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Original Article

High Resolution Computed Tomography Chest Findings in Patients with Positive RT-PCR of Covid-19

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ABSTRACT

High-resolution CT chest abnormalities in patients with higher RT-PCR among those with COVID-19 have been poorly studied. It remained unknown what mechanism was responsible for the rise in COVID-19 cases. **Objective:** Observations from high-resolution chest CT scans in patients with a negative RT-PCR for COVID-19. **Methods:** A total of 400 male and female samples were collected using a simple random sampling method. The research method used was a descriptive one. The researchers used CT scans and in-depth interviews to compile their data. The current version of SPSS (21.0.0) was utilized for the statistical analysis. **Results:** There were a total of 245 men and 155 females in the sample pool for this investigation. COVID-19 was present in all of these patients. Based on the findings of the study, the patients were diagnosed with respiratory symptoms as fever, breathlessness, and cough. High resolution computed CT revealed, however, that these patients also have Ground glass opacities, heterogeneous patterns, septal thickening, consolidations, and pleural effusion. The patient population also included smokers. **Conclusion:** High-resolution computed CT results consistent with COVID-19 infection were found to include ground glassware opacities, mixed patterning, septal thickness, restructurings, CORAD classifications, nodules, bronchiectasis, crazy paving, and pleural effusion. Negative RT-PCR results in people with COVID-19 symptoms (such as cough, illness, fever, and shortness of breath) received little to no attention. The HRCT should be used for the overall diagnosis of COVID-19, and this should be the centre of learning and treatment for the population that tested negative with the RT-PCR.

INTRODUCTION

A continuous respiratory disease epidemic, officially dubbed Coronavirus Disease 2019, poses the newest risk to global health. Recognized as COVID-19 in December of 2019. In late 2019, SARS-CoV-2, a novel coronavirus linked to severe respiratory disease, was detected in Wuhan, China. Direct contact and droplet transmission are the two main modes of transmission, and epidemiological data show that the virus can cause a wide spectrum of clinical disease (mild to severe illness, including death) [1, 2]. It was quickly determined that a novel coronavirus, similar structurally to the virus that causes Severe Acute Respiratory Syndrome (SARS), was to blame. An outbreak of a novel coronavirus that causes pneumonia, identified as coronavirus disease 2019 (COVID-19) by the World Health Organization on February 11, 2020, has spread swiftly [3, 4]. Coronaviruses belong to the subfamily Coronavirinae, in the family Coronaviridae, of the order Nidovirales [5, 6]. They are big, positive-sense RNA viruses encompassing four genera; alpha, beta, delta, and gamma. Patients hospitalized with COVID-19 frequently have laboratory

