Original Article

Clinico-radiological profile of COVID-19 in Kashmiri population: A descriptive study

Mir Shahnawaz[1], Abdul H. Wani[2], Shivani Upadhyay[1], Sasmita Pattnaik[3], Hena Mustafa[1], Aaliya- Mohi-Ud-Din- Azad[1], Syed Suraiya Arjumand Farooq[1], Waseem Nabi[5], Yasir Hassan[5], Nayeem U Din Wani[3], Bikram S. Datta[1], Naveed N. Shah[1], Inaamul Haq[4], Khurshid A. Dar[1]

[1]Department of Respiratory Diseases, Government Chest Disease Hospital, [2]Radiology, [3]Microbiology, [4]Community Medicine, [5]Department of Respiratory Medicine, Government Medical College Srinagar, Jammu and Kashmir, India

Abstract

Aim: The purpose of our study was to assess the presentation of COVID-19 disease in terms of clinical and radiological features in our population. **Methods:** 64 RT-PCR documented COVID-19 patients were included in the study. Clinical, biochemical, and radiological data were collected and analyzed retrospectively from last week of March to 30th April 2020. **Results:** Out of the 64 patients, 38 (59.4%) were males, 44 (68.7%) had a history of contact with COVID-19 positive patient. 26.6%patients were in the age group of 21–30 years. 53.1% patients were asymptomatic while as cough and fever were the most common symptoms in 21.8 and 20.3% patients, respectively. Anosmia was present in four patients. Hypertension and hypothyroidism were the most common comorbid illnesses among the study population in 9.4% patients each. Lymphopenia was present in 38% of patients CRP was increased in 83% patients, LDH in 90.2%, and ferritin in 51.5% of patients. 17 (26.6%) patients had bilateral disease in CT. RUL was the most common lobe involved in 18 (28.1%) patients. GGO and consolidation were seen in 22 (34.45) and 13 (20.3%) patients, respectively. Vessel enlargement was observed in 11 (17.2%) patients. All five lobes were involved in 9 (14.1%) patients. Five patients developed severe disease with respiratory comprise; two of them eventually died. **Conclusion:** The clinical and radiological characteristics of COVID-19 patients vary among different populations. Although there are no radiological features which seems to be characteristic of COVID-19, but CT helps in evaluation of the patients as many asymptomatic ones have some radiological findings suggestive of viral pneumonia.

Keywords: Anosmia, ground glass opacity (GGO), lymphopenia, vessel enlargement

Introduction

COVID-19 has affected all the regions of the world in an unprecedented way. We had our first COVID-19 case in March 2020 and ever since the cases have been soaring. Here, we present our study of the first 64 cases and describe how CT acquisition helped in paving a way for future prospects in COVID-19 diagnosis.

Methods

This single center retrospective study was carried at Government chest diseases hospital, an associated hospital of Government medical college Srinagar, Jammu & Kashmir. The said hospital

Address for correspondence: Dr. Khurshid A. Dar, Professor, Department of Respiratory Diseases, Government Chest Disease Hospital, Government Medical College Srinagar - 190 001, Jammu and Kashmir, India.
E-mail: darkhurshid97@gmail.com

Received: 17-06-2020 **Revised:** 08-09-2020
Accepted: 05-01-2021 **Published:** 08-04-2021

Access this article online

Quick Response Code:

Website: www.jfmpc.com

DOI: 10.4103/jfmpc.jfmpc_1178_20

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Shahnawaz M, Wani AH, Upadhyay S, Pattnaik S, Mustafa H, Azad AM, *et al*. Clinico-radiological profile of COVID-19 in Kashmiri population: A descriptive study. J Family Med Prim Care 2021;10:1473-8.

was the first COVID-19 designated hospital in the summer capital of Jammu & Kashmir. The data of the first 64 patients were collected from case files, laboratory records, and CT scan records.

This study has been approved by the institutional ethical committee. Informed consents were taken from the patients. The study is duly approved by the ethical committee of the institution on 16/6/2020 under reference number 1013/ETH/GMC.

