

Clinical Profile and CT Severity Score of Covid-19 Pneumonia at a Tertiary Care Centre: A Retrospective Observational Study

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Abstract

Background: COVID-19 infection previously identified as unexplained cause of pneumonia among groups of patients in China ultimately turned out to be a different entity as the scientific manifestations evolved from asymptomatic to fever, running nose, cold to severe life-threatening pneumonia.

Objective: The objective of this study was to evaluate the common symptoms in admitted patients with Covid-19 and to assess the association of different co morbidities with CT severity score.

Material and Methods: This was an observational study conducted in admitted patients in a tertiary care hospital.

Results: Most of the participants (66.28%) in our study were males. Common presenting symptoms were fatigue in 91.86%, fever in 69.77%, muscle aches/joint pains in 63.95%, dyspnoea in 54.65%, cough in 53.49%, chills in 52.33% and anosmia in 50.0%. The common co morbidities present were hypertension in 48.84%, Diabetes in 33.72%, cardiovascular disease in 24.42%, Hypothyroidism in 20.93%. The disease was of mild severity (CT severity score <7) in 17.44%, moderate severity (CTSS 7-18) in 48.84% and severe (CTSS > 18) in 33.72%.

Conclusion: The clinical outcome and CT severity score in COVID-19 subjects largely depends on the presence of different co-morbidities in the infected population.

Key words: COVID-19 infection, CT severity score, Diabetes, cardiovascular diseases.

Introduction

COVID-19 infection was previously identified as unexplained cause of pneumonia among groups of patients in China. However it turned out to be a different entity as the scientific manifestations evolved from asymptomatic to fever, running nose,

cold to severe life-threatening pneumonia. The varied clinical outcomes have been attributed to multifaceted presentations in the host, infection and the environment.^[1] Reverse transcription-polymerase chain reaction (RT-PCR) and high-resolution computed tomography (HRCT) are the major methods used for the diagnosis. RT-PCR

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is used as the reference standard in confirming COVID-19 infection.^[2] The test has almost 100% specificity but the fallacy with the test is considerable number of false negative outcomes.^[3] In cases with lung involvement but false-negative reports of RT-PCR HRCT chest provides significant information in detecting the disease as well as disease progression.^[4] HRCT reveals the important findings of COVID-19 infections like ground-glass opacities with or without consolidation and basal and peripheral thickening of bronchovascular structures in both the lungs.^[5] HRCT chest sensitivity in detecting COVID-19 pneumonia increases to 97% after five days.^[6] Therefore, in non-specific clinical settings HRCT is considered as the most valued tool for recognizing patients with COVID-19 pneumonia.^[7] In addition on the basis of HRCT a score was also established to scrutinize the severity of COVID-19 disease.^[8] This CT severity score system allows recognition of the outcome of COVID-19 patients.^[9,10] The main aim of the current research was to assess the symptoms of the admitted subjects and to observe the association of different co morbidities with CT severity score.

Materials and Methods

This was an observational study conducted at the tertiary care hospital of North India. All patients admitted to our institute throughout the period from September to December 2020 suffering from COVID-19 infection and aged more above 18 years were incorporated in the research. This research was initiated after getting the institutional ethics committee approval (IEC/17/20). The informed written consent was collected from all subjects before participation in the study. The study participants with suspected COVID-19 were subjected to RT-PCR of nasopharynx. The RT-PCR negative participants were confirmed by CT on strong suspicion. Relevant demographic data, co morbidities and clinical information from infected patients was collected on a predesigned proforma. Base line tests, chest roentgenogram and if necessary CT scan was done during admission. CT Severity score was performed by the method of Li et al., 2020 [11].

Statistical analysis:

The SPSS (Version 20.0) was used to analyze the data and was represented as mean, frequency and percentage. Chi-square test was used to analyse the categorical data and ANOVA used for the

continuous data. The p-value of <0.05 was measured as statistically significant. SPSS version 20.0 was used for the analysis

Results

Demographical features of the subjects were studied in the present study (Table-1). Nearly 2/3rd of (66.28%) the study population were males whereas only 1/3rd (33.72%) were females. In majority the common presenting symptoms were fatigue in 91.86%, fever in 69.77%, muscle aches/joint pains in 63.95%, dyspnoea in 54.65%, cough in 53.49%, chills in 52.33% and anosmia in 50.00%. The common co morbidities present among the participants were hypertension in 48.84%, diabetes in 33.72%, cardiovascular disease in 24.42%, hypothyroidism in 20.93% and others were less common. The disease was found to be of mild severity (CT severity score <7) in 17.44%, moderate severity (CTSS 7-18) in 48.84% and severe (CTSS > 18) in 33.72%.

