Scientific Research Publishing

Advances in Computed Tomography, 2022, 11, 1-10
https://www.scirp.org/journal/act
ISSN Online: 2169-2483
ISSN Print: 2169-2475

High Resolution Computed Tomography Scan Findings of Chest among Hospitalized COVID-19 Patients at a Dedicated Hospital in Dhaka City during the First Wave of Pandemic

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How to cite this paper: Islam, Md.Z., Fatema, K., Shams, F., Kamal, S.M.S., Ara, A. and Yusuf, Md.A. (2022) High Resolution Computed Tomography Scan Findings of Chest among Hospitalized COVID-19 Patients at a Dedicated Hospital in Dhaka City during the First Wave of Pandemic. *Advances in Computed Tomography*, **11**, 1-10.
https://doi.org/10.4236/act.2022.111001

Received: January 6, 2022
Accepted: March 27, 2022
Published: March 30, 2022

Abstract

Background: The use of chest imaging in COVID-19 can be especially useful for patients with moderate to severe symptoms or comorbidities. **Objective:** This study aimed to demonstrate the high resolution computed tomography (CT) findings observed among the coronavirus disease 2019 (COVID-19) patients presented with pneumonia and to reveal the most frequent infiltration and distribution patterns of the disease. **Methodology:** This was a retrospective study. This study was performed in the Department of Radiology & Imaging at Kurmitola General Hospital, Dhaka, Bangladesh. This was the first dedicated COVID-19 hospital with a bed capacity of 500 and well-equipped ICU facilities. The recorded HRCT scan data were collected in the period from April 2020 up to May 2020 during the first wave of COVID-19 in Bangladesh. As this was a retrospective study, verbal or written consent was not obtained from all potential participants or guardians. The available demographic data as well as the medical history of all data were collected and thoroughly reviewed from the record book. These patients were RT-PCR confirmed cases of COVID-19 patients presented with pneumonia and were admitted to Kurmitola General Hospital, Dhaka, Bangladesh. All these patients underwent HRCT scans of the chest. **Result:** A total number of 155 COVID-19 patients with HRCT scan were evaluated. The mean age with SD of the study population was 58.03 ± 14.08 years with the range of 22 to 97 years. The male and female ratio was 2.04:1. Fibrosis of the lungs and thickening of pleura

were found in 38 (24.5%) cases and 33 (21.3%) cases respectively. The involvement of both lungs was found in 32 (20.6%) cases. The presence of pneumonitis and bronchiectasis were detected in 77 (49.7%) cases and 5 (3.2%) cases respectively. Left-sided mild pleural effusion was also noted in 6 (3.9%) cases. Ground glass opacity was found in different forms. The most common form was the presence of only ground glass opacities which was 63 (40.6%) cases. Bilateral ground-glass opacities were detected in 63 (40.6%) cases. **Conclusion:** In conclusion, HRCT scan of the chest shows the bilateral ground-glass opacities and fibrosis of the lungs with pneumonitis in most of the COVID-19 hospital admitted patients.

Keywords

High Resolution CT Scan, Chest, COVID-19 Diseases,
First Wave of Pandemic

1. Introduction

Computed Tomography (CT) scan is highly important in the diagnosis and follow-up of lung disease treatment [1]. In a review of different studies, one may find that the imaging features of COVID-19 pneumonia are varied from their natural appearance to diffuse changes in the lungs [2] [3] [4]. In addition, different radiological patterns are observed at different times over the course of the disease. Since the onset of symptoms and acute respiratory distress syndrome (ARDS) was short-lived in the first cases of COVID-19 pneumonia, early detection of the disease is essential for the management of these patients [3].

