Research Article

Clinical Correlation and Radiological Profile of SARS- COVID-19 Patients: A Record Based Cross Sectional Study in a Tertiary Care Hospital in Eastern Odisha

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ABSTRACT

The present Covid-19 pandemic caused by corona virus (SARS-CoV-2) is an unpredictable public health burden in India and abroad. Worldwide emergency steps are taken to counter the current situation. Odisha state (Eastern India) is now passing through a crucial period with a huge number of corona positive cases with high degree of mortality and morbidity. The aim of the present study is to correlate the demographic, clinical and radiological profiles of Covid-19 patients. The present study was carried out in the Covid-19 Hospital of S C B medical college Cuttack. This was a record based cross sectional study of 196 patients from 01/05/2021 to 01/06/2021. Plain X Rays were taken in all the patients to evaluate the incidence of disease. Total number of 196 Covid-19 cases was included in this study with male female ratio being 2.16:1. Maximum male patients were seen amounting (68%) and females (32%) respectively. Severity was mild to moderate in 80 % of cases. The diagnostic features of novel SARS-CoV-2 infection were observed in 32 % cases in x ray images of thorax. The co-morbid conditions for mortality were diabetes mellitus and hypertension. The chest X rays of corona virus 2 (SARS-CoV-2) infected patients are showing typical ground glass opacity (GGO), mixed GGO with consolidation bilaterally in the peripheral part of middle and lower lobe of lungs. The clinical co-morbid condition observed to be associated with high mortality in SARS-CoV-2 cases were diabetes and hypertension.

Keywords: Covid-19, Ground Glass Opacity, Radiological Findings, Co- morbidities.

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INTRODUCTION

Odisha state located in eastern part of India is experiencing a crucial situation with a large number of corona positive cases. The mortality and morbidity are also considerably high. The dedicated covid-19 hospitals in the state are managing a large number of covid-19 cases. The outbreak of such highly contagious pneumonia in December 2019 of unknown origin was reported in Wuhan city of China. Many patients with severe acute respiratory syndrome (SARS) are reported and eventually spread to other countries. Corona virus disease (SARS-covid-19) was first officially declared as pandemic on 12th march 2020. [1] Corona virus (SARS-COV-2) was first identified from the nasopharyngeal swab of infected patients. It is a single stranded RNA virus belongs to the family coronaviridae. [2]

Due to quick emergence of mutant strains and large number of false negative results RT-PCR has got limited reliability in the diagnosis of covid-19.[3] Covid-19 pandemic is a major threat to the socioeconomic status of a developing country like India. The economic backbone is also shaken in other developing countries globally. Hence we considered the correlation between clinical features and simple chest radiographs as an alternative modality to achieve diagnostic measure and treatment in remote areas of our country. Though RT-PCR diagnosis is gold standard in the present scenario but the chest radiography is proved as the affordable preliminary first line investigation tool for all people irrespective of low to high socioeconomic status groups. Hospitalized Covid-19 patients are advised to go for a routine chest radiograph to assess lung pathology like common flu-like symptoms associated with complications. Chest radiography is a quick affordable low-cost investigation which is frequently requested for outdoor patients with chest complaints. Chest radiographs also provide information about the affected zones of the lungs.

Chest X rays (CXR) PA view usually shows ground glass opacity commonly known as GGO, linear opacities and consolidation.[4] These findings are seen from 2nd week onward and researchers set a two-step scoring system for Covid-19 pandemic diseases. Both the lungs are divided as six zones and each zone assigned 0-3 scoring with overall chest radiographic score from 0-18. [5] Again RALE (Radiographic Assessment of Lung Edema) is also documented by Wong et al and warren et al. [6]

The aim of this study is to re-establish the CXR findings of the previous authors and add further information for various anatomical zones of lungs involved in covid-19

infections for a quick in-expensive outdoor diagnosis and treatment.

MATERIALS AND METHODS

The present study was carried out in the Department of Anatomy in collaboration with dedicated Covid-19 Hospital of SCB Medical College and hospital Cuttack. This was a record-based study of 196 patients managed for Covid-19 from 1/5/2021 to 1/6/2021. The case notes of patients were taken from hospital records and the relevant data extracted and analyzed. Plain X-ray was done in all the patients to determine the incidence of SARS- COV- 2 infection.

