DOI: https://doi.org/10.54393/pbmj.v5i7.556

PAKISTAN BIOMEDICAL JOURNAL

https://www.pakistanbmj.com/journal/index.php/pbmj/index

Volume 5, Issue 7 (July 2022)

Original Article

Frequency of HRCT Findings and Distribution in Lung Parenchyma in Pneumonia

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ARTICLE INFO

Key Words:

HRCT, Bronchopneumonia, Lobular pneumonia, Lymphadenopathy, Ground-glass opacities

How to Cite:

Rasheed , L. ., Jamil , M., Ali, A. ., Azam, S. ., Akram, H. ., & Kiran, W. . (2022). Frequency Of HRCT Findings and Distribution in Lung Parenchyma in Pneumonia: HRCT Distribution in Lung Parenchyma in Pneumonia. Pakistan BioMedical Journal, 5(7). https://doi.org/10.54393/pbmj.v5i7.556

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Received Date: 13th June, 2022
Acceptance Date: 9th July, 2022
Published Date: 31st July, 2022

ABSTRACT

Lung's primary role is to allow the diffusion of gases from the surrounding atmosphere into circulation. Pneumonia and associated spread in the lungs parenchyma is a very common finding in one or both lungs. **Objective:** To determine the frequency of HRCT findings and distribution in the lung parenchyma in pneumonia patients. **Methods:** It was a cross-sectional study conducted at a Tertiary Hospital in Lahore, Pakistan in the department of Radiology over five months, from January 2022 to May, 2022. A sample size of 90 patients was taken using a convenient sampling approach from previously published articles. Patients with pneumonia were included in the study after informing a consent. All the data were entered and analyzed using SPSS version 22.0. **Results:** Results shows that pneumonia is more common in the age of 56-65years (30.0%)**.** It is more common in the patients having a history of smoking 44(48.9%). One of the most prevalent CT findings was ground-glass opacities 55(17.7%). Lung infection dissemination was found to be unilateral in 16(17.8%) patients and bilateral in 74(82.2%). On categorization and parenchymal distribution, lobular pneumonia was more common 77(85.6%). **Conclusion:** In conclusion, pneumonia is the most prevalent disease among children and older males at the age of 56-65years, having previous history of smoking. The most prevalent observations were lymphadenopathy, ground-glass opacities GGO, and consolidations. Bronchopneumonia findings are more common however, the majority of cases were bilateral than unilateral.

INTRODUCTION

Pneumonia is a disease in which the airways of either one or both lungs become irritated. Sore throat with sputum or mucus, temperature, cold, and trouble breathing may result from the air sacs filling with mucus (serious waste) [1,2]. Pneumonia can be caused by a variety of organisms, comprising bacteria, and spores [3]. The severity of pneumonia might vary from minor to life-ending [4]. Babies and toddlers, adults over the age of 65, and individuals with chronic conditions or compromised immunity are the most vulnerable [5,6]. The type of germ that develops the illness, the person's maturity level, and their general fitness are all variables that influence how dangerous an incidence of pneumonia is. It occurs more frequently in adults of higher ages [7,8]. If an immunosuppressed individual presents with indications such as coughing, mucus formation, difficult breathing (with changed respiration and wheezing), or temperature, it must be evaluated in pneumonia [9]. The above clinical signs are non-specific and therefore can occur in people with throat infections, some lung conditions like acute and long-term pneumonia, as well as non-infectious illnesses like responsive lung disorder, lung collapse cardiomyopathy, vasculopathy, and a blood clot in a pulmonary blood vessel, and neoplastic disorder [10,11]. Computed tomography (CT) is substantially

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higher efficient in identifying lung nodules, but the clinical implications [12,13]. Even though there are microorganisms that exhibit a radiographic appearance of non-segmental pneumonia, the imaging pattern of non-segmental pneumonia is not limited to any particular causal organism [14]. Non-segmental pneumonia is caused by Pneumococcal bacteria, which is the most prevalent pathogenic microorganism and the nation's fourth-biggest time of mortality [15]. The use of HRCT to indicate the degree of diffused lung disease [16,17]. Since the degree of scarring observed on HRCT corresponds strongly with the fatality rate, HRCT is in the deed effective for evaluating the clinical consequences of idiopathic pulmonary fibrosis (IPF) [18,19]. HRCT findings in Pneumonia include ground-glass opacity, Broncho-vascular opacity [20], reticulation opacities, bronchiectasis, interlobular septal thickening, focal ground-glass opacities [21], consolidation, and their distribution in the lung parenchyma whether it is on left side of right side, whether it is unilateral of bilateral. Findings also includes lobe of lung upper, middle and lower thirds, also with central or peripheral findings [22-25]

METHODS

It was a cross-sectional study undertaken at a Tertiary Hospital in Lahore, Pakistan's Radiology department over five months, from January 2022 to May, 2022. A sample size of 90 patients was taken by using a convenient sampling approach from previously published articles. After informing a consent patient with pneumonia were included. Patients were having the symptoms of severe cough with or without sputum, shortness of breath, fever, and cyanosis in the study region. Known subjects other than Pneumonia on HRCT were excluded. All data were entered and analyzed using SPSS version 22.0.