Numerous studies have been performed regarding the findings of CT scans in COVID-19 patients and the results are inconsistent [5] [6] [7] [8]. The lesions in patients with COVID-19 show ground-glass opacity (GGO), mixed pulse consolidation or reticular patterns, and are likely to have peripheral distribution, bilateral involvement, lower lobe dominance, and multi-lobe distribution [7] [8]. In a systematic review and meta-analysis, a structured review of all documentation and its composition can provide a more comprehensive picture of all dimensions of the subject [2]. One of the main goals of meta-analysis, which is a combination of different studies, is to reduce the differences between parameters by increasing the number of studies involved in the analysis process.

High Resolution Computed Tomography (HRCT) of the chest is increasingly recognized as strong evidence for early diagnosis [9], because the changes in chest imaging sometimes may be earlier than clinical symptoms and thus HRCT scan plays an early warning role in the diagnosis of COVID-19. HRCT scan can play a critical role in the early identification of pneumonia and help in accurate diagnosis as HRCT has a high sensitivity of 97.0% in diagnosing COVID-19 cases [9]. Some previous studies [4] [7] [9] reported the radiological features of CT scan in hospitalized COVID-19 patients, showing clear destruction of the pul-

monary parenchyma including interstitial inflammation and extensive consolidation. In a study [10], the changes in chest CT scan imaging on COVID-19 patients from the initial diagnosis to recovery have been described. This study aimed to demonstrate high resolution CT scan findings observed among COVID-19 patients presented with pneumonia and to reveal the most frequent infiltration and distribution patterns of the disease.

2. Methodology

This was a retrospective study. This study was performed in the Department of Radiology & Imaging at Kurmitola General Hospital, Dhaka, Bangladesh. This was a first dedicated COVID-19 hospital with a bed capacity of 500 and well-equipped ICU facilities. The recorded HRCT scan data were collected in the period spanned from April 2020 up to May 2020 during the first wave of COVID-19 in Bangladesh. The sample size was based on the patients admitted in the hospital during the time period. As this was a retrospective study, verbal or written consent was not obtained from all potential participants or guardians. The available demographic data as well as the medical history of all data were collected and were thoroughly reviewed from the record book. These patients were RT-PCR Confirmed cases of COVID-19 patients presented with pneumonia and were admitted in Kurmitola General Hospital, Dhaka, Bangladesh and all these patients underwent HRCT chest. All HR-CT scan of chest images were evaluated by two radiologists blindly with a minimum experience of 8 years and all patients were evaluated to identify any change occurred within lung parenchyma. Patterns and distributions of lung involvement were evaluated. Visual quantitative evaluation for each of the five lung lobes were also assessed for degree of involvement and classified as none (0%), minimal (1% - 25%), mild (26% - 50%), moderate (51% - 75%) and severe (76% - 100%). The total severity score was reached by summing the score of all five lobes with the range of total severity score was 0 to 20. For all scanning techniques (axial, coronal and/or sagittal), American, General Electric (GE) hi-speed 128 slice multi-detector CT scanner was used to obtain the HRCT chest. The scanning parameter was 120 kV, 200 mAs; matrix was 512 × 512; scanning time was 0.55 s/circuit; collimator was 0.625 m; pitch was 0.89, FOV 360 mm; scanning thickness was 0.625 mm; reconstruction algorithm: high spatial frequency, window: lung window. The scan ranged from the thoracic entrance to the angle plane of the bilateral rib. Level of inspiration: full inspiration. Proper protections of all the radiology staffs were taken. The Statistical Package for the Social Sciences (SPSS) version 23 (Statistical Package for the Social Sciences) for Windows, Version 23.0 (IBM Corporation, Armonk, New York) was used to perform the statistical analysis. Categorical data were presented as numbers and percentages. Numerical data were presented as mean and standard deviation. An unpaired t test was employed to assess quantitative variables, while the chi-square test was used to assess qualitative ones. Statistical significance was defined as $p < 0.05$.