CT acquisition protocol and image interpretation

Chest CT was performed on an average 3 days (range 1–9 days) after symptom onset that were performed on a 16-Slice Siemens Somatom, Emotion Multidetector CT using 16 × 0.6 collimation, 100–120 kVp, and 90–130 mAs using low dose institutional protocol. Sharp kernel (B70s) algorithm was used. Mediastinal window settings and lung window settings were viewed. CT suite was decontaminated using surface disinfection with 70% ethanol or 0.1% sodium hypochlorite. Passive air exchange was performed for 60 min after each CT examination.

An experienced radiologist evaluated CT images on Apple workstation in a satellite room. Assessment of presence, location, extent, and density of lung parenchymal abnormality was made and specifications as per unilaterality/bilaterality, lobar distribution and with regards to anterior and posterior location was noted. Ground glass opacity (GGO) was defined as increase in density of lung with visualization of bronchial and vascular structures through it, whereas consolidation was defined as increased density of lung tissue through which vascular and bronchial structures were not visible. Vascular enlargement was considered to be present when vessel diameter was more than 3 mm.

Confirmation of COVID-19

Nasopharyngeal and oropharyngeal swab specimens from the upper respiratory tract were obtained from all patients as per the standard microbiological protocol. 2019-nCoV was confirmed by real-time RT-PCR.

Statistical analysis

Data was entered in a Microsoft Excel spreadsheet. Continuous variables were summarized as median and inter-quartile range. Data analysis was done using SPSS for windows version 23 (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp.)

Results

Total number of RT-PCR documented COVID-19 patients included in this study were 64. The demographic details of the patients and their contact and travel history in presented in Table 1. The average age of the patients was 37 years (range 2–70 years) and 38 (59.4%) were males. 20 (31.3%) patients had history of recent travel from COVID-19 hit areas both from international and national destinations; the rest [(44 (68.7%)] had a history of contact with a SARS-CoV-2 positive patient. There were two couples (husband–wife) and a father–daughter among the study patients.

Figure 1 depicts the frequency of symptoms the patients presented with. Just over half the number of patients [34 (53.1%)] were asymptomatic. Cough was the most common symptom [14 (21.8%)], followed by fever [13 (20.3%)]. Anosmia was present in four patients and conjunctival congestion in one patient.

While analyzing the comorbid illnesses among the study population [Table 2], we found that 49 (76.6%) patients had no comorbid illness, six (9.4%) patients had hypertension and an equal number of patients had hypothyroidism. Some of the study population had more than one comorbid illness.

The laboratory findings of the patients are mentioned in Table 3. The biochemical values were not available for whole of the study population. The total number of patients for every biochemical value is mentioned in the table. 46.7% of the patients have anemia on admission, while as thrombocytopenia was present in 66.7% of patients. Lymphopenia was present in 38% of patients. Most of the patients had increased levels of lactate

Table 1: Characteristics of study patients

Patient characteristics	Frequency	Percent (*n*=64)
Age (Years)		
<=10	6	9.4
11-20	8	12.5
21-30	17	26.6
31-40	6	9.4
41-50	7	10.9
51-60	9	14.1
61-70	11	17.2
Gender		
Male	38	59.4
Female	26	40.6
History of contact	44	68.7
History of travel	20	31.3

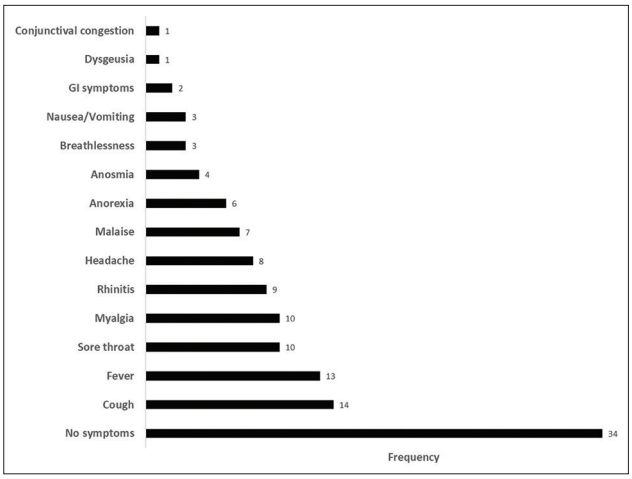

Figure 1: Frequency of various clinical features

dehydrogenase (LDH) and serum ferritin. C-reactive protein was increased in 83% of patients. All but one patient had normal procalcitonin values.

