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Research Article

Chest Computed Tomography Comparative Study of COVID-19 Cases from China and the Democratic Republic of Congo

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Abstract

Objective: We aimed to study the diagnostic values of Covid-19's CT images, evaluate the differences between CT images of Covid-19 patients from China and Democratic Republic of Congo. We would also want to identify the relation between the diagnostic performance of Chest CT-Scan Images and initial RT-PCR.

Methods: A retrospective research method design was used to assess Chest CT-Scan images of adult patients suffered from Covid-19 pandemic in China and DRC. Our research sample was selected by using random sampling technique. The data Analysis of CT images taken as confirmed cases of covid-19 patients was facilitated by three radiologists. The analysis was been realized with the manner of percentage, tables and using the Micro-Soft Word. The statistical analysis was analyzed using an IBM SPSS Statistics, version 25 for Windows and the P value which was considered as statistically significant was $P < 0.05$.

Results: The result found 50 patients from China and 35 patients from DRC. Fever (76%), cough with 68%, shortness of breath (66%), and sore throat (58%) were most common onset symptoms of the patients from China while in DRC, fever appeared as the first symptom with 80% followed by sore throat (74.28%), Cough (68.57%), and shortness of breath (68.57%). Ground-glass opacities (62%) and consolidations (24%) were common chest CT lesions where multilobar lesions (70%), bilateral (68%), unilateral (32%), peripheral (44%), and posterior (48%) were seen in China. In other hand, Ground-glass opacities (35.42%) and mixed cases(37.14%) were common lesions seen in DRC where we found multilobar lesions (80%), bilateral lesions (68.57%), unilateral lesions (31.42%), peripheral lesions (40%) and posterior lesions (48.57%).

Conclusions: CT scan images found in two areas were analyzed and it was concluded that there was a lot of similarities in both areas even if some different features were identified. The commonest findings in Covid-19's patients of two areas were ground glass opacities, multilobal lesions, bilateral, peripheral and posterior lesions.

Keywords: *Computed Tomography; Covid-19; RT-PCR; Ground-Glass Opacities (GGOs)*

Abbreviations

COVID-19: 2019 Novel Coronavirus Disease; SARS-COV2: Severe Acute Respiratory Syndrome Corona Virus 2; RT-PCR: Reverse Transcription-polymerase Chain-reaction; DRC: Democratic Republic of Congo; WHO: World Health Organization; CT: Computed Tomography; GGO: Ground-Glass Opacity; SIT: French Society of Thoracic Imaging

Introduction

2019 novel coronavirus disease (Covid-19) is a topical pandemic in the world. It has been found for the first time in China, Hubei province, in the city of Wuhan since December 2019. It is the infection caused by severe acute respiratory syndrome coronavirus 2 (SARS-

CoV-2) [1,2]. Its commonly known symptoms would be the fever, diarrhea, difficulty while breathing, dry cough and sputum production. In other hands, the sore throat as well as muscle pain is the symptom which is less common [3]. No one could ignore the concern of everyone in the fighting against this pandemic according to the damage caused by it such as the human and material losses [1,4].

In fact, its virus's structure is defined as spherical virus, enveloped of 60-220 nm, characterized by, the glycoprotein spikes (S), the envelope, the membrane and the nucleocapsid [5]. Moreover, the Sars-CoV-2 multiplication cycle in the cell includes the stages of attachment, penetration and decapsidation which are accompanied by the macromolecules synthesis (nucleic acids and proteins) in three phases: early-immediate, immediate and late [6]. These syntheses will allow the assembly of the nucleocapsids followed by the envelopment of infectious virions at the same time as lyses of the infected cell. Its contagiousness is explained by its reproduction rate which is an indicator that assesses the contagious potential of an infectious agent. This is the number means of subjects to whom a patient is likely to transmit disease in a population who does not immune to the virus [6].

CT technique advantage

The diagnosis of Covid-19 pandemic would be taken in consideration as the disease is the current enemy of the humanity. Its diagnosis analysis is one of the necessary studies which would be developed in order to be able to help many patients who are suffering from this pandemic. The chest CT-scan quickly established itself as an interesting diagnostic tool which should be used in the fighting against Covid-19 disease [7]. The non-injection chest computed tomography is readily available and feasible in different hospitals. This CT-scan technical can quickly detect lung damage and make imaging diagnoses.