Table 1: Demographic features of study participants

Variables		Frequency (%)
Sex	Male	58(66.97)
	Female	28(32.55)
Age (in years)	Less than 40	11(12.79)
	40-50	27(31.40)
	51 - 60	15(17.44)
	61-70	22(25.58)
	More than 71	11(12.79)
Presenting symptoms (multiple responses)	Fatigue	79(91.86)
	Fever	60(69.77)
	Muscle aches/ joint pains	55(63.95)
	Dyspnoea	47(54.65)
	Cough	46(53.49)
	Chills	45(52.33)
	Anosmia	43(50.0)
	Headache	31(36.05)
	Chest pain	29(33.72)
	Sore throat	27(31.4)
	Diarrhoea	19(22.09)
	Vomiting/ Nausea	17(19.77)
	Rhinorrhoea	10(11.63)
Haemoptysis	9(10.47)	

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Co morbidities (multiple responses)	Hypertensive disorders	42(48.84)
	Diabetes mellitus	29(33.72)
	Cardiovascular disorders	21(24.42)
	Hypothyroidism	18(20.93)
	COPD	7(8.14)
	CKD	4(4.65)
	Immunocompromised	1(1.16)
	Any other	12(13.95)

CT score	Mild (less than 7)	15(17.44)
	Moderate (between 7 and 18)	42(48.84)
	Severe (more than 18)	29(33.72)

Juxtaposition of different categorical variables based on severity of the disease is shown in Table 2. Excluding gender and hypothyroidism all co morbidities like hypertension, diabetes, COPD had more severe form of COVID-19 and the variance was statistically significant.

Table 2: Comparison of categorical variables with CT severity score

		Mild (score <7)	Moderate (score 7 - 18)	Severe (score > 18)	P value
Gender	Male	4 (13.79%)	13 (44.83%)	12 (41.38%)	P= 0.538
	Females	11 (19.30%)	29 (50.88%)	17 (29.82%)	
Hypertension	Yes	2 (4.76%)	15 (35.71%)	25 (59.52%)	P = 0.000
	No	13 (29.55%)	27 (61.36%)	4 (9.09%)	
Diabetes	Yes	3 (10.34%)	9 (31.03%)	17 (58.62%)	P= 0.002
	No	12 (21.05%)	33 (57.89%)	12 (21.05%)	
COPD	Yes	0 (0%)	0 (0%)	7 (100%)	P= 0.001
	No	15 (18.99%)	42 (53.16%)	22 (27.85%)	
Hypothyroid	Yes	0 (0%)	9 (50%)	9 (50%)	P= 0.652
	No	15 (22.06%)	33 (48.53%)	20 (29.41%)	
Other co morbidities	Yes	4 (17.44%)	11 (31.43%)	20 (57.14%)	P= 0.001
	No	11 (21.57%)	31 (60.78%)	9 (17.65%)	

Table 3 shows juxtaposition of different characteristics based on severity of the disease. Age, blood glucose, ratio of absolute neutrophil to lymphocyte counts, bilirubin, SGOT and SGPT

were significantly more in severe cases while as oxygen saturation, serum protein and albumin were significantly lower in the same group.

Table 3: Comparison of clinical characteristics (continuous variables) of the participants with Chest CT severity score

Variables	Mild score (less than 7)	Moderate score (between 7 and18)	Severe score (more than 18)	P value
Age (mean SD)	40.4 ± 15.18	50.14 ± 13.85	66.75 ± 9.40	0.038
SPO2 at admission	89.26 ± 4.36	84.90 ± 3.92	81.58 ± 4.63	0.0001
PCO2	33.92 ± 7.57	31.52 ± 7.04	35.70 ± 7.64	0.064
PO2/FiO2	83.38 ± 24.82	83.12 ± 24.28	83.15 ± 18.70	0.295
Sr HCO3	22.97 ± 4.22	22.36 ± 4.26	23.83 ± 3.65	0.3304
Sr Na	138.73 ± 4.41	140.16 ± 3.66	137.62 ± 6.44	0.1006

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Sr K	4.09 ± 0.41	4.25 ± 0.54	4.08 ± 0.55	0.331
WBC count	6.25 ± 3.22	7.42 ± 3.65	8.60 ± 5.69	0.227
NLR	2.24 ± 1.42	5.39 ± 1.96	6.42 ± 2.56	0.001
Hb	12.29 ± 2.31	12.80 ± 2.55	11.34 ± 1.93	0.037
Plt	242.7 ± 38.2	224.6 ± 46.4	198.5 ± 38.8	0.086
Blood sugar (F)	80.46 ± 4.38	106.42 ± 40.2	125.5 ± 34.98	0.023
S. Urea	48.82 ± 11.23	44.40 ± 9.34	49.04 ± 16.34	0.642
S Creatinine	1.03 ± 0.36	1.08 ± 0.47	1.31 ± 0.51	0.0863
LFT- TP	6.87 ± 0.68	7.09 ± 0.87	6.42 ± 0.94	0.0079
LFT- Alb	3.59 ± 0.64	3.46 ± 0.73	3.02 ± 0.54	0.009
LFT- BIL	0.58 ± 0.28	0.78 ± 0.23	0.89 ± 0.24	0.017
LFT- SGOT	44.53 ± 16.46	96.76 ± 21.43	126.46 ± 24.21	0.012
LFT - SGPT	41.73 ± 11.24	74.98 ± 19.23	94.28 ± 9.52	0.021

Multivariate analyses of the possible influencing factors were studied in this observational study (table 4).

