL	NIL	P	RL
18	1051048	29-04-2021	50	M				Present							98.6	114	32	40	70		NIV			Severe	5	12/25	GGO/CON	NIL	LL	P	BL
19	1051064	30-04-2021	87	M	Present	Present		Present							98.6	88	30	83	130	70	RA			Severe	5	11/25	GGO	NIL	LL	P	BL
20	1051075	30-04-2021	33	M	Present	Present	Present	Present							98.6	120	30	85	100	60	RA			Severe	5	12/25	GGO/CON	L	LL	P	BL
21	1051111	30-04-2021	27	M	Present	Present	Present		HEADACHE						100	109	26	94	110	70	RA			Moderate	5	9/25	GGO/CON	L	LL	P	BL
22	1051125	30-04-2021	60	M	Present			Present		Present	Present				98.6	120	30	85	130	80	RA			Severe	4	9/25	GGO	L	NIL	P	BL
23	1051158	30-04-2021	71	M		Present	Present	Present			Present	Present			98.6	98	32	85	140	70	RA			Severe	5	18/25	GGO/CON	L	LL	P	BL
24	1051199	01-05-2021	85	M	Present	Present	Present			Present	Present		Present		100	88	26	92	140	100	RA			Moderate	5	8/25	GGO/CON	L	NIL	P	BL
25	1051203	01-05-2021	67	M	Present	Present		Present		Present					100	96	24	92	140	80	RA			Moderate	5	16/25	GGO/CON	L	NIL	P	BL
26	1051224	01-05-2021	65	M	Present	Present									98.6	88	24	94	140	80	RA			Moderate	5	13/25	GGO/CON	L	LL	P	BL
27	1051254	02-05-2021	55	M			Present	Present							98.6	82	32	78	180	100	RA			Severe	5	22/25	GGO	L	LL	P	BL
28	1051293	02-05-2021	73	M		Present		Present							98.6	120	36	65	120	70	RA	15L		Severe	5	11/25	GGO	NIL	LL	P	BL
29	1051294	03-05-2021	28	M		Present									98.6	90	18	96	130	80	RA			Mild	5	11/25	GGO/CON	NIL	LL	P	BL
30	1051295	03-05-2021	68	M		Present		Present							98.6	78	30	87	130	70	RA			Severe	5	14/25	CP	L	LL	P	BL
31	1051304	03-05-2021	62	M	Present	Present									101	82	32	89	140	80	O2	5L		Severe	5	17/25	CP	NIL	NIL	P	BL
32	1051422	04-05-2021	45	F	Present	Present									98.6	114	18	93	130	90	RA			Moderate	5	14/25	GGO	NIL	LL	P	BL
33	1051477	04-05-2021	75	M	Present	Present		Present		Present					98.6	94	30	86	150	80	O2	15L		Severe	5	17/25	GGO	FB	NIL	P	BL
34	1051490	04-05-2021	45	M	Present	Present	Present	Present							100	102	16	90	120	70	RA			Moderate	5	19/25	GGO	NIL	NIL	P	BL
35	1051504	04-05-2021	48	F	Present	Present		Present		Present	Present				98.6	108	28	89	130	70	O2	15L		Moderate	5	22/25	CP	NIL	NIL	P	BL
36	1051508	04-05-2021	40	M	Present	Present		Present							98.6	110	20	95	110	70	RA			Mild	5	18/25	GGO	NIL	NIL	P	BL
37	1051509	04-05-2021	30	F		Present		Present						HYPOTHYROID	98.6	112	14	96	130	80	RA			Mild	5	6/25	GGO	NIL	NIL	P	BL
38	1051514	04-05-2021	71	M	Present	Present	Present			Present	Present	Present			98.6	98	32	90	120	80	O2	15L		Severe	5	18/25	GGO	NIL	NIL	P	BL
39	1051516	05-05-2021	63	M		Present		Present		Present	Present				98.6	90	30	88	160	90	RA			Severe	4	3/25	GGO	NIL	NIL	P	BL
40	1051555	05-05-2021	52	F	Present	Present	Present			Present					98.6	78	14	97	130	70	RA			Mild	5	11/25	CP	FB	LL	P	BL
41	1051596	05-05-2021	37	M	Present	Present									101	100	16	98	150	100	RA			Mild	5	7/25	CP	L	LL	P	BL
42	1051607	05-05-2021	38	M	Present	Present									98.6	106	20	96	130	80	RA			Mild	5	9/25	GGO	L	LL	P	BL
43	1051610	05-05-2021	46	M	Present	Present		Present							98.6	116	32	80	130	90	O2	15L		Severe	5	6/25	GGO	NIL	LL	P	BL
44	1051612	05-05-2021	47	M	Present	Present		Present							98.6	114	26	75	130	80	V		100	Severe	4	14/25	GGO	NIL	NIL	P	BL
45	1051613	05-05-2021	56	M		Present		Present							100	112	32	85	110	70	RA			Severe	5	15/25	GGO	NIL	NIL	P	BL