Therefore, it has great value in early detection of differential diagnosis and assessment of disease severity of COVID-19 [8]. It has presented different imaging manifestations at different stages, mainly related to pathogenesis. Early-stage Covid-19 lesions are relatively localized and manifested primarily as inflammatory infiltration located in to the sub-pleural or peri-bronchovascular regions of one or both lungs, exhibiting unequal or segmental purity ground- glass opacities with vascular dilation [8]. CT imaging can reveal a progression of this pandemic which is disrupting the whole world [9]. Chest computed tomography is one of the means of imaging which should be considered as the basis of the diagnosis of COVID-19.

Statement of problem and significance

Covid-19 pandemic remains the world's enemy. Since the appearance of Covid-19 pandemic until November 2021, more than 260.000.000 cases of people have been reported in the world as infected cases of Covid-19, and more than 5.018.000 deaths [24]. All over the world, countries closed many activities, borders and their airports, etc. Those consequences were affecting the global political and economical plans of the entire world. Its spread's speed has led scientists all over the world to carry out numerous researches to better understanding of its effects on the people's health. Even if there are many studies which have demonstrated that the diagnostic workup of Covid-19 pandemic should be diagnosed using Chest CT images, we realized that there is no other research which aimed to compare whether the images of patients from different areas such as Asia and Africa should have some remarkable differences. For this reason, our comparative study is the novel study which would aim to study the diagnostic values of Covid-19's CT images of patients from China and DRC in order to bring the new step of comparative research mindset on Covid-19 pandemic between different regions. It will be more tremendous as it will motivate other researchers to move forwards for analyzing any differential diagnosis on Covid-19's patients from different areas. Furthermore, it will be once again useful for the concerned authority who prepares the plans and programs related to the protocol of Covid-19 disease.

Materials and Methods

Study design and participants

A retrospective research method design was used to assess the difference between Chest CT-Scan images of adult patients suffered from Covid-19 pandemic. Our choice of research area was two places of different continents. The first area was China, a country located in Asian Continent while the second area was Democratic Republic of Congo, an African country. These areas were selected based on the absence of same previous research which compares these areas on Covid-19 pandemic features. In our inclusion criteria**,** we retrospectively selected the electronic medical records of adult patients who were diagnosed for Covid-19 in a certain period in Radiology departments of two hospitals (Zhujiang hospital of Southern Medical University and Care Center of Covid-19 patients in DRC), males and females.

All cases of patients underwent the RT-PCR test before the CT-Scan examinations. Some of the patients were found with positive results but were obliged to have a repeated RT-PCR test for the real confirmation. Others had negative results, but they were put in observations and had also a repeated RT-PCR test in order to confirm the last diagnosis. The number of the population was 85 cases (35 cases from DRC and 50 cases from China). As limitation; we acknowledge that our study is only based on patients from China and patients from DRC infected by Covid-19 pandemic. We also excluded patients whom the results were negative of Covid-19 pandemic after a repeated RT-PCR test.

Data collection method and sampling technique

Our data was collected through a retrospective method of Covid-19 adult patients diagnosed in the month of March to April of 2020 in Zhujiang Hospital of Southern Medical University and Care Center of Covid-19 patients in DRC while the research sample was selected by using random sampling technique. Moreover, clinical informations and laboratory checking were also identified through the retrospective method of data found in our two areas. Images from China have been realised using a good quality machine GE light speed, 64 slices Scanner, where scan images were collected and analyzed with the use of Picture Archiving and Communication Systems (PACS). In DRC's center, scan images have been realised using HITACHI machine scan, SCENARIA with a reconstructed images software of TERARECOM. Furthermore, the scanning parameters were as follows: tube voltage was 120 kV and 100 to 600 mA with smart mA dose modulation. The width was 0.625 X 0.625 mm while the rotation time was 0.5s. The data analysis was facilitated by three experienced radiologists who helped to analyze the Chest CT-Scan images taken as confirmed cases of covid-19 patients. These radiologists evaluated those Chest CT images with both mediastinal and lung window level settings. They also identified lung lesions according to their shape, severity, location and their density. Furthermore, the manner of percentage, tables was used and everything was done with the use of Micro-Soft Word.

Statistical analysis

About the statistical analysis, the difference between our results found in two areas was analyzed using an IBM SPSS Statistics, version 25 for Windows. The *P* value which was considered as statistically significant was less than 0.05 ($P < 0.05$). Our variables were analyzed as means and medians, while categorical variables were presented as counts and percentages.

Results

Outcome of the patients

Among 50 cases from China, 31 patients were male, 19 patients were female. Among 35 cases from DRC, 16 patients were female and 19 patients were male. All patients taken were adults.