3. Result

A total number of 155 COVID-19 patients with HRCT scan were evaluated. Most of the study population were in the age group of 40 to 60 years which was 73 (47.1%) cases followed by 60 to 80 years, less than 40 years and more than 80 years which were 57 (36.8%) cases, 17 (11.0%) and 8 (5.2%) cases respectively. The mean age with SD of the study population was 58.03 ± 14.08 years with the range of 22 to 97 years (Table 1).

In this study male was predominant than female which were 104 (67.1%) cases and 51 (32.9%) cases respectively. The male and female ratio was 2.04:1 (Figure 1).

Involvement of different lobes of lungs among study population had revealed that right upper, middle and lower lobes were involved in 30.61 ± 25.528, 25.63 ± 24.940 and 45.10 ± 30.186 respectively. However, left upper and lower lobes were involved in 29.37 ± 24.403 and 41.19 ± 30.064 respectively (Table 2).

Medistinal lymphadenopathy was the most common HRCT scan findings of chest among the COVID-19 patients which was found in 114 (73.5%) cases

Table 1. Age distribution of the study population.

Age Group	Frequency	Percent
Less Than 40 Years	17	11.0
40 to 60 Years	73	47.1
60 to 80 Years	57	36.8
More Than 80 Years	8	5.2
Total	**155**	**100.0**
Mean ± SD (Range)	58.03 ± 14.08 (22 to 97)	

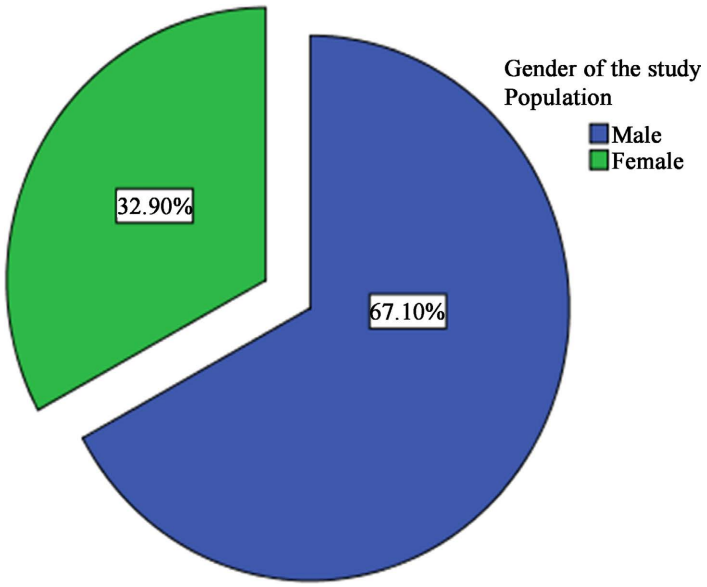

Figure 1. Distribution of gender of the study population.

followed by sub-centrimetric lymphadenopathy, consolidations and crazy paving which were 82 (52.9%) cases, 78 (50.3%) cases and 55 (35.5%) cases. Fibrosis of Lungs and Thickening of Pleura were found in 38 (24.5%) cases and 33 (21.3%) cases respectively. The involvement of Both Lung was found in 32 (20.6%) cases. Presence of pneumonitis and bronchiactesis were detected in 77 (49.7%) cases and 5 (3.2%) cases respectively. Left-sided mild pleural effusion was also noted in 6 (3.9%) cases (Table 3).

Ground glass opacity was found in different forms. The most common form

Table 2. Involvement of different lobes of lungs among study population.

Lobes of Lung	Mean ± Std. Deviation	Range
Right Upper Lobe	30.61 ± 25.528	0 to 95
Right Middle Lobe	25.63 ± 24.940	0 to 100
Right Lower Lobe	45.10 ± 30.186	0 to 95
Left Upper Lobe	29.37 ± 24.403	0 to 90
Left Lower Lobe	41.19 ± 30.064	0 to 95
TSS	9.35 ± 4.940	1 to 20
Total Lung	34.39 ± 24.827	1 to 95

Table 3. Different findings of HRCT scan of chest among the study population.