39 (60.9%) patients among the study population (n = 64) had normal CT chest. Among the 25 patients who had CT chest findings, 17 (26.6%) had bilateral diseases, six (9.4%) patients had right lung involvement while 2 patients had CT chest findings only on left side of the lung.

Table 2: Co-morbid illnesses in the study population

Comorbid illnesses	Frequency	Percent (n=64)
No comorbid illness	49	76.6
Hypertension	6	9.4
Thyroid disorder	6	9.4
Chronic obstructive pulmonary diseases	2	3.1
Diabetes mellitus	2	3.1
Coronary artery disease	2	3.1
Smoker	2	3.1
Chronic kidney disease	1	1.6

Table 3: Laboratory findings in the study patients

Biochemical Parameters	Values
Leukocytes	
Median (IQR)- per mm^3	5600 (5000-7000)
Increased (>11000/cumm)	1/50 (2%)
Decreased (<4000/cumm)	8/50 (16%)
Lymphocytes	
Median (IQR)- per mm^3	1800 (1300-2000)
Decreased n/N (%) (<1500/cumm)	19/50 (38%)
Haemoglobin*	
Median (IQR)- mg/dl	12.8 (11.6-14.2)
Below normal	21/45 (46.7%)
Normal	19/45 (42.2%)
Above normal	5/45 (11.1%)
Platelet count	
Median (IQR)- per mm^3	135000 (113000-118000)
Below normal (<165000/cumm)	30/45 (66.7%)
Normal (165000-415000/cumm)	15/45 (33.3%)
Creatinine†	
Median (IQR)- mg/dl	1.2 (1-1.3)
Below normal	2/42 (4.8%)
Normal	19/42 (45.2)
Above normal	21/42 (50%)
C-reactive protein	
Median (IQR)- mg/l	8 (5.4-11.6)
Normal	7/41 (17%)
Above normal (<3 mg/L)	34/41 (83%)
Serum ferritin#	
Median (IQR)- ng/ml	186 (102-278)
Normal	24/41 (58.5%)
Above normal	17/41 (51.5%)
LDH	
Median (IQR)- u/L	305 (244-500)
Normal	4/41 (9.8%)
Above normal (≥220 u/L)	37/41 (90.2%)

IQR=Inter-quartile range. *Normal range for males: 13.3-16.2 g/dL; for females: 12-15.8 g/dL. †Normal range for males: 0.6-1.2 mg/dL; for females: 0.5-0.9 mg/dL. #Normal range for males: 29-248 ng/mL; for females: 10-150 ng/mL

Right upper lobe was the most common lobe involved in 18 (28.1%) patients, left lower lobe was involved in 17 (26.6%) patients, left upper lobe in 16 (25.0%) patients, right lower lobe in 15 (23.4%) patients, and right middle lobe in 13 (20.3%) patients. All five lobes were involved in nine (14.1%) patients, while as single lobe involvement was present in six (9.4%) patients [Table 4].

GGO was the most common finding present in 22 (34.4%) followed by consolidation in 13 (20.3%) of patients. The number of opacities was ≤3 in 13 (20.3%) while as 12 patients had >3 opacities on the CT scan of chest. Size of opacity was ≤3 cmin 19 (29.7%) of patients.

Among other radiological findings vessel enlargement, defined as vessel diameter >3 mm was observed in 11 (17.2%) patients. One patient had pleural effusion and four patients had inter/intra-lobular septal thickening. None of our patients had pericardial effusion, mediastinal lymphadenopathy, or cavitations. Most of the opacities were located in periphery of the lung (39.1%). Other details are mentioned in Table 4. Examples of various radiological findings are explained in Figures 2–5.

Clinical outcome

Out of the 64 patients included in our study, five (7.8%) patients developed severe disease with respiratory compromise and saturation of less than 70% on room air. These patients were subsequently shifted to ICU and managed there. Two out of the five patients admitted in ICU expired on day 1 and day 2 of ICU admission. One of the expired patients had COPD as comorbid illness and the other one had underlying hypertension, coronary artery disease with low ejection fraction. Both of them were in the age group of 60–70 years. The remaining three improved and were shifted back toward on day 6. A total of 62 patients were discharged after two consecutive negative RT-PCR tests 24 h apart.