46	1051614	05-05-2021	32	M	Present	Present		Present							98.6	116	30	88	130	90	RA			Severe	5	17/25	GGO	NIL	NIL	P	BL
47	1051616	05-05-2021	58	M		Present		Present							98.8	72	24	94	120	80	RA			Moderate	5	19/25	GGO	NIL	NIL	P	BL
48	1051618	05-05-2021	70	M	Present	Present		Present			Present				98.6	99	28	92	130	70	RA			Moderate	5	17/25	GGO	NIL	LL	P	BL
49	1051624	05-05-2021	44	M	Present	Present	Present			Present					98.6	98	26	94	110	70	RA			Moderate	5	14/25	CP	NIL	NIL	NIL	BL
50	1051633	06-05-2021	61	F	Present	Present				Present					98.6	98	32	94	130	80	O2	10L		Severe	5	12/25	GGO	NIL	LL	P	BL
51	1051635	06-05-2021	60	F	Present			Present	HEADACHE	Present	Present				99	110	30	87	90	50	RA			Severe	5	16/25	GGO	NIL	LL	P	BL
52	1051643	06-05-2021	63	M		Present				Present	Present	Present		CVA	98.6	112	32	90	110	70	O2	15L		Severe	5	15/25	CP	NIL	NIL	NIL	BL
53	1051644	06-05-2021	67	M				Present							98.6	60	28	92	90	60	NIV	90		Moderate	5	14/25	CP	PE	NIL	NIL	BL
54	1051647	06-05-2021	60	M	Present										99	98	14	91	130	80	RA			Moderate	5	10/25	GGO	NIL	LL	P	BL
55	1051662	06-05-2021	56	M				Present		Present	Present				98.6	88	34	60	140	70	RA			Severe	5	22/25	GGO/CON	L	LL	P	BL
56	1051669	06-05-2021	48	M	Present			Present		Present	Present	Present			98.6	114	18	90	110	70	RA			Moderate	5	9/25	GGO/CON	L	LL	P	BL

57	1051693	06-05-2021	45	F	Present			Present							98.6	98	34	80	110	70	O2	15L		Severe	5	23/25	GGO/CON	L	NIL	NIL	BL
58	1051698	06-05-2021	60	M					ALTERED S		Present				98.6	96	32	94	120	70	O2	10L		Severe	4	2/25	GGO	NIL	LL	NIL	UL
59	1051703	06-05-2021	70	F	Present	Present	Present			Present	Present				98.6	111	30	97	130	60	O2	5L		Severe	5	15/25	GGO/CON	L	LL	P	BL
60	1051707	06-05-2021	65	F	Present		Present			Present					98.6	96	16	96	140	70	RA			Mild	4	2/25	GGO/CON	L	UL	P	RL
61	1051709	06-05-2021	48	M		Present									98.6	82	20	94	130	90	RA			Moderate	5	10/25	GGO/CON	NIL	LL	P	BL
62	1051716	06-05-2021	45	M	Present	Present	Present								98.6	88	34	94	130	80	O2	10L		Severe	5	18/25	CP	NIL	NIL	NIL	BL
63	1051718	06-05-2021	42	F	Present	Present	Present								100	110	30	94	110	70	O2	5L		Severe	5	14/25	GGO/CON	NIL	NIL	NIL	BL
64	1051728	06-05-2021	40	M		Present	Present								98.6	92	30	86	130	80	O2	15L		Severe	5	18/25	CON	NIL	LL	P	BL
65	1051730	06-05-2021	58	M	Present	Present		Present							98.6	98	34	92	120	70	O2	15L		Severe	5	23/25	GGO/CON	NIL	LL	P	BL
66	1051733	07-05-2021	35	M	Present	Present		Present							98.6	120	30	75	130	80	RA			Severe	5	18/25	CP	NIL	NIL	P	BL
67	1051783	07-05-2021	62	M	Present	Present		Present		Present	Present			HYPOTHYROID	98.6	115	18	92	130	90	RA			Moderate	5	13/25	GGO/CON	L	LL	P	BL
68	1051798	07-05-2021	33	F				Present							98.6	92	16	92	130	70	RA			Moderate	5	17/25	GGO	NIL	LL	NIL	BL
69	1051805	07-05-2021	30	M	Present	Present		Present							98.6	120	32	95	110	70	O2	15L		Severe	5	16/25	GGO	NIL	NIL	P	BL
70	1051809	07-05-2021	55	M				Present							98.6	110	30	94	110	70	O2	15L		Severe	5	23/25	GGO/CON	NIL	NIL	P	BL
71	1051810	07-05-2021	54	M		Present	Present				Present			CVA	100	76	14	96	130	80	RA			Mild	5	15/25	GGO	L	LL	P	BL
72	1051812	07-05-2021	32	M	Present	Present	Present	Present							98.6	98	14	96	110	70	RA			Mild	5	15/25	GGO/CON	NIL	NIL	P	BL
73	1051815	07-05-2021	72	M	Present	Present	Present			Present					98.6	80	16	94	120	80	RA			Moderate	5	13/25	GGO	L	LL	P	BL