HRCT scan findings	Frequency	Percent
Sub-segmental Collapse	5	3.2
Medistinal Lymphadenopathy	114	73.5
Sub-centrimetric Lymphadenopathy	82	52.9
Dilated Vessels	14	9.0
Consolidations	78	50.3
Reticulations Lymphadenopathy	11	7.1
Subtle	9	5.8
Diffuse	51	32.9
Crazy Paving	55	35.5
Fibrosis of Lungs	38	24.5
Thickening of Pleura	33	21.3
Bronchiactesis	5	3.2
Bullae	6	3.9
Involvement of Both Lung	32	20.6
Presence of Pneumonitis	77	49.7
Left-sided mild pleural effusion	6	3.9
Minimal Fibrosis	1	0.6

was the presence of only ground glass opacities which was 63 (40.6%) cases. Bilateral ground glass opacities were detected in 63 (40.6%) cases. Widespread and bilateral focal ground glass opacities were reported in 18 (11.6%) cases and 6 (3.9%) cases respectively. Bilateral multifocal was found in 4 (2.6%) cases. Only 1 (0.6%) case was found with scattered ground glass opacities (Table 4).

Imaging of lungs with HRCT scan of chest was reported in different stages of COVID-19. The most common was the progressive stage which was 65 (41.9%) cases followed by Advanced Stage, Early Stage and Peak Stage which were 36 (23.2%) cases, 35 (22.6%) cases and 14 (9.0%) cases respectively. However, only 5 (3.2%) cases were reported as absorptive stage (Table 5).

4. Discussion

SARS-CoV-2 is optimized to disseminate rapidly and widely, primarily through the respiratory tract by droplets, respiratory secretions, and direct contact [10]. It has been described that small particles containing the virus may diffuse in indoor environments covering distances up to 10 m from the emission source [11]. Furthermore, SARS-CoV-2 may remain viable in aerosols for 3 hours and on plastic and stainless steel for up to 72 hours [12]. Chest CT should be performed with strict precautions to minimize hazardous exposure of patients and health care professionals to SARS-CoV-2. When possible, chest CT is performed at sites with less traffic to avoid exposure of other patients and staff [13]. Where more

Table 4. Different variations of ground glass opacity in lungs.

Ground Glass Opacity	Frequency	Percent
Bilateral Focal	6	3.9
Widespread	18	11.6
Bilateral Multifocal	4	2.6
Bilateral	63	40.6
Only Ground Glass Opacities	63	40.6
Scattered	1	0.6
Total	**155**	**100.0**

Table 5. Different stages of COVID-19 according to HRCT scan of chest.

Different Stages	Frequency	Percent
Advanced Stage	36	23.2
Progressive Stage	65	41.9
Early Stage	35	22.6
Peak Stage	14	9.0
Absorptive Stage	5	3.2
Total	**155**	**100.0**

than one fixed CT scan is available, dedicated use of only one CT scanner for patients with COVID-19 may be ideal. Another option is the use of a mobile CT scanner.

A total number of 155 COVID-19 patients with HRCT scan were evaluated. Most of the study population were in the age group of 40 to 60 years which was 73 (47.1%) cases followed by 60 to 80 years, less than 40 years and more than 80 years which were 57 (36.8%) cases, 17 (11.0%) and 8 (5.2%) cases respectively. The mean age with SD of the study population was 58.03 ± 14.08 years with the range of 22 to 97 years. Patients who are referred for chest CT should be screened for COVID-19 symptoms, and symptomatic patients should be provided with a surgical mask and placed in an isolation room [14]. The same applies to patients with proven COVID-19. A strong case can also be made for all patients to wear face masks, whether they are symptomatic or not. Distances between patients in waiting areas near the CT scanner should be maximized; maintaining an interpersonal distance of 2 m in combination with wearing a face mask has been reported to be effective protection [15] [16] [17].