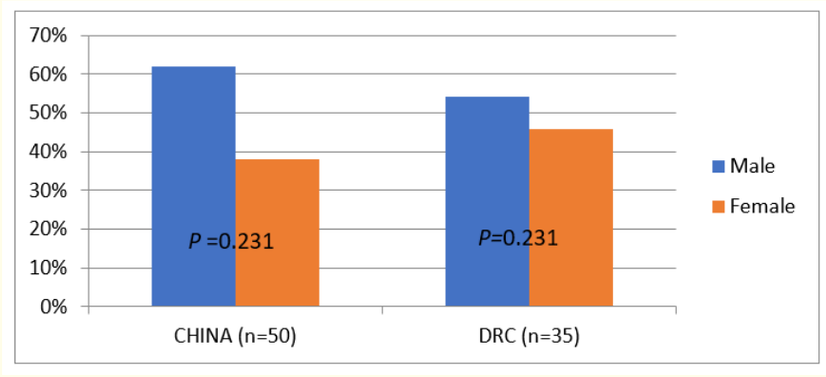

Figure 1: *Sex of selected patients with Covid-19 in China and DRC.*

In 50 cases from China and 35 cases from DRC, we found 62% of male patients and 38% female patients from China (n: 50); 54.28% male and 45.71% female from DRC (n: 35). In both sides, male patients were many than female patients.

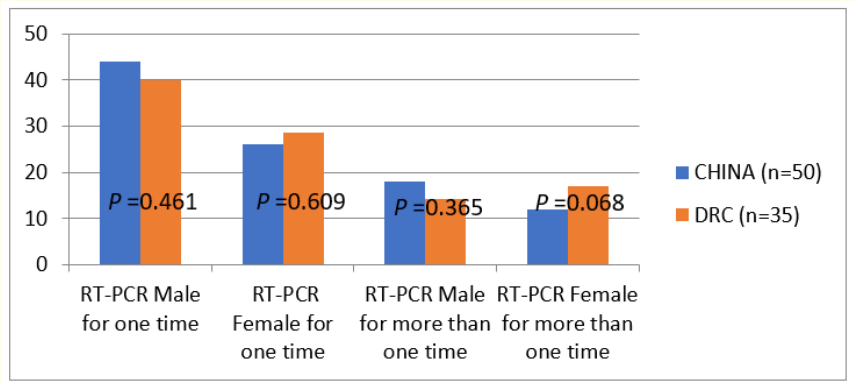

Figure 2: *RT-PCR times of checking for the selected patients with Covid-19 in China and DRC.*

The RT-PCR test of all patients was positive of Covid-19 even if some patients were checked more than 1 time for the confirmation of Covid-19 pandemic by RT-PCR checking. All patients underwent RT-PCR test before CT-scan exams; 44% of male and 26% of female from China were tested positive for the first time through RT-PCR checking while 18% of male and 12% of female were checked through RT-PCR more than 1 time in order to be found positive of Covid-19. On the other hand, 40% of male and 28.57% of female from DRC were tested positive for the first time through RT-PCR check while 14.28% of male and 17.14% of female were tested positive after more than one time of RT-PCR check. Statistically, considering the number of patients found in two areas and their RT-PCR test, there is no significant difference between China and DRC as we did not found the *P* value which is less than 0.05.

Type of virus

2019 novel coronavirus disease (Covid-19) is the infection caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [1,2]. Scientists proved that SARS-CoV-2 characteristics were changing in the genetic code since December 2019 when it appeared in the city of Wuhan until now. The mutations of the virus happened very frequently. Even if there are several notable variants of SARS-CoV-2, 4 major variants of the virus had been classified so far (Alpha, Beta, Gamma and Delta) [10]. As our study was retrospective in early 2020, the virus found in our two areas (China and DRC) was the parent SARS-CoV-2 which was seen in Wuhan where it firstly appeared. There was no variant of it which had been identified at the moment of our data.

Clinical features of images

Symptoms

As symptoms, we found that fever comes as the first symptom with 76% for the patients from China, followed by cough with 68%, shortness of breath (66%), sore throat (58%), headache (24%), abdominal pain (14%), pleural chest pain (12%) and vomiting (10%). In DRC, we found that also fever appeared as the first symptom with 80%, followed by sore throat with 74.28%, Cough (68.57%), shortness of breath (68.57%), headache (25.71%), vomiting (20%), abdominal pain (11.42%) and pleural chest pain (5.57%). Statistically, there is no significant difference found between two areas on abdominal pain, vomiting, fever, headache and cough.