74	1051881	08-05-2021	69	M	Present	Present		Present		Present	Present				98.6	87	32	82	100	60	RA			Severe	5	13/25	CP	NIL	NIL	P	BL
75	1051915	09-05-2021	68	F	Present	Present		Present		Present					100	80	14	94	110	70	RA			Moderate	5	20/25	CP	NIL	NIL	NIL	BL
76	1051930	09-05-2021	31	M	Present	Present		Present							100	102	14	94	120	80	RA			Moderate	5	14/25	GGO	NIL	NIL	P	BL
77	1051961	09-05-2021	52	F	Present	Present		Present		Present	Present				98.6	88	30	96	110	70	O2	5L		Severe	5	10/25	GGO	NIL	NIL	P	BL
78	1051963	09-05-2021	30	M	Present	Present		Present							98.6	104	32	90	110	80	O2	15L		Severe	5	22/25	GGO/CON	NIL	LL	P	BL
79	1052029	10-05-2021	52	M	Present	Present		Present							98.6	120	32	88	120	70	O2	15L		Severe	5	18/25	GGO	NIL	LL	P	BL
80	1052071	10-05-2021	50	F	Present	Present		Present							98.6	88	34	94	130	80	O2	15L		Severe	5	22/25	CP	L	NIL	NIL	BL
81	1052706	10-05-2021	32	M	Present	Present		Present							98.6	120	16	95	120	70	RA			Mild	5	14/25	GGO/CON	L	NIL	P	BL
82	1052083	10-05-2021	55	M		Present		Present		Present	Present				98.6	98	30	80	120	70	O2	15L		Severe	5	12/25	GGO	NIL	NIL	P	BL
83	1052111	11-05-2021	77	M	Present	Present		Present		Present					101	102	16	95	140	80	RA			Mild	5	13/25	GGO	FB/L	NIL	P	BL
84	1052116	11-05-2021	62	M	Present		Present	Present							98.6	120	30	92	130	60	O2	5L		Severe	5	2/25	CP	NIL	LL	P	BL
85	1052120	11-05-2021	57	F	Present	Present	Present			Present	Present				98.6	98	32	98	120	80	O2	10L		Severe	5	16/25	GGO	L	NIL	P	BL
86	1052121	11-05-2021	44	M	Present			Present			Present				98.6	100	18	90	130	80	RA			Moderate	5	16/25	GGO	NIL	NIL	P	BL
87	1052142	11-05-2021	52	M		Present		Present							98.6	78	30	92	110	70	O2	5L		Severe	5	18/25	CP	L	NIL	NIL	BL
88	1052152	11-05-2021	50	M	Present			Present			Present				98.6	80	28	90	130	80	NIV		80	Moderate	5	19/25	GGO	NIL	NIL	P	BL
89	1052172	12-05-2021	85	M		Present		Present		Present	Present				98.6	96	32	96	140	70	O2	15L		Severe	5	18/25	GGO	NIL	LL	P	BL
90	1052232	12-05-2021	52	F	Present	Present		Present	OOSE STOOL	Present				RVD	100	88	30	94	110	70	O2	15L		Severe	5	21/25	GGO/CON	L	NIL	NIL	BL
91	1052335	13-05-2021	42	M	Present	Present	Present								98.6	98	14	95	110	70	RA			Mild	5	7/25	GGO	NIL	NIL	P	BL
92	1052343	13-05-2021	81	M	Present	Present				Present					98.6	110	30	92	110	70	O2	5L		Severe	5	9/25	CP	L	NIL	NIL	BL
93	1052344	13-05-2021	74	M	Present	Present		Present				Present			98.6	92	34	96	160	90	O2	15L		Severe	5	14/25	CP	NIL	NIL	NIL	BL
94	1052348	13-05-2021	38	F		Present									101	80	16	96	120	70	RA			Mild	5	6/25	GGO/CON	NIL	LL	P	BL
95	1052350	13-05-2021	65	F	Present	Present		Present							98.6	116	32	92	140	90	O2	15L		Severe	5	8/25	GGO	NIL	NIL	P	BL
96	1052351	13-05-2021	62	F		Present		Present			Present		Present		98.6	120	30	96	150	90	O2	15L		Severe	5	6/25	GGO	PE/L	NIL	P	BL
97	1052352	13-05-2021	67	M	Present	Present		Present			Present	Present			98.6	90	34	80	110	70	O2	15L		Severe	5	20/25	CP	L	NIL	NIL	BL
98	1052362	14-05-2021	55	M	Present	Present		Present							98.6	88	14	96	120	90	RA			Mild	5	19/25	GGO	L	LL	P	BL
99	1052382	14-05-2021	60	F		Present		Present							101	90	32	90	130	80	O2	15L		Severe	5	18/25	GGO/CON	L	LL	NIL	BL
100	1052403	14-05-2021	45	F	Present	Present	Present								98.6	82	14	96	110	80	RA			Mild	5	18/25	GGO	L	LL	P	BL

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