RESULTS

A sample size of 90 patients was taken. There were 40(44.4%) ladies and 50(55.6%) gents among the 90 cases. Patients in the age ranges of (15-25), (26-35), (36-45), (46-55), (56-65), and (66-75) were 4(4.4 %), 9(10.0 %), 16(17.8%), 20(22.2 %), 27(30.0 %), and 14(15.6 %), respectively. Table 1 and Table 2 show people with various medical illnesses including 13(14.4%) patients with chronic kidney disease, 16 (17.8%) patients with diabetes, and 24(26.7%) patients with hypertension. However, 37 (41.1%) of the patients had no prior medical history.

Clinical history	Frequency	Percent
Cough	64	20.6
Fever	42	13.5
Shortness of breath	75	24.1
Chest pain	13	4.2
Flue	24	7.7
Cyanosis	13	4.2
Crackles	34	10.9
Wheezing sound	46	14.8
Total	311	100.0

Table 1: Clinical History of participants

Medical history	Frequency	Percent
Diabetes	16	17.8
Hypertension	24	26.7
Chronic kidney disease	13	14.4
No history	37	41.1
Total	90	100.0

Table 2: Medical History of the Patients

Table 3 shows the history of smoking in patients. 44 people (48.9%) had a history of current smoking, 24 (26.7%) were non-smokers, and 22(24.4%) had been prior smokers.

History of smoking	Frequency	Percent
Active smoker	44	48.9
Previous smoker	22	24.4
Non-smoker	24	26.7
Total	90	100.0

Table 3: Smoking History of the Patients

Table 4 shows CT findings in patients. One of the most prevalent CT findings were reticular opacities, which were seen in 22 patients (7.1%), bronchiectasis, which was seen in 26 patients (8.4%), septal thickening, which was seen in 22 patients (9.0%), pleural effusion, which was seen in 29 patients (9.3%), osteophytes, which were seen in 46 patients (14.8%), consolidations, which were seen in 49 patients (15.8%), ground-glass opacities, which were seen (18.0%).

CT Findings	Frequency	Percent
Consolidations	49	15.8
Ground glass opacities	55	17.7
Bronchiectasis	26	8.4
Osteophytes	46	14.8
Lymphadenopathy	56	18.0
Pleural effusion	29	9.3
Septal thickening	28	9.0
Reticular opacities	22	7.1
Total	311	100.0

Table 4: CT findings in Patients with Pneumonia

Table 5 shows the lungs infected. Lung infection dissemination was found to be unilateral in 16 (17.8%) and bilateral in 74(82.2%) cases

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Distribution of Lungs infected	Frequency	Percent
Unilateral	16	17.8
Bilateral	74	82.2
Total	90	100.0

Table 5: Distribution of Lungs infected

Table 6 shows the parenchymal distribution in pneumonia. On categorization and parenchymal distribution in pneumonia, there were 13 (14.4%) bronchopneumonia and 77(85.6%)lobular pneumonia.

Categorization and Parenchymal distribution in Pneumonia	Frequency	Percent
Broncho pneumonia	13	14.4
Lobular pneumonia	77	85.6
Total	90	100.0

Table 6: Categorization and Parenchymal distribution in Pneumonia

DISCUSSION

In the current study, the evaluation of high-resolution computed tomography scans of 90 patients having severe symptoms of pneumonia is included. The minimum age was 15 years and the maximum age was 75 years. The severity of the disease and its parenchymal distribution depends on the immunity of the patient and history of smoking. The current data is approximately similar to literature data showing these tomographic findings in patients with pneumonia. Chen et al, in 2019 concluded the observations of consolidations with ground-glass opacities, reticular opacities with concomitant septal thickening, and bronchiectasis [1]. These results have been reported in a few studies with varying degrees of frequency. In this investigation, reticular opacities, bronchiectasis, septal thickening, ground-glass opacities, and consolidations were seen in 7.1 percent, 8.4 percent, 9.0 percent, 17 percent, and 15 percent of the patients, respectively. These findings have been shown in a few research with varying degrees of frequency. A study done by Lee et al, in 2012 showed that reticular opacities, bronchiectasis, septal thickening, ground-glass opacities, and consolidations were found in 7.1 percent, 8.4 percent, 9.0 percent, 17 percent, and 15% of the patients, respectively [4]. In current study, 9.3% of participants had pleural effusion, which might be unilateral or bilateral, whereas prior studies had only recorded a few cases. Lymphadenopathy was found in 18% of individuals, although there was no evidence of mediastinal lymphadenopathy in the publications. Tibana et al, concluded that a most prevalent HRCT observation was bilateral multifocal infiltration, primarily in the inferior portion, in a prior investigation [8]. In certain investigations, although, the pattern is widespread, with no evidence of regional primacy. In this analysis, HRCT imaging revealed bilateral engagement in the overwhelming majority of instances (82.2%), as well as segmental pneumonia in 85.6 percent of cases.

CONCLUSION

Pneumonia is the most prevalent disease among children and older males, who have a previous history of smoking. The most prevalent observations were lymphadenopathy, ground-glass opacities, and consolidations. There were more bronchopneumonia findings than lobular pneumonia. However, the majority of cases were bilateral than unilateral.

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