Discussion

We are presenting a descriptive analysis of clinico-radiological characteristics of 64 RT-PCR documented COVID-19 patients.

The mean age of patients in the study was 37 ± 19.7 years with a range of 2–70 years. Males were more as compared to

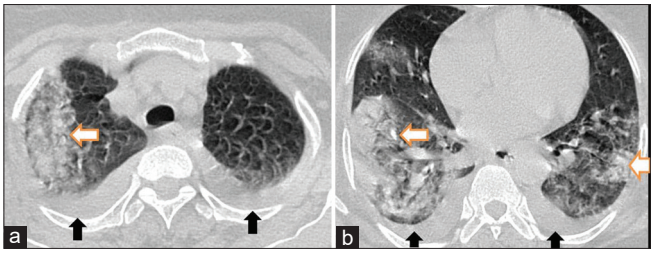

Figure 2: Axial NCCT image in lung window in a 60 year old COVID-19 patient showing (a) bilateral moderate pleural effusion (black arrows) with multiples consolidations and (b) vessel dilatation sign (open arrow)

Table 4: CT findings in the study patients

CT chest findings	Number	Percentage (*n*=64)
Lung involvement		
Bilateral	17	26.6
Right lung	6	9.4
Left lung	2	3.1
Normal	39	60.9
Lobar involvement		
RUL	18	28.1
RML	13	20.3
RLL	15	23.4
LUL	16	25.0
LLL	17	26.6
Number of lobes involved		
1	6	9.4
2	4	6.3
3	4	6.3
4	2	3.1
5	9	14.1
Location of opacity		
Peripheral	25	39.1
Central	2	3.1
Types of lesion		
GGO	22	34.4
Consolidation	13	20.3
Crazy paving	1	1.6
Subpleural linear opacities	2	3.1
Halo sign	2	3.1
Reverse halo	1	1.6
Vessel enlargement	11	17.2
Bronchial wall thickening	3	4.7
Bronchiectasis	1	1.6
Pleural effusion	1	1.6
Pericardial effusion	0	0.0
Mediastinal lap	0	0.0
Cavitation	0	0.0
Inter/intra-lobular septal thickening	4	6.3
Other findings		
Emphysema	4	6.3
Sequalae of old granulomatous pathology	1	1.6
PAH	0	0.0
Coronary artery calcification	1	1.6
Features of ILD/fibrosis	4	6.3

females (59.4% vs. 40.6%). Males are known to get infected more by coronaviruses as compared to females as reported by Badawi A. *et al.* and Channappanavar R. *et al.* in their studies on MERS-Cov and SARS- CoV related infections.[1,2] Most of patients in the present study do have a history of contact with a COVID-19 patient, while as a few have history of travel from areas were COVID-19 disease does exist. These findings are in sync with the route of transmission of other coronaviruses via respiratory droplets and direct contact.[3,4]

In the present descriptive study, majority (53.1%) of the patients were asymptomatic. Cough and fever was the most common symptoms in 21.8% and 20.3% of patients, respectively. Anosmia

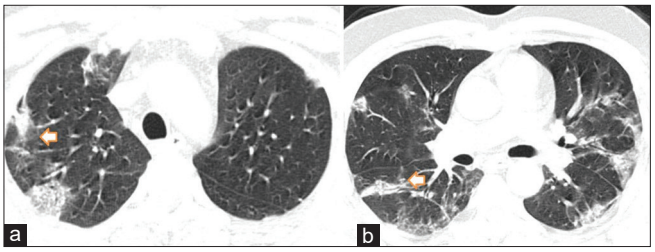

Figure 3: Axial NCCT images in lung window setting of a 35 year old COVID-19 patient with multifocal consolidations and ground glass opacities in peripheral (a) and posterior (b) distribution

Figure 4: Coronal NCCT images in lung window setting of a 60 year old COVID-19 patient showing basal (a) and peripheral (b) ground glass opacities