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abnormalities, including profound lymphopenia, a delayed prothrombin time, high lactate dehydrogenase, and raised D-dimer levels. Similar anomalies in laboratory testing have been observed in patients infected with SARS-CoV and MERS-CoV. X-rays of the chest show bilaterally diffuse shadowing with ground-glass opacities. Acute respiratory distress crisis, arrhythmias, acute heart injury, shock, and acute renal injury are among the most frequently reported side effects of COVID-19. In December of 2019, it was reported that nine people had contracted pneumonia from the Huanan South China Fish Market in Hubei, Hubei Province, China. There were 12,723 confirmed cases of COVID-19 in Pakistan, including 9,216 current cases, 111 severe cases, 269 fatalities, and 2,866 recoveries. There were 55 confirmed cases for every 1 million people. It was determined that there were actually 90,878 instances. While the World Health Organization (WHO) did find a link between the Useful and appropriate South China Fish Market and the coronavirus outbreak, they were unable to pinpoint any particular animals as a possible cause. Clinical manifestations include high body temperature, difficulty breathing, dry cough, and extreme exhaustion [7]. Fever (99%), weariness (70%), dry cough (60%), muscle aches (44%), and dyspnea are the most frequent initial signs of sickness [8]. The most prevalent clinical symptoms upon presenting are fever and coughing in addition to additional nonspecific symptoms like dyspnea, headache, sore muscles, and exhaustion [9]. Less typical symptoms are headache, disorientation, diarrhoea, and nausea [10]. Additionally, to the infection threat provided by SARS-CoV-2, the mental health problems of dealing with a fatal contagious diseases have also been serious, with panic disorders, depression, and poor sleep appearing as major issues. The most frequently described CT findings in patients with COVID-19 are ground-glass opacities and regions of consolidation, often with a rounded shape and peripheral distribution. For COVID-19, hospitalization is indicated mostly by a positive RT-PCR or gene sequencing result from respiratory or blood samples. However, it was found that the entire positive cases of RT-PCR for throat swabs were taken was only between 30% to 60% at initial introduction due to restrictions of sample transport and limits in kit performance [11]. For decades, RT-PCR has been the go-to method for diagnosing COVID-19. Many reports have noted an alarmingly high rate of false negatives [12]. This high false-negative result increases the risk of additional infection as well as delaying the make it easier to keep of suspected patients. CT plays a vital role in the identification of meningeal pneumonic patches. The discovery of patch of viral bacterial meningitis is among the most essential clinical guidelines for the cases reported. CT has been found to have great accuracy in relation to the RT-PCR [13]. Affected patients may exhibit anything from a dry cough to severe respiratory distress. Causes of Acute Respiratory Distress Syndrome (ARDS) is observed in COVID-19, and it is thought that this is due to damage to an alveolar wall, but the endothelial of vascular system is less affected, leading to less exudation. This explains why COVID-19 individuals experience less impairment to their other organ functions [14]. Despite its potential for rapid and accurate COVID-19 diagnosis, the test has been hampered by its collection method, lengthy turnaround time, and limited availability. In light of this, chest CT scans can be quite useful for identifying and treating COVID-19 pneumonia [15].

METHODS

During those four months, researchers at Farooq Hospital gathered data from a descriptive survey with a sample of 400. The research period was from June 15, 2021, through October 16, 2021. The researchers used CT scans and in-depth interviews to compile their data. The data were analysed using SPSS 21.0.

RESULTS

According the table there have been 245 (61.25%) men and 155 (38.75%) are female patients. There have been 24 (6%) smokes and 376 (94%) non-smokers. There were 109 (27.25%) hypertension, and 291 (72.75%) were non-hypertensive. There were 24 (6%) travellers and 376 (94%) were non travellers. There have been 58 (14.5%) individuals who had light fever, 208 (52%) patients had severe temperature, and 134 (33.5%) had serious fever. Three hundred forty-five patients (86.25%) reported shortness of breath, while fifty-five (13.75%) did not. A total of 397 (99.5%) patients reported having a sore throat, whereas just 3 (0.5%) did not. There have been 9 (2.25%) individuals who already had influenza and 391 (97.75%) individuals had no symptom of flu. There have been 371 (92.75%) patients who already had cough while 29 (7.25%) had no cough Table 1.

Variable	Categories	Frequency
Age	Mean	54.2800
	Std. Deviation	15.77542
Gender	Male	245 (61.25%)
	Female	155 (38.75%)
Smoking	Yes	24 (6%)
	No	376 (94%)
Hypertension	Yes	109 (27.25%)
	No	291 (72.75%)
Travelling	Yes	24 (6%)
	No	376 (94%)
Fever	Mild	58 (14.5%)
	Moderate	208 (52%)
	Severe	134 (33.5%)

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Shortness of Breath	Yes	345 (86.25%)
	No	55 (13.75%)
Sore throat	Yes	397 (99.25%)
	No	3 (0.75%)
Flu	Yes	9 (2.25%)
	No	391 (97.75%)
Cough	Yes	371 (92.75%)
	No	29 (7.25%)

Table 1: Frequency of different variables pertaining to patient sample.