Table 4: Multivariate analysis against CT Severity score (For variable significant on univariate analysis)

Variable	Coef.	Std. Err.	T	P-value
Age	.0848686	.0426874	1.99	0.050
HTN	4.366174	1.277474	3.42	0.001
DM	-1.176437	1.159559	-1.01	0.032
COPD	3.736959	1.814762	2.06	0.043
SPO2	-.3171424	.1156525	-2.74	0.008
SGOT	-.0094074	.0192969	-0.49	0.627
Bilirubin	5.48387	2.01207	2.73	0.084
Constant	30.29333	11.367	2.67	0.009

Discussion

The current research work was performed at the tertiary care institute of North India in which 86 subjects participated over a period of 4 months. Nearly 2/3rd (66.28%) of the subjects were males and only 1/3rd (33.72%) were females. Only 11 (12.79%) were of age less than 40 years while as rest were 40 years or above. This may be attributed to the fact that the infection was more common among males and elderly and significantly more fatal among the later as supported by another study from the area.^[12] Existing literature with respect to the gender wise dissimilarities among COVID-19 subjects shows that males were at greater risk of progression to severe disease and augmented demise because of COVID-19 than the opposite sex.^[13,14] In our study subjects majority reported complaints as fatigue in 91.86%, fever in 69.77%, muscle aches/joint pains in

63.95%, dyspnoea in 54.65%, cough in 53.49%, chills in 52.33% and anosmia in 50.00% were observed. A meta-analysis done by Alimohamadi et al. revealed fever in 81.20%, cough in 58.50%, fatigue in 38.50%, dyspnoea in 26.10% and the sputum production in 25.80% as the common complaints in COVID-19 subjects.^[15] Another literature documented by Viner et al., reported pyrexia (46.00 - 64.20%) and cough (32.00 - 55.90%) as the most common symptoms. All other symptoms or signs were infrequent occurring in less than 10-20%.^[16] The majority of the subjects in this observational research were having one or more co morbidities. The common co morbidities were hypertension in 48.84%, diabetes in 33.72%, cardiovascular disease in 24.42%, hypothyroidism in 21%. Stokes et al., revealed that 45.4% of COVID-19 subjects necessitating hospital admission and clinical management seemed to have many pre-existing

medical conditions than those who were devoid of such medical conditions.^[17] Paudel et al.,^[18] and Zhou et al.,^[19] documented that diabetes mellitus, hypertension, cardiovascular disorders and central nervous disorders were the common reported co morbidities during hospital admission in COVID-19 subjects.

The disease was found to be of mild severity (CT severity score <7) in 17.44%, moderate severity (CTSS = 7-18) in 48.84% and severe (CTSS > 18) in 33.72%. Excluding primary hypothyroidism all co morbidities like hypertension, diabetes, COPD and other major co morbidities had more severe form of COVID-19 and these variations were significant. Several documented studies reported that the co morbidities make the disease progress in more complicated way.^[20-22] Subjects with advanced age and with primary clinical co-morbidities have an increased threat for the progression to severe COVID-19 infection. A study reported that the mortality with 19.50% was twelve times more among subjects with pre-existing medical conditions when compared to the persons without any co morbidities (1.67%).^[17] Another study also revealed that the elderly subjects with co morbidities were susceptible to severe illness subsequent to COVID-19 infections.^[23] Our study revealed that blood sugar, ratio of neutrophil to lymphocyte count, bilirubin, SGOT and SGPT were significantly more in severe cases while as SpO₂, haemoglobin, serum protein and albumin were significantly lower in the same group. Hence these laboratory markers can further be studied to reach a conclusion about their reliability on progression of the disease. Studies done by Leulseged et al.,^[24] and Sakthivadivel et al.,^[25] showed that CT-severity score had significant association with various biochemical markers like leukocyte count, C-reactive protein, urea, creatinine, IL-6, platelet count, D-dimer, ferritin, random blood glucose levels for the COVID-19 severity as well as outcome.

Conclusion

On the basis of the findings in the study and after comparison with different international studies we conclude that despite the varied frequency of signs and symptoms across different projects the result of the COVID-19 infections largely depends on age,

gender and presence of different co morbidities and chronic diseases.

Conflict of Interest: Nil

Informed consent : Taken

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