In this study male was predominant than female which were 104 (67.1%) cases and 51 (32.9%) cases respectively. The male and female ratio was 2.04:1. Medistinal lymphadenopathy was the most common HRCT scan findings of chest among the COVID-19 patients which was found in 114 (73.5%) cases followed by sub-centrimetric lymphadenopathy, consolidations and crazy paving which were 82 (52.9%) cases, 78 (50.3%) cases and 55 (35.5%) cases. Fibrosis of lungs and thickening of pleura were found in 38 (24.5%) cases and 33 (21.3%) cases respectively. The involvement of both lungs was found in 32 (20.6%) cases. Presence of pneumonitis and bronchiactesis were detected in 77 (49.7%) cases and 5 (3.2%) cases respectively. Left-sided mild pleural effusion was also noted in 6 (3.9%) cases. Several studies have been published reporting chest CT findings in COVID-19 cases [18]. However, many studies are limited by selection bias, potential blinding issues, and potential confounding of chest CT findings owing to the simultaneous presence of other lung diseases [10] [13] [17]. Nearly all authors of studies who investigated the chest CT scan appearance of COVID-19 investigated CT performed in symptomatic patients. The pulmonary histologic findings of COVID-19, which are characterized by acute and organizing diffuse alveolar damage, resemble those observed in other coronavirus infections, including severe acute respiratory syndrome coronavirus 1 (SARS-CoV-1) and MERS-CoV cases [19]. Accordingly, the reported chest CT abnormalities in COVID-19 are similar to those seen in infections with SARS-CoV-1 and MERS-CoV cases. The prevalence of chest CT abnormalities in COVID-19 is dependent on the stage and severity of the disease. There is currently a lack of radiologic-pathologic correlation studies in the literature.

Ground glass opacity was found in different forms. The most common form is the presence of only ground glass opacities which was 63 (40.6%) cases. Bilateral ground glass opacities were detected in 63 (40.6%) cases. Widespread and bila-

teral focal ground glass opacities were reported in 18 (11.6%) cases and 6 (3.9%) cases respectively. Bilateral multifocal was found in 4 (2.6%) cases. Only 1 (0.6%) case was found with scattered ground glass opacities. Several chest CT findings have been reported in 10.0% to 70.0% of RT-PCR test-proven COVID-19 cases, including consolidation (51.5%), linear opacity (40.7%), septal thickening and/or reticulation (49.6%), crazy-paving pattern (34.9%), air bronchogram (40.2%), pleural thickening (34.7%), halo sign (34.5%), bronchiectasis (24.2%), nodules (19.8%), bronchial wall thickening (14.3%), and reversed halo sign (11.1%) [20]. The lesion distributions have been reported in a study [21] as unilateral (15.0%), multifocal (63.2%), diffuse (26.4%), single and/or focal (10.5%), middle or upper lobe involvement (49.3% to 55.4%), peripheral location (59.0%), and central and peripheral location (36.2%).

Imaging of lungs with HRCT scan of chest was reported in different stages of COVID-19. The most common was the progressive stage which was 65 (41.9%) cases followed by advanced stage, early stage and peak stage which were 36 (23.2%) cases, 35 (22.6%) cases and 14 (9.0%) cases respectively. However, only 5 (3.2%) cases were reported as absorptive stage. Depending on local circumstances, such as the number of patients with proven or suspected COVID-19 who require chest CT, the number of patients who require CT for reasons other than COVID-19, and available CT scanners and radiology staff, this limited patient throughput may cause considerable planning and logistic challenges that need to be addressed [17].

There are some limitations of the study. This study was conducted in a single centre based in the hospital.