Ground glass opacities were present in all 400 patients (100%), as shown in the table. We found that 323 patients, or 80.75%, had a mixed pattern, while 77 patients, or 19.25%, did not. Thirteen individuals, or 3.2%, had thickened septums, while 387 patients, or 96.75%, did not. In total, 323 patients (80.75%) had consolidations, while 77 patients (19.25%) did not. Patients with mild disease numbered 57 (14.25%), those with moderate disease were 209 (52.25%), and those with severe disease numbered 134 (33.5%). Six patients (1.5%) were classified as having CORAD 3, ten (2.5%) were classified as having CORAD 4, fourteen (3.5%) were classified as having CORAD 5, and 370 (92.5%) were classified as having CORAD 6. Thirteen patients, or 3.25%, had only one affected side, whereas 387, or 96.75%, were affected on both sides. Seven patients (1.75%) had diffuse pleural effusion, while 393 (98.25%) had any pleural effusion. A total of 5 patients (1.25%) were found to have nodules in their lungs, while 395 (98.75%) did not. Atelectasis was present in 252 individuals (63%) and was absent in 148 patients (37%). Ten patients (2.5% of the total) displayed irrational behaviours, while 390 (97.5%) did not (Table no 2).

Variable	Categories	Frequency
Ground Glass Opacities	Yes	400 (100%)
	No	0 (0%)
Mixed Patterns	Yes	323 (80.75%)
	No	77 (19.25%)
Septal Thickening	Yes	13 (3.25%)
	No	387 (96.75%)
Consolidations	Yes	323 (80.75%)
	No	77 (19.25%)
Severity	Mild	57 (14.25%)
	Moderate	209 (52.25%)
	Severe	134 (33.5%)
Distribution	Unilateral	13 (3.25%)
	Bilateral	387 (96.75%)
Pleural Effusion	Yes	7 (1.75%)
	No	393 (98.25%)
Nodules	Yes	5 (1.25%)
	No	395 (98.75%)
Atelectasis	Yes	252 (63%)
	No	148 (37%)
Crazy Paving	Yes	10 (2.5%)
	No	390 (97.5%)

Table 2: Frequency of multiple variables, including ground glass opacities, mixed patterns, and consolidations, among others in patients.

From the data in the table, we can deduce that out of a total population of 400, only 24 (6%) were smokers, while the remaining 376 (94%) were non-smokers. Yes 323 (80.0%) and No 77 (19.0%) in Mixed Designs; No 387 (96.0%) and Yes 13 (3.3%); No 390 (97.5%) as well as Yes 10 (2.5%) in Crazy Pavement; No 148 (37.0%) and Sure 252 (63.1%) in Airway obstruction; No 395 (98.1%) and Yes 5 (1.3%) in Nodules; No 393 (98.3%) as well as Yes 7 (1.8%) in Pleural Effusion; Yes 387 (14.3%). In addition, Mild Severity is 57. (14.3%) Two hundred and nine moderate (52.3%) and one hundred thirty-four severe (5.8%)(33.5%). (Tables 3, 4, and 5.)

Smoking	Ground Glass Opacities		Mixed Patterns	
	No	Yes	No	Yes
No	0(0%)	376(100%)	71(18.9%)	305(81.1%)
Yes	0(0%)	24(100%)	6(25%)	18(75%)
Total	0(0%)	400(100%)	77(19.3%)	323(80%)

Consolidation		Septal thickening	
No	Yes	No	Yes
71(18.9%)	305(81.1%)	365(97.1%)	11(2.9%)
6(25%)	18(75%)	22(91.7%)	2(8.3%)
77(19.3%)	323(80.8%)	387(96.8%)	13(3.3%)

Table 3: Incidence of smoking, ground glass opacities, mixed patterns, consolidations, and septal thickening in patient sample.

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Smoking	Crazy Paving		Atelectasis	
	No	Yes	No	Yes
No	366(97.3%)	10(2.7%)	140(37.2%)	236(62.8%)
Yes	24(100%)	0(0%)	8(33.3%)	16(66.7%)
Total	390(97.5%)	10(2.5%)	148(37.0%)	252(63%)
Nodules			**Pleural effusion**	
No	**Yes**		**No**	**Yes**
371(98.7%)	5(1.3%)		370(98.4%)	6(1.6%)
24(100%)	0(0%)		23(95.8%)	1(4.2%)
395(98.8%)	5(1.3%)		393(98.3%)	7(1.8%)

Table 4: Prevalence of smoking, crazy paving, atelectasis, nodules, and pleural effusion in patient sample.