All the patients were studied for clinical features with chest radiographs in a specialized tertiary care Covid-19 center at S C B Medical College Cuttack. The study period was 31 days during Covid-19 outbreak. Patients suffering from Covid-19 infection > 18 years of both sexes with positive symptoms, antigen test and X-ray findings were included in the study. Other patients < 18 years showing normal study as per the above criteria and LAMA (Left Against Medical Advice) were excluded from the study.

Portable digital chest radiographs are taken by the institutional radiographer as per local protocol PA view (Postero-Anterior view) for ambulatory patients and AP view (Antero-posterior view) for bed ridden patients. Radiological opinion was obtained as per RALE criteria and scoring of positive findings like GGO, linear opacity and consolidation were studied. The presence of lung pathology was given a score 25 to 75% or more of affected lung parenchyma according to Warren et al. [6]

Ethical issue

The Ethical clearance of the present study satisfies the criteria of the Institutional Ethics Committee (IEC) S.C.B Medical College Cuttack, 753007, Orissa as per the in world Medical Association Declaration of Helsinki online.

Data analysis

All the data observed were analysed as per GraphPad software. The percentage, proportions were calculated and p-value (<0.05) considered statistically significant. We considered Z score to obtain p value.

OBSERVATIONS

In the present study out of 196 COVID-19 cases on presentation male patients were 134 and 62 females respectively.

Table 1: Age and Sex wise distribution of study population

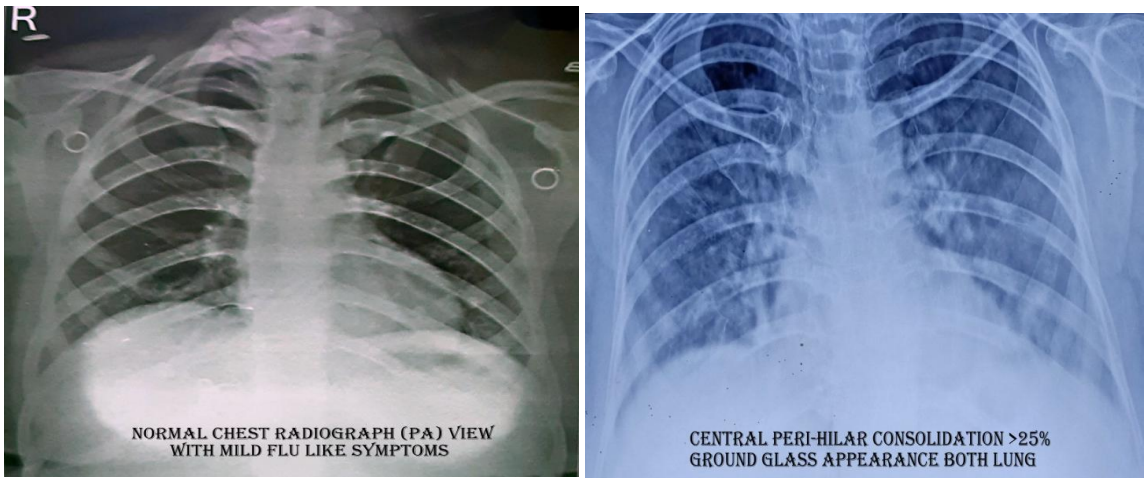
Age in years	Male (%)	Female (%)	Total (%)	P value (z score)
18- 40	28 (14.28)	11(5.61)	39 (19.89)	<0.0001
41-60	65(33.16)	32 (16.32)	98(50)	0.0131
61-80	38(19.38)	18 (9.18)	55(20.06)	<0.0001
>80	3(1.53)	1(0.51)	04(2.04)	04388
Total	134 (68.36)	62(31.63)	196 (100)	<0.0001

The male: female ratio being 2.16:1.The age range was from 18 to above 86 years. Maximum number of male patients was seen amounting to 68% and female patients amounting to 32% only. The male and female proportions are statistically highly significant, p value is <0.0001. (Table No 1).