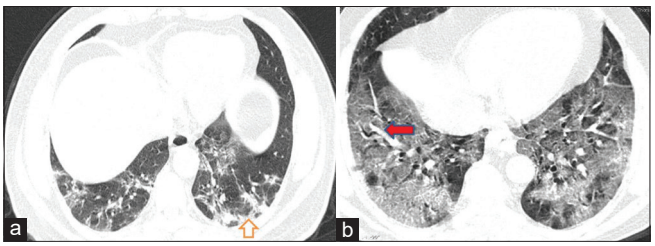

Figure 5: Axial NCCT images in lung window in a COVID-19 positive patient with peripheral small consolidations and reticulations (arrow in a) segmental vessel dilatation sign (arrow in b)

was present in four patients. Sore throat and myalgia was present in 10 patients each. Breathlessness was present in three patients. Other less common symptoms were gastrointestinal and conjuctival congestion. In a study from Wuhan by Chaolin Huang *et al.*,[5] fever and cough was the most common symptom in 98% and 76%, respectively. In our study, breathlessness was less common as compared to the study by Chaolin Huang *et al.* The reason for these differences may be because of younger population in our study. However, the systemic symptoms were similar to our study. Another study by Nanshan Chen *et al.*[6] from China had similar frequency of clinical features as compared to our study. In a study by Pavan K Bhatraju *et al.*[7] from Seattle region in America reported cough and fever as the most common feature followed by less common systemic features. Although the symptoms of COVID-19 has been same in different publications around the world, but severity and frequency does vary. We found in our study that the frequency and severity of symptoms are less as compared to Chinese and European studies.

While framing the radiology proforma for our study, we mainly consider the publications from China and Italy on radiological features of COVID-19 and role of CT chest.[8-11] In our study of 64 patients who were documented by RT-PCR as COVID-19, majority of the patients 39 (60.9%) have no radiological findings. 17 (26.6%) patients had bilateral diseases, 6 (9.4%) patients had right lung involvement while 2 (3.1%) patients had CT chest findings only on left side of lung. Bilateral pattern of involvement in COVID-19 patients on CT chest has been reported by various authors. Heshui Shi *et al.*[8] reported that 64 (79%) among 81 patients had bilateral disease, while as Damiano Caruao *et al.*[10] reported 91% ($n = 58$) had bilateral distribution of lesions. Right lung involvement is more as compared to left lung as reported, may be because of its anatomic structure.

In our study, right upper lobe was the most common lobe involved in 18 (28.1%) patients followed by left lower lobe in 17 (26.6%) patients, left upper lobe in 16 (25.0%) patients, right lower lobe in 15 (23.4%) patients, and right middle lobe in 13 (20.3%) patients. All five lobes were involved in 9 (14.1%) patients, while as single lobe involvement was present in 6 (9.4%) patients. The involvement of right upper lobe as the most common lobe in our study was in contrast to the studies were right lower lobe has been documented as the most common lobe involved.[8,10] However, involvement of right middle lobe as the least common segment is in accordance with these studies. Multi-lobular involvement as mentioned in our study is the predominant feature in COVID-19 patients and same has been reported in various publications.[8,10,11]

The peripheral distribution of lesions is more common than central distribution in COVID-19 patients as mentioned in our study (39.1% vs. 3.1%). Shuchang Zhou *et al.*[11] reported 77.4% of peripheral lesions while as only 22.6% had central lesions. Similar results have been reported in various studies from China and Italy.[8-11] GGO was the most common finding closely followed by consolidation. Most of our patients had less than three or equal to three opacities in number and were also less than 3 cm in size. Although most of the studies reported GGO and consolidation as predominant opacities as our study, however the frequency varies. In a study by Damiano Caruso *et al.*,[10] GGO was present in 89% while as in our study GGO was present in only 34.4% patients. Similarly, consolidation was present in 72% of patients as compared to 20.3% in our study. Vessel enlargement was found in 17.2% of patients in our study as compared to 89% of patients in the Italian study.[10] Pleural effusion was present in 1.6% of patients in our study. Similar reports about frequency of pleural effusion have been reported and have been considered as a bad prognostic feature.