Smoking	Crazy Paving		Atelectasis		
	Bilateral	Unilateral	Mild	Moderate	Severe
No	365(97.1%)	11(2.9%)	51(13.6%)	195(51.9%)	130(34.6%)
Yes	22(97.1%)	2(8.3%)	6(25%)	14(58.3%)	4(16.7%)
Total	387(96.8%)	13(3.3%)	57(14.3%)	209(52.3%)	134(33.5%)

Table 5: Distribution and severity of smoking in patient sample.

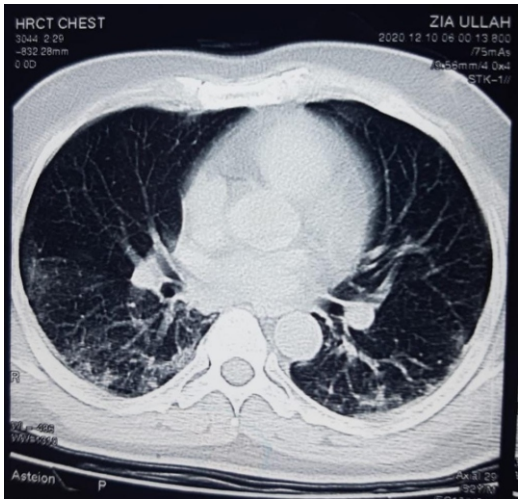

Figure 1: Demonstration of bilateral spotty ground glass opacities and primarily sub-pleural on chest CT scan.

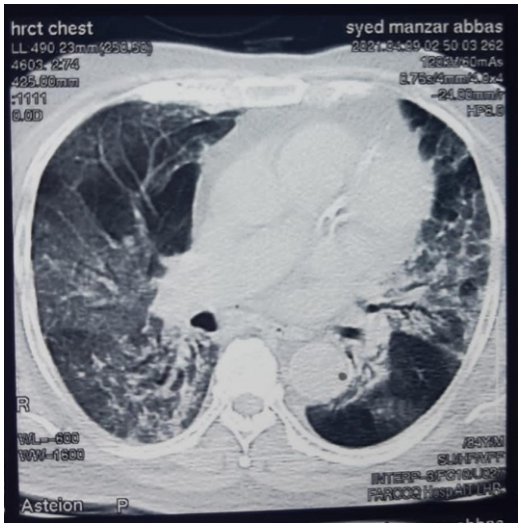

Figure 2: CT scan of the chest exhibiting bilateral consolidation in the lower lobe's apical section.

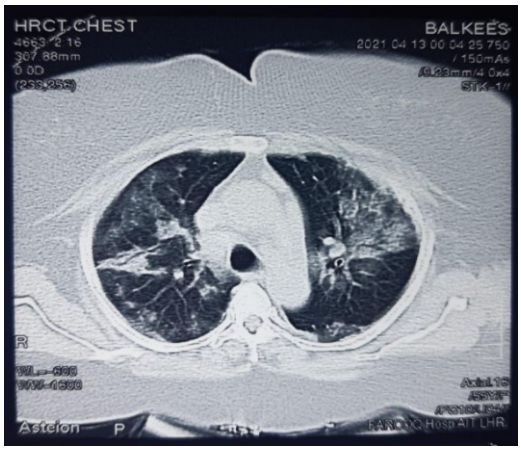

Figure 3: Distinct ground glassware opacities with a mosaic pattern both in lung fields shown on a positron emission tomography scan of the chest.