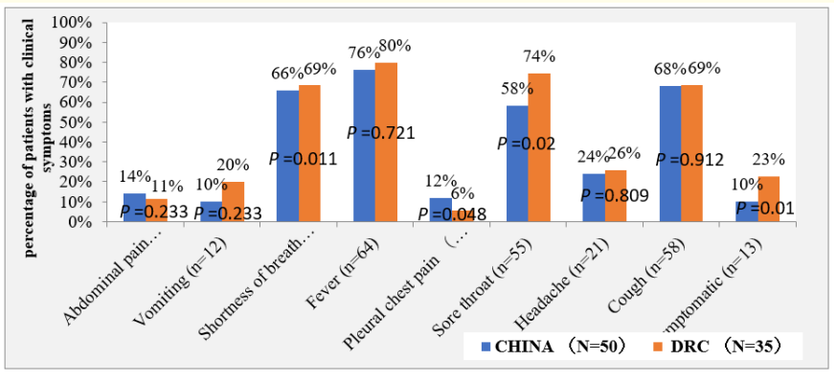

Figure 3: *Clinical symptoms details of selected patients of Covid-19 in China and DRC.*

CT features of images from both areas

CT scan images of covid-19 patients from both sides (China and DRC) found typical features of lesions with different percentage. Their comparison would refer to their density, shape, location and their stage. The found abnormalities were described as follows.

Lesion features	CHINA	DRC	
	N: 50	N: 35	P Value
Density			
Ground-Glass Opacity	31 (62%)	11 (35.42%)	0.380
Consolidation	12 (24%)	9 (25.71%)	0.724
Mixed	7 (14%)	13 (35.14%)	0.000
Air bronchogram	8 (16%)	5 (14.28%)	0.669
Crazy-paving pattern	9 (18%)	6 (17.14%)	0.840
Location			
Bilateral patchy lesions	34 (68%)	24 (68%)	0.912
Unilateral patchy lesions	16 (32%)	11 (31.42%)	0.500
Multilobar lesions	35 (70%)	28 (80%)	0.034
Peripheral distribution	22 (44%)	14 (40%)	0.321
Basal distribution	12 (24%)	16 (45.71%)	0.001
Posterior distribution	24 (48%)	17 (48.57%)	0.921
Shape			
Patchy Rounded lesions	12 (24%)	6 (17.14%)	0.124
Patchy Amorphous lesions	38 (76%)	29 (82.85%)	0.124
Nodular lesions/Patchy	13 (26%)	11 (31.42%)	0.293
Stage			
Mild cases	18 (36%)	9 (25.71%)	0.042
Moderate cases	20 (40%)	6 (17.14%)	0.000
Extensive cases	9 (18%)	9 (25.71%)	0.098
Severe cases	3 (6%)	10 (28.57%)	0.000
Critical cases	0 (0%)	1 (2.85%)	0.234

Table 1: *Chest CT lesion features of images.*

Density lesions

The most common density lesions seen in China were images with Ground-glass opacities with 62% followed by 24% of consolidations, while mixed cases of GGO and consolidations were seen with 14%. Other features were also been found such as Air bronchogram (16%) and Crazy paving (18%). In DRC, Ground-glass opacities were at 35.42%, 25.71% of consolidations, and 37.14% of mixed cases, Air bronchogram (14.28%) and Crazy paving (17.14%).

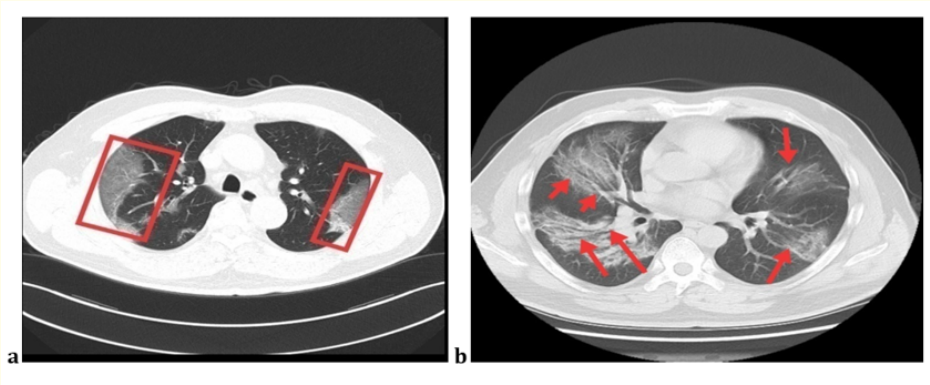

Figure 4: *a. Chest CT adult's image of Covid-19 patient from China seen with bilateral ground glass opacity which are located in peripheral areas (red frame). b. Chest CT adult's image of Covid-19 patient from DRC which shows a progressive stage with multiple bilateral patchy ground-glass opacities and consolidative changes (red arrows) observed with the thickening of interlobular septum.*