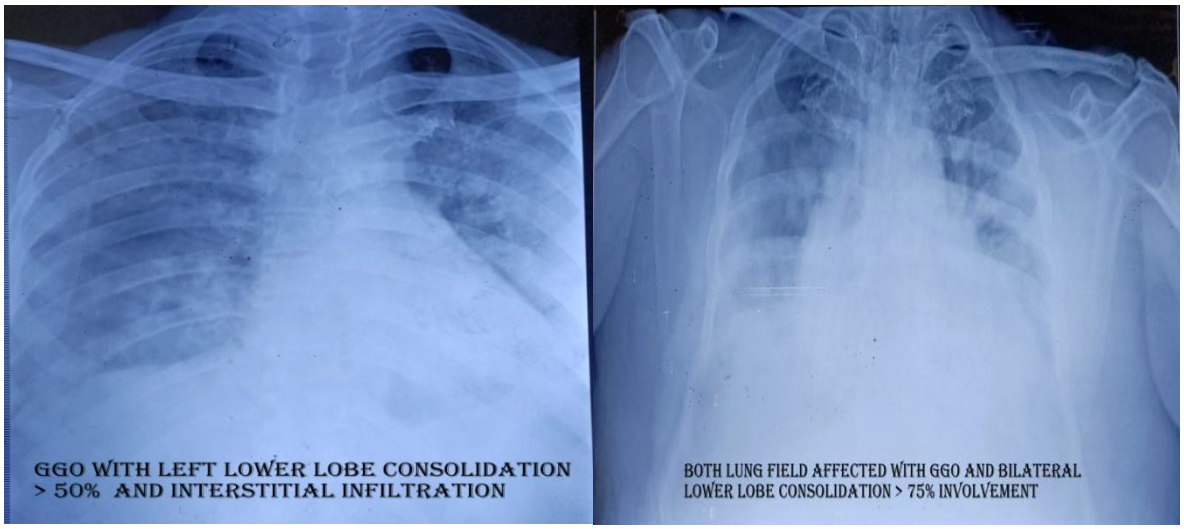
Table 2: Clinical features of the Study Population

Common symptoms	Number of cases	Percentage
Flu like symptoms	157	80.10%
Severe Acute Respiratory Syndrome (SARS)	143	72.95%
Co-morbidity	90	45.91
Hypertension	61	31.12
Diabetes mellitus	29	14.79

The common symptoms observed were pyrexia, cough, dyspnoea and myalgia. Severity was moderate to severe in 80% of cases. Severe Acute Respiratory Syndrome (SARS) was observed in 143(73%) followed by co-morbidity 90 cases (45.91) constituting 61 cases hypertension (31.12%) and diabetes mellitus (14.79%) respectively. (Table 2)