DISCUSSION

Yang et al. found that the posterolateral basal and outstanding segments of the inferior portion and the posterolateral sections of the upper lobe were the most frequently involved segments [11]. Our study's severity index of the respiratory system shows that 57 (14.25%) cases were classified as mild, 209(52.25%) as modest, and 134 (33.5%) as severe. The severity of lung participation was less severe during 1–7 days after symptom start, as assessed by CT scoring summing of all lobes of the both lungs, compared to the symptom onset in the range of 8–14 days. After 14 days, the observations have diminished in severity. Our analysis included 58(45.31%) cases diagnosed between days 1 and 7, the majority of which had mild lung involvement (16.5%) but nevertheless required hospitalization (3.91%). Among the 59 individuals who were diagnosed between days 8 and 14, 18(14.06%) had moderate to severe lung tissue involvement, while 8 (6.25%) showed only little lung parenchyma involvement. There were 8(6.25 %) individuals with just mild lung disease in the >14-day stage (neither moderate nor severe). From their analysis of 100 COVID-19 pneumonia cases in Wuhan, Zhou et al. inferred that the early rapidly advancing stage occurred between days 1 and 7, the advanced stage occurred between days 8 and 14, as well as the abnormalities began to improve after day 14 [3]. Females may be more resistant to viral infections due to the protective effects of the X - linked and sex hormones. From a total of 400 participants, 245 (61.5%) were male and 155 (38.5%) were female, indicating that men make up a sizable majority of the study's male participants. High-resolution ultrasound imaging (CT) chest symptoms in patients with higher RT-PCR for Covid-19 were investigated. Patients were chosen using an easy method. Patients with Covid-19 were found to have ground glass opacities, according to the study. Scan

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results confirmed that all 400 individuals exhibited ground glass opacities. All 135 patients in a study by Wan S, Xiang Y et al, who were diagnosed with Covid-19, exhibited GGOs on CT scans [16]. Patients diagnosed with COVID-19 were found to have ground glass opacities, according to the study. All four hundred patients scanned positive for ground glass opacities. All 87 individuals scanned by Khaliq M, Raja R et al, who did a similar study, had GGOs [15]. The individuals with COVID-19 were found to have ground glass opacities, according to the study. They found that almost all 400 individuals had crushed glass opacities in their scans. Patients taking COVID-19 had GGOs present on 77.4% of CT scans, according to a separate study by Mohammed YG et al. According to the results of the study, 81% of participants had CT scans that showed consolidations. For example, it was reported that 14.8% of individuals who had consolidations. According to the results of the study, CT scans revealed consolidations in 81% of participants [18]. Chen D et al., who did a comparable study, found that CT scans showed consolidations in 72% of participants. Based on the results of the study, 81% of participants had CT scans that showed consolidations [19]. Another study, this one by Zhao W et al., found that 64% of Covid-19 patients developed merger on the CT scans. The results of the performed investigation revealed that 2.5% of patients had evidence of crazy paving on CT scans [20]. Khaliq M, Raja R et al. found a similar percentage (33.3%) of people with abnormal CT scans, which they referred to as "crazy paving" [15]. 2.5% of people in the sample had evidence of crazy paving on their CT scans, according to the study. Mohamed YG et al., who also performed a CT scan research, found that 18.5% of participants exhibited crazy paving. The results of the study demonstrated that 1.25% of patients had nodules present on CT scans [18]. Yoon SH, Lee KH et al. also found that 48% of patients had nodules on their CT scans [17]. 1.75% of COVID-19 participants were found to have pleural effusion in the research. An identical study by Chen D, Jiang X et al. found that 19% of people with COVID-19 also experienced pleural effusion [19]. The study found that 1.75% of COVID-19 participants experienced pleural effusion. A second study with similar results was published by Khaliq M. et al., and it found that only 2 patients had pleural effusions [15]. Results of the study revealed that 3.25% of patients exhibited thickening of the septum detectable on HRCT of the chest. Septal thickening was detectable on HRCT chest scans in 62% of patients, according to a study by Chen D, Jiang X, et al, [19].

CONCLUSION

Ground glass one or, mixed patterning, septal thickening, restructurings, CORAD classifications (3, 4, 5, & 6), nodules, bronchiectasis, crazy paving, and pleural effusion were all observed on Good resolution tomography (CT in patients with COVID-19), according to the study. Negative RT-PCR results in people with COVID-19 symptoms, including cough, illness, fever, and shortness of breath received little to no attention. The HRCT is the best tool for making a definitive diagnosis of COVID-19, and this is where our attention should be focused in terms of both information and treatment for the population that tested negative by RT-PCR.

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