The differences in number of lesions as compared to other published reports may be because of different study populations. One important thing to note is that the severity of disease in our study population was less as compared to whatever has been reported around the globe.

In our study, leukocytosis was not as common as reported from China and Italy. Lymphocytes were below normal in 38% of patients with available data. Our findings were similar as reported in various publications around the globe. 46.7% of patients have low hemoglobin levels while as thrombocytopenia was present in 66.7% of patients. In literature, thrombocytopenia has been reported and varies from 12% to 57.7% in various study groups depending upon the severity of disease. Procalcitonin level was again in sync with the published literature. C-reactive protein, LDH, and serum feritin levels were increased in most of the patients in our study. Similar results have been reported by various authors with regard to the increased levels of these markers.[5,6,12]

Relevance to primary care physicians: COVID is a pandemic and has affected the healthcare in a quite unprecedented way. No healthcare domain can claim to have not been affected. The present study gives a simple overview of so many radiological findings in COVID-19 on HRCT and thus can be helpful tool to the primary care physician as well.

Summary

CT has proved to be a highly diagnostic tool in the assessment of COVID-19 disease, both in terms of diagnosis and assessing the severity and also follow-up.[13,14] This study which includes data from the earlier months of COVID-19 pandemic had quite well elaborated the findings present in COVID pneumonia even at that time and with just a small sample size. Our study has few shortcomings. The sample size was limited. The biochemical data was not available for all patients. No follow-up CT chest was done to evaluate progress of the lesions.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Badawi A, Ryoo SG. Prevalence of comorbidities in the Middle East respiratory syndrome coronavirus (MERS-CoV): A systematic review and meta-analysis. Int J Infect Dis2016;49:129-33.
2. Channappanavar R, Fett C, Mack M, Ten Eyck PP, Meyerholz DK, Perlman S. Sex-based differences in susceptibility to severe acute respiratory syndrome coronavirus infection. J Immunol 2017;198:4046-53.
3. Lei H, Li Y, Xiao S, Lin CH, Norris SL, Wei D, *et al.* Routes of transmission of influenza A H1N1, SARS CoV, and norovirus in air cabin: Comparative analyses. Indoor Air 2018;28:394-403.
4. Otter JA, Donskey C, Yezli S, Douthwaite S, Goldenberg SD, Weber DJ. Transmission of SARS and MERS Coronaviruses and influenza virus in healthcare settings: The possible role

of dry surface contamination. J Hosp Infect 2016;92:235-50.

5. 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. Lancet 2020;395:497-506.
6. Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, *et al.* Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: A descriptive study. Lancet 2020;395:507-13.
7. Bhatraju PK, Ghassemieh BJ, Nichols M, Kim R, Jerome KR, Nalla AK, *et al.* Covid-19 in critically ill patients in the Seattle region-Case series. N Engl J Med 2020;382:2012-22.
8. Shi H, Han X, Jiang N, Cao Y, Alwalid O, Gu J, *et al.* Radiological findings from 81 patients with COVID-19 pneumonia in Wuhan, China: A descriptive study. Lancet Infect Dis 2020;20:425-34.
9. Li Y, Xia L. Coronavirus disease 2019 (COVID-19): Role of chest CT in diagnosis and management. AJR Am J Roentgenol 2020;214:1280-6.
10. Caruso D, Zerunian M, Polici M, Pucciarelli F, Polidori T, Rucci C, *et al.* Chest CT features of COVID-19 in Rome, Italy. Radiology 2020;296:E79-85.
11. 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;214:1287-94.
12. Guan WJ, Ni ZY, Hu Y, Liang WH, Ou CQ, He JX, *et al.* Clinical characteristics of coronavirus disease 2019 in China. N Engl J Med 2020;382:1708-20.
13. Hope MD, Raptis CA, Shah A, Hammer MM, Henry TS, six signatories. A role for CT in COVID-19? What data really tell us so far. Lancet 2020;395:1189-90.
14. Pontone G, Scafuri S, Mancini ME, Agalbato C, Guglielmo M, Baggiano A, *et al.* Role of computed tomography in COVID-19. J Cardiovasc Comput Tomogr 2020. doi: 10.1016/j.jcct. 2020.08.013.