Location

The most common CT abnormalities found in both sides were multilobar lesions in 70% in China and 80% in DRC. 68% of lesions were bilateral in China while 68.57 were also bilateral in DRC. Other lesions were located differently such as unilateral (32%), peripheral (44%), basal (24%), posterior (48%) in China and unilateral (31.42%), peripheral (40%), basal (45.71%), posterior (48.57%) in DRC.

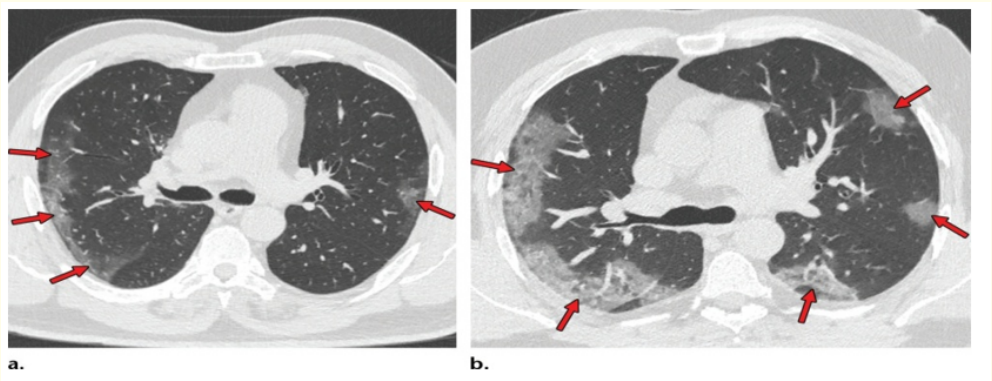

Figure 5: *Chest CT adult's image of Covid-19 patient seen in bilateral areas with ground-glass opacities located in peripheral areas (red arrows).*

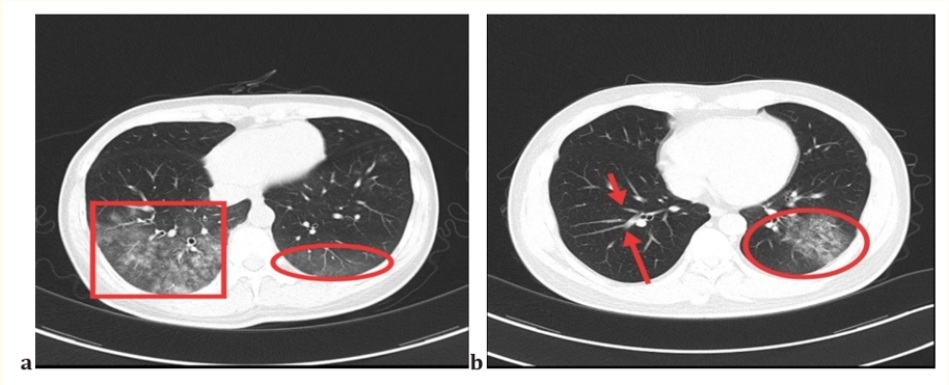

Figure 6: *a. Chest CT adult's image of Covid-19 patient from China seen with bilateral ground glass opacity which is located in the posterior basal segment associated with vascular thickening in the right lung (red frame). b. Chest CT adult's image of Covid-19 patient seen with ground glass opacity in the posterior basal segment of the left lower lobe.*

Shape

The most common CT abnormalities found were patchy amorphous lesions with 76% in China and 82.85% in DRC. Moreover, 48% of Rounded lesions and 26% of nodular lesions were found in China while it was found respectively with 17.14% and 31.42% in DRC. There is no significant *P* value between China and DRC on the shape of images.