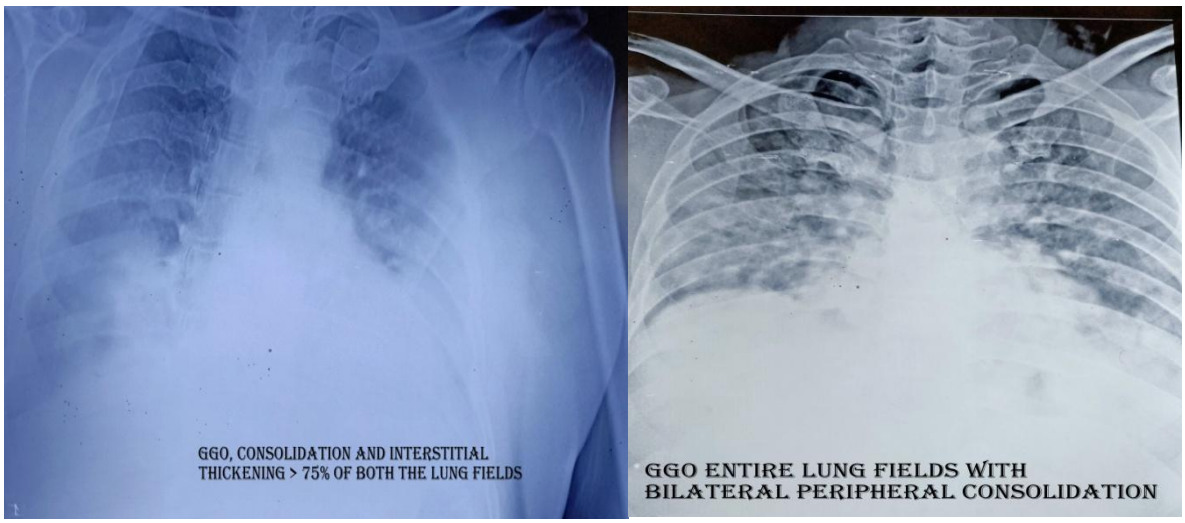


A Normal B > 25% involvement

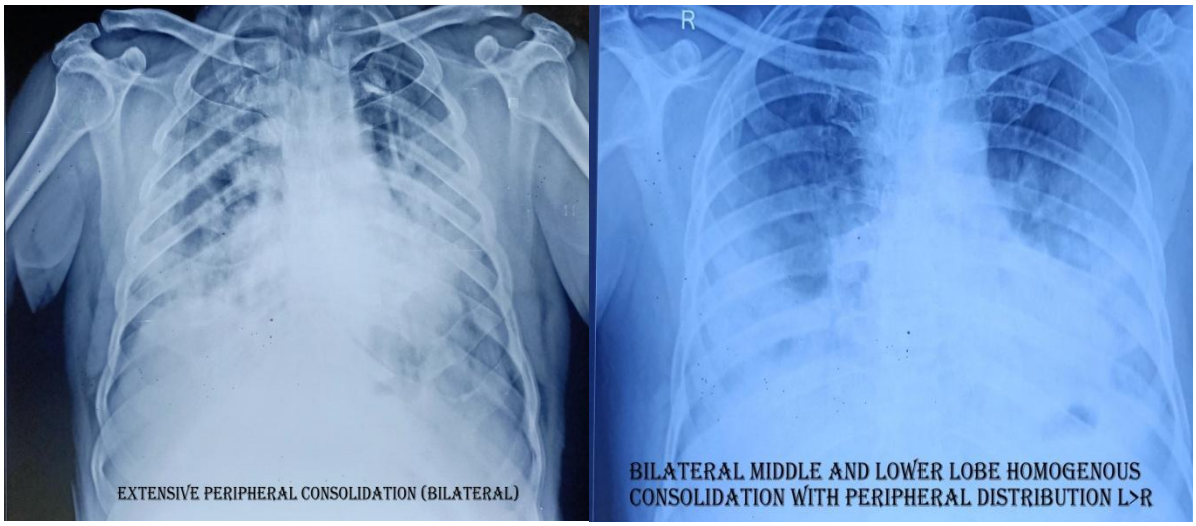


C > 50% involvement D > 75% involvement

Figure 1: Radiographic involvement of lung parenchyma with RALE Score. A. Normal chest radiograph, B- > 25% involvement in lung parenchyma showing resolution, C- > 50% involvement with consolidation interstitial infiltration in a 65 year female patient and D- > 75 % involvement 71 years male patient was being on oxygen support.