5. Conclusion

In conclusion, HRCT scan of the chest shows that the bilateral ground-glass opacities have been found in half of the COVID-19 cases. Again, in the present study, fibrosis of the lungs is also reported in people who are presented with COVID-19 and admitted to the hospital. Imaging of lungs with HRCT scan of the chest has been reported in different stages of COVID-19 and the most common is the progressive stage followed by an advanced stage. Further, a large-scale study should be conducted to see the real scenario.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] Yun, Y., Wang, Y., Hao, Y., Xu, L. and Cai, Q. (2021) The Time Course of Chest CT Lung Changes in COVID-19 Patients from Onset to Discharge. *European Journal of Radiology Open*, **8**, Article ID: 100305. https://doi.org/10.1016/j.ejro.2020.100305

[2] Karimian, M. and Azami, M. (2021) Chest Computed Tomography Scan Findings of Coronavirus Disease 2019 (COVID-19) Patients: A Comprehensive Systematic

Review and Meta-Analysis. *Polish Journal of Radiology*, **86**, e31-e49. https://doi.org/10.5114/pjr.2021.103379

[3] Zhai, P., Ding, Y., Wu, X., Long, J., Zhong, Y. and Li, Y. (2020) The Epidemiology, Diagnosis and Treatment of COVID-19. *International Journal of Antimicrobial Agents*, **55**, Article ID: 105955. https://doi.org/10.1016/j.ijantimicag.2020.105955

[4] Ieong, C.M., Xu, X., Kong, S.C. and Luo, L. (2020) Evaluation of Chest CT and Clinical Features of COVID-19 Patient in Macao. *European Journal of Radiology Open*, **7**, Article ID: 100275. https://doi.org/10.1016/j.ejro.2020.100275

[5] Xie, C., Ng, M.Y., Ding, J., Leung, S.T., Lo, C.S., Wong, H.Y. and Vardhanabhuti, V. (2020) Discrimination of Pulmonary Ground-Glass Opacity Changes in COVID-19 and Non-COVID-19 Patients Using CT Radiomics Analysis. *European Journal of Radiology Open*, **7**, Article ID: 100271. https://doi.org/10.1016/j.ejro.2020.100271

[6] Xiong, Y., Sun, D., Liu, Y., Fan, Y., Zhao, L., Li, X. and Zhu, W. (2020) Clinical and High-Resolution CT Features of the COVID-19 Infection: Comparison of the Initial and Follow-Up Changes. *Investigative Radiology*, **55**, 332-339. https://doi.org/10.1097/RLI.0000000000000674

[7] Wang, K., Kang, S., Tian, R., Zhang, X. and Wang, Y. (2020) Imaging Manifestations and Diagnostic Value of Chest CT of Coronavirus Disease 2019 (COVID-19) in the Xiaogan Area. *Clinical Radiology*, **75**, 341-347. https://doi.org/10.1016/j.crad.2020.03.004

[8] Li, M. (2020) Chest CT Features and Their Role in COVID-19. *Radiology of Infectious Diseases*, **7**, 51-54. https://doi.org/10.1016/j.jrid.2020.04.001

[9] Sun, D., Li, X., Guo, D., Wu, L., Chen, T., Fang, Z., Chen, L., Zeng, W. and Yang, R. (2020) CT Quantitative Analysis and Its Relationship with Clinical Features for Assessing the Severity of Patients with COVID-19. *Korean Journal of Radiology*, **21**, 859-868. https://doi.org/10.3348/kjr.2020.0293

[10] Guo, Y.R., Cao, Q.D., Hong, Z.S., Tan, Y.Y., Chen, S.D., Jin, H.J., Tan, K.S., Wang, D.Y. and Yan, Y. (2020) The Origin, Transmission and Clinical Therapies on Coronavirus Disease 2019 (COVID-19) Outbreak—An Update on the Status. *Military Medical Research*, **7**, Article No. 11. https://doi.org/10.1186/s40779-020-00240-0

[11] Pan, F., Ye, T., Sun, P., Gui, S., Liang, B., Li, L., Zheng, D., Wang, J., Hesketh, R.L., Yang, L. and Zheng, C. (2020) Time Course of Lung Changes at Chest CT during Recovery from Coronavirus Disease 2019 (COVID-19). *Radiology*, **295**, 715-721. https://doi.org/10.1148/radiol.2020200370