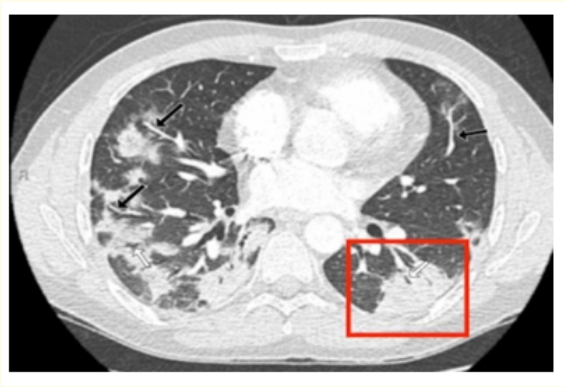

Figure 7: *Chest CT adult's image of Covid-19 patient seen with bilateral large rounded consolidations located in peripheral and posterior of two lower lobes; vascular engorgement (black arrows) and also air bronchograms were seen.*

Stage

CT techniques method is able to find easily the diagnostic but can also permit to the radiologist to know and localize very well the stage of COVID-19. Moreover, it shall know its change and evolution which is more needed when clinicians are treating patients infected by Covid-19. Lodé B., *et al*. found in their Imaging of Covid-19's study that it should be five various degrees of severity seen in chest CT imaging of Covid-19's patient which should also be correlated with clinical severity of the patient [11]. Furthermore, the SIT found that the lung

involvement's severity should be classified as mild lesions (A) (< 10%), moderate lesions (B) (10-25%), extensive lesions (C) (25-50%), severe lesions (D) (50-75%) and critical lesions (E) (> 75%) (Figure 8) [12].

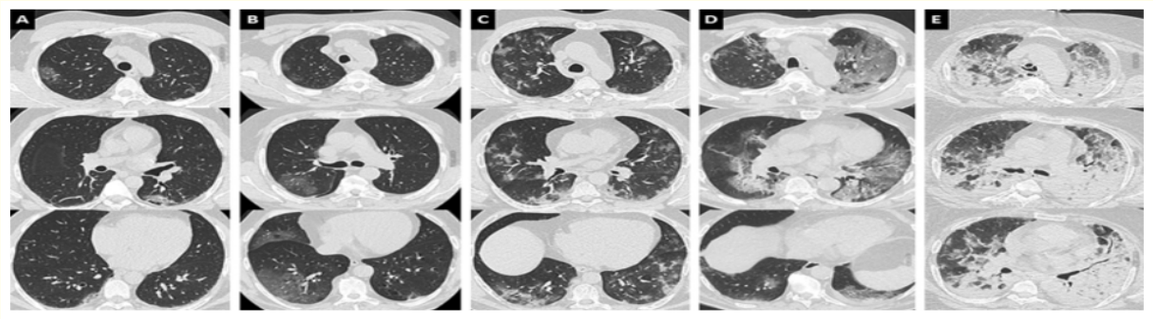

Figure 8: *Different various degrees of severity of Covid-19's CT Imaging since the normal image to the infected critical image which is classified in five degrees such as mild lesions (A) (< 10%), moderate lesions (B) (10-25%), extensive lesions (C) (25-50%), severe lesions (D) (50-75%) and critical lesions (E) (> 75%) [11].*

In our study, we found that 36% were classified as mild cases, followed by 40% of moderate cases, 18% of extensive cases, and 6% of severe cases in China while 25.71% of mild cases, 17.14% of moderate cases, 25.71% of extensive cases and 28.57% of severe cases were found in DRC.

Comparison between two areas (CHINA and DRC)

Our study showed that there are variable imaging findings of COVID-19 disease which should affect the human lungs. Even if we found that there are multiple factors which should vary the diagnostic performance of a chest CT scan [13], the two areas have a lot of similarities of chest CT images abnormalities of Covid-19 patients. Nevertheless, according to the look of CT images found in two areas, its analysis showed a remarkable difference on the sharpness quality of images due to the used CT Scan machines and technical parameters from two sides.

Even more, some differences between two areas were found statistically on symptoms and CT lesions.

- About symptoms, we found that there was a significant difference on shortness of breath where the study found 33/50 patients (66%) in China and 24/35 patients (68.57%) in DRC, with p value of 0.011; pleural chest pain with 6/50 patients (12%) in China and 2/35 patients (5.57%) in DRC, p value 0.048; sore throat with 29/50 patients (58%) in China and 26/35 patients (74.28%) in DRC, p value 0.02; and on asymptomatic patients with 5/50 patients (10%) in China and 8/35 patients (22.85%) in DRC, p value 0.01.