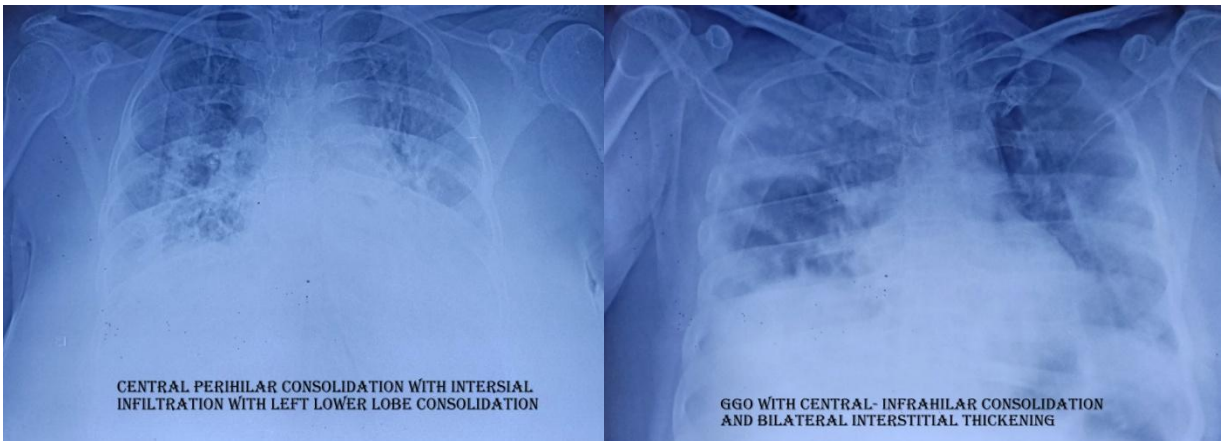


A B



C D

Figure 2: GGO, consolidation and interstitial thickening (A), GGO with bilateral peripheral consolidation (B), Bilateral extensive peripheral and lower basal consolidation(C) and bilateral middle and lower lobe consolidation (D).



A B

Figure 3: A-GGO with predominant central perihilar consolidation and B- central infrahilar consolidation with interstitial thickening.

Table 3: Abnormal Chest X Ray and Pattern of Opacity Distributed in Lung fields of the study population

Pattern of opacity	Right (%)	Left (%)	Both (%)
GGO	51(26.02)	50(25.51)	101(51.53)
Consolidation	25(12.75)	29(14.79)	54(30.61)
Interstitial infiltration	21(10.71)	20(10.02)	41(20.91)
Total	97(49.49)	99(50.51)	196(100)
Type of distribution in the lung fields (pattern of opacity)			
Peripheral	43(21.94)	41(20.92)	84(42.84)
Peri-hilar	23(11.73)	21(10.71)	44(22.45)
Diffuse	33(16.84)	35(17.86)	68(34.69)
Total	99(50.51)	97(49.49)	196(100)

Table 4: Abnormal Chest X Ray and Lobar Involvement with Percentage of Lung Parenchyma Involved of the Study Population

Lobar involvement of pattern of opacity			
Lobes involved	**Right (%)**	**Left (%)**	**Both (%)**
Upper lobe	2 (1.02)	3(1.53)	5(2.55)
Middle lobe	31(15.81)	33(16.83)	64(32.65)
Lower lobe	63(32.14)	64(32.65)	127(64.79)
Total	96(48.98)	100(51.02)	196(100)
RALE score and involvement of lung parenchyma			
Normal	00	00	00
>25%	26 (13.26)	27(13.77)	53(17.04)
>50%	47(24)	55(28.06)	102(52.04%)
>75%	22(11.22)	19(9.7)	41(20.92)
Total	95(48.47)	101(51.53)	196(100)

The diagnostic features of SARS-COV-2 infection were observed in almost all cases in X-ray images of thorax. Radiographic features of pattern opacity were ground glass opacities (GGO) present in 101(51.53%) cases followed by consolidation 54(30.61%) and interstitial infiltration 41(20.91%). The type of distributions of lung opacity was also described as Peripheral in 84(42.84%) cases followed by diffuse 68(34.69%) and Peri-hilar 44(22.45%) cases in the present study. (Fig No. 2, 3 and Table No. 3).

In the present study different lobes of the lung involved were upper lobe in five patients 5(2.55%), middle lobe 64(32.65%) and lower lobe 127(64.79%) respectively.

The RALE score classification and involvement of lung parenchyma showed >25% involvement in 53(17.04%) cases, > 50% in 102(52.04%) cases and > 75% involvement in 41(20.92%) of patients in the present study. (Fig No. 1, 2, 3 and Table No. 4).