[12] Setti, L., Passarini, F., De Gennaro, G., Barbieri, P., Perrone, M.G., Borelli, M., Palmisani, J., Di Gilio, A., Piscitelli, P. and Miani, A. (2020) Airborne Transmission Route of COVID-19: Why 2 Meters/6 Feet of Inter-Personal Distance Could Not Be Enough. *International Journal of Environmental Research and Public Health*, **17**, Article 2932. https://doi.org/10.3390/ijerph17082932

[13] Bernheim, A., Mei, X., Huang, M., Yang, Y., Fayad, Z.A., Zhang, N., Diao, K., Lin, B., Zhu, X., Li, K. and Li, S. (2020) Chest CT Findings in Coronavirus Disease-19 (COVID-19): Relationship to Duration of Infection. *Radiology*, **295**, Article ID: 200463. https://doi.org/10.1148/radiol.2020200463

[14] Staples, C.A., Müller, N.L., Vedal, S., Abboud, R., Ostrow, D. and Miller, R.R. (1987) Usual Interstitial Pneumonia: Correlation of CT with Clinical, Functional, and Radiologic Findings. *Radiology*, **162**, 377-381. https://doi.org/10.1148/radiology.162.2.3797650

[15] Alam, S.Z., Al Muid, S.M., Akhter, A., Rahman, A.S., Al Emran, M. and Al Mostakim, M.T. (2020) HRCT Chest Evaluation of COVID-19 Patients: Experience in

Combined Military Hospital Dhaka, Bangladesh. *Journal of Bangladesh College of Physicians and Surgeons*, **38**, 21-28. https://doi.org/10.3329/jbcps.v38i0.47441

[16] Haque, S., Chowdhury, N., Nabi, S., Ara, H., Mahfuza, M., Shamsunnahar, S., Sajida, N., Noor, M. and Islam, I. (2020) Role of HRCT Imaging in Diagnosis And Prognosis of Novel Corona (COVID-19) Pneumonia, Radiologists Experience in Dhaka Medical College Hospital Correlated with RT-PCR. *Journal of Dhaka Medical College*, **29**, 110-115. https://doi.org/10.3329/jdmc.v29i2.51184

[17] Dai, H., Zhang, X., Xia, J., Zhang, T., Shang, Y., Huang, R., Liu, R., Wang, D., Li, M., Wu, J. and Xu, Q. (2020) High-Resolution Chest CT Features and Clinical Characteristics of Patients Infected with COVID-19 in Jiangsu, China. *International Journal of Infectious Diseases*, **95**, 106-112. https://doi.org/10.1016/j.ijid.2020.04.003

[18] Lei, J., Li, J., Li, X. and Qi, X. (2020) CT Imaging of the 2019 Novel Coronavirus (2019-nCoV) Pneumonia. *Radiology*, **295**, 18. https://doi.org/10.1148/radiol.2020200236

[19] Wang, H., Wei, R., Rao, G., Zhu, J. and Song, B. (2020) Characteristic CT Findings Distinguishing 2019 Novel Coronavirus Disease (COVID-19) from Influenza Pneumonia. *European Radiology*, **30**, 4910-4917. https://doi.org/10.1007/s00330-020-06880-z

[20] Kwee, T.C. and Kwee, R.M. (2020) Chest CT in COVID-19: What the Radiologist Needs to Know. *RadioGraphics*, **40**, 1848-1865. https://doi.org/10.1148/rg.2020200159

[21] Adams, H.J., Kwee, T.C., Yakar, D., Hope, M.D. and Kwee, R.M. (2020) Chest CT Imaging Signature of Coronavirus Disease 2019 Infection: In Pursuit of the Scientific Evidence. *Chest*, **158**, 1885-1895. https://doi.org/10.1016/j.chest.2020.06.025