- About CT lesions, The density showed that mixed cases (Images mixed with GGOs and Consolidations) were found with the significant difference because the results showed that there are 7/50 mixed lesions(10%) in China and 13/35 mixed lesions (35.14%) in DRC, p value 0.000. Moreover, the location of the lesions found that there was significant difference on multilobar lesions with 35/50 patients (70%) in China and 28/35 patients (80%) in DRC, p value 0.034 and on basal distribution 12/50 patients (24%) in China and 16/35 patients (45.71%) in DRC, p value 0.001. We finally analyzed the stage of the Covid-19 disease according to CT images where the analysis between two areas showed that the significant difference was been observed on mild cases with 18/50 patients (36%) in China and 9/35 patients (25.71%) in DRC, p value 0.042, moderate cases with 20/50 patients (40%) in China and 6/35 patients (17.14%) in DRC, p value 0.000 and severe cases with 3/50 patients (6%) in China and 10/35 patients (28.57%) in DRC, p value 0.000.

Correlation between RT-PCR and CT

Considering the diagnostic workup of Covid-19 pandemic, many studies demonstrated that Covid-19 should be diagnosed in different ways such as biological and other techniques but two typical techniques are mainly performed: Firstly, the repeated practice of reverse-transcriptase polymerase-chain reaction (RT-PCR) on oro or nasopharyngeal swabs is the first method that we choose when a suspected patient of covid-19 comes at hospital. RT-PCR test is currently the most useful and efficient method of rapid COVID-19 screening. Nevertheless, its sensitivity is insufficient, while it is ranging from 50 to 62% according to previous large-scale reports [2,14]. Secondly, Chest CT-Scan techniques should be mentioned as the second choice.

The non-contrasted thoracic CT is currently indicated for suspected patients with dyspnea, polypnea or desaturation to refer them to "COVID" or "non-COVID" services when RT-PCR results are pending [15]. The sensitivity of Chest CT for the diagnosis of COVID-19 is greater than 90%, with false negative results mainly in patients who have been symptomatic for less than 3 days [16,17]**.** Normally, we should confirm that a patient is suffered from COVID-19 when initial RT-PCR was positive or initial RT-PCR negative but CT positive. Initial RT-PCR and chest CT had similar and good diagnostic performance in rapid screening of clinically suspected COVID-19 patients.

In fact, even if these two main methods of coronavirus's detection are seen in both areas, some differences were seen. For example, RT-PCR testing kits were seen but should be in limited supply in China when an ease of access to CT and low cost makes it a good modality in the management of Covid-19 pandemic. On the other hand, RT-PCR testing is a remarkable used method in DRC when CT scan's accessibility is the most observed problem of many patients in Africa due to the high cost caused by few CT machines in African countries. Many patients are not diagnosed as well as there is the lack of developed radiology's machines such as CT, MRI, etc. For this, there is a little number of patients infected by Covid-19 who underwent CT scan examination in Africa because of the highest prices for its access.

Discussion

Our study found that RT-PCR and CT imaging method are two main diagnosis methods used in this fighting of Covid-19 pandemic. Lin., *et al*. in their study, found that CT imaging findings should appear before clinical symptoms but they should both help to have the best idea while clinicians are diagnosing a suspected covid-19 patient [18]. We found that the good diagnosis would put together two methods of diagnosis which are RT-PCR and CT scan techniques. The availability on CT scan's specificity is very little as it is somehow difficult to distinguish other abnormalities caused by other infections which are not caused by Covid-19. Then, the combination of these two methods is more tremendous in this fighting of the current Covid-9 pandemic.

T. Ai, Z. Yang, H. Hou., *et al*. in their research about the correlation of chest CT and RT-PCR while testing COVID-19 in China proved that even if RT-PCR is recognized as the best method of Covid-19's diagnosis, it sometimes finds false negative; so that CT has demonstrate a higher sensitivity than RT-PCR even if its specificity has no effective guarantee [16]. Indeed, several researchers were proposing that CT scans technique should be taken as an alternative to RT-PCR owing to produce the best sensitivity than RT-PCR [19,20]. There was another retrospective Chinese study which carried out on 1,014 patients infected with Covid-19 which aimed to compare the sensitivity and specificity of RT-PCR and of the chest CT images. It revealed that the sensitivity of the chest CT scan is estimated to be 97%, and specificity at 25%, against a sensitivity of 65% and a specificity of 83% for RT-PCR [21]. For sure, Chest CT-Scan Images are used as important way of diagnostic of this early pandemic in its detection and treatment [2,14].