DISCUSSION

In the present study the male: female ratio was 2.16:1 and age ranged from 18 to above 86 years. There were male predominance about 68% and female patients were 32% only (Table No 1). [7] The male and female proportions were statistically highly significant p value is <0.0001 (Table 1). [8]

The sign and symptoms of the study population were flu-like consisting of pyrexia, cough, dyspnoea and myalgia observed in 80% cases. The hospitalized moderate to severe cases (80%) were observed. Severe Acute Respiratory Syndrome (SARS) was seen in 143(73%). Abdelwahed Abougazia et al.[9] Association of diabetes mellitus and hypertension were the key comorbid factors observed in the present study. There were 61(31.12%) cases of hypertension and 29 (14.79%) diabetes mellitus respectively detected in our study which is similar to the study done by Hussain A et al.[7, 10] (Table 2)

The present COVID-19 epidemic was mostly under-diagnosed and misdiagnosed due to common flu-like symptoms. RT-PCR was the first line of diagnostic methods for COVID-19 patients followed by chest CT scans. The

major drawback RT-PCR results are one day delay in diagnosis, false positives and confusion in the highly infectious disease with quick mutations. Both RT-PCR and chest CT scans are costly to the common people. Hence digital portable chest x-rays are the easily available and less expensive modality of the diagnosis in our country like India. [11]

Normal chest x-ray in RT-PCR positive patients was seen in 25% and 31% in previous studies. [8] In our study, almost all the patients who tested positive for COVID-19 and moderately or severely symptomatic had positive chest x-rays. Most commonly reported CXR findings of COVID-19 include lung consolidation, ground glass opacities and interstitial infiltrations in resolving cases of Covid-19 patients. [12]

COVID-19 typically produces opacities in more than one lobe. Identifying multifocal airspace disease on CXR is a significant clue to COVID-19.And the air space disease tends to have a lower lobe distribution and is frequently bilateral. One of the most unique and somewhat specific features of COVID-19 is the high frequency of peripheral lung involvement. Such peripheral lung opacities also tend to be multifocal either patch or confluent and can be readily identified on CXR. Lung opacities may rapidly evolve into a diffuse coalescent or consolidative pattern within 1-3 weeks of symptoms onset. Our study confirms the main radiological characteristics in COVID-19 patients described in previous studies: In most cases, CXR shows patchy or diffuse reticular–nodular opacities and consolidation, with basal, peripheral and bilateral predominance [13] (Figs. 2, 3 and Table No 3)

The lobes of the lung involved were commonly lower lobe 127 (64.79%) mostly bilateral in distribution followed by middle lobe 64(32.65%) and in five patients 5(2.55%) of upper lobe. The distribution of lung opacity was being Peripheral in 84(42.84%) cases followed by diffuse 68(34.69%) and Peri-hilar 44(22.45%) cases in the present study which was corroborative with the studies of Zhoua A [14, 15] (Figs No 3 and Table No 3).

The radiographic assessment of lung oedema (RALE) score classification and involvement of lung parenchyma was studied. Maximum cases were seen having > 50% lung involvement in 102(52.04%) cases followed by > 75% involvement were seen in 41(20.92%) of patients and only 53(17.04%) cases had more than 25% lung tissue involvement in the present study (Fig No.1 and Table No. 4). Similar results were observed by the previous authors [16-18].

CONCLUSION

In the current covid-19 pandemic more than 80% patients are presented with mild flu like symptoms or asymptomatic. Only the RT-PCR positive moderate and severe cases are hospitalized for treatment. Almost all cases in X-ray images of thorax are having the radiographic patterns opacity as ground glass opacities (GGO), consolidation and interstitial infiltrations during resolution phage. Ground glass opacities (GGO) which is peripherally distributed with bilateral lower lobe involvement followed by consolidation and interstitial infiltrations in resolution phages are usually observed in chest radiographic findings. Though RT-PCR and CT scan thorax is considered gold standard diagnostic modality for SARS Covid-19 patients Worldwide, the simple Chest X-ray screening is a quick and affordable tool in the diagnosis and management of COVID-19 patients. Extensive study of chest X- ray may be helpful for young doctors and paramedical staff involved in covid-19 patients for quick diagnosis of highly mutant strains observed in the present pandemic.

Limitations: This single centered study had a small sample size of 196 patients. The chest X-rays were taken after the diagnosis of COVID-19 and no comparison was made with follow up chest X-rays.

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