Comparing our study to previous studies, clinical symptoms are not far from other symptoms found in existing studies, including fever, cough, and abdominal pain, shortness of breath, sore throat and headache. Our study found that fever comes as the first symptom with 76% followed by cough (68%), sore throat (58%) in China while we found 80% of fever cases, sore throat (74.28%), shortness of breath (68.57%), cough (68.57%) in DRC. In our study, we saw that fever were the common first symptom seen in both areas (China and DRC), while cough had similar percentage of 68% in both areas. However, there were sore throat and shortness of breath symptoms which were seen at the high level in DRC than China. According to the report of 48 studies done by Ephrem A. and Firehiwot B., in a Systematic Review and Meta-Analysis of CT Imaging Features of Patients with COVID-19, they found that the principal clinical characteristics of COVID-19 infected patients were fever and dry cough, which were respectively accounted for 80% and 56.2% [22]**.**

Our study also found that asymptomatic patients are higher in DRC with 22.85% than China with 10% which is different to Ephrem A. and Firehiwot B.'s study whose asymptomatic patients were about 2.3% [22]**.** Our study found that patterns of lung abnormalities in patients with COVID-19 are in majority with Ground-glass opacities (62%), consolidations (24%), mixed cases(14%), Air bronchogram (16%), Crazy paving (18%), multilobar lesions (70%), bilateral (68%), unilateral (32%), peripheral (44%), posterior (48%) and

nodular lesions with 26% in China while there are as follows in DRC: Ground-glass opacities (35.42%), consolidations (25.71%), mixed cases(37.14%), Air bronchogram (14.28%), Crazy paving (17.14%), multilobar lesions (80%), bilateral (68.57%), unilateral (31.42%), peripheral (40%), posterior (48.57%) and nodular lesions with 31.42%. In our analysis, GGOs were found at the high level in China than DRC while mixed cases with GGOs and consolidations were at high level in DRC than China.

Moreover, multilobar and bilateral lesions were seen in majority in both sides while peripheral and posterior lesions were also similar. In fact, there is a lot of similarities to Ephrem A. and Firehiwot B.'s findings where 80% (3952/4940) of patients had bilateral lung lesions, 20% (641/3206) of patients had unilateral lung lesions. Furthermore, ground-glass opacities were evaluated in 65%, consolidations (22%) while mixed GGO with consolidations had 18% of patients. Other CT features in their research were pulmonary nodules (21.6%), crazy paving (12%), and Air bronchogram (18%) [22]**.** Shi and their coworkers [23] found that the most common feature seen in the chest CT of Covid-19 patients was Ground-glass opacity with 65%, and that its presence is the earliest CT finding which usually appear in the majority of patients on 0-5 days after the beginning of the infection [7]. However, there is somehow an opposite to Yan Li and Liming Xia's study where they found that GGO and consolidation are only two principle features of COVID-19's abnormalities on CT images. They also realized that CT had multiple or singular and irregular sides of ground-glass opacity, consolidation or both with 96.1% of patients. Moreover, they found air bronchogram sign in 68.6% of cases [8].

Conclusion

Covid-19 pandemic remains the world's concern. RT-PCR method and CT are two typical techniques used in the diagnostic workup of this pandemic and they had similar and good diagnostic performance in rapid screening of clinically suspected COVID-19 patients. RT-PCR method is rapid and most useful but it is less sensitive than CT because CT is one of the means of imaging which should be considered as the basis of the diagnosis of COVID-19. The result of our study found that fever; cough, sore throat and shortness of breath are the commonest symptoms of Covid-19 disease in China and DRC while asymptomatic patients were also seen. We also found that patterns of lung abnormalities in patients with COVID-19 are in majority with Ground-glass opacities, consolidations, mixed cases, Air bronchogram, Crazy paving, multilobar lesions, bilateral, unilateral, peripheral, posterior and nodular lesions in China and DRC. Moreover, our study showed that 40% were moderate cases and 6% were severe cases in China while it had seen 17.14% of moderate cases and 28.57% of severe cases in DRC.

CT images of Covid-19 patients between China and DRC showed a lot of similarities even if some different features were identified in our study. As our study showed that CT can reveal a progression of this pandemic, we should recommend that future studies may include artificial intelligence for CT images reading in order to refuse the subjective bias but search for the improvement of diagnostic performance. We should also want to suggest that future researchers should aim to compare patients of Covid-19 from other areas such as America, Europe, etc. for seeing whether their CT images should have some remarkable differences or not; which should bring the conclusion on how CT images of Covid-19 patients are characterized in general. As there are many variants of this pandemic until now, it should be useful for the concerned authority who prepares the plans and programs related to the protocol of Covid-19 disease.

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