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HIGH-RESOLUTION CT FINDINGS IN SYMPTOMATIC PATIENTS WITH GUJJAR LUNG

Radiology

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ABSTRACT

Gujjar lung, is a form of domestic pneumoconiosis caused by deposition of particulate matter of biomass combustion in households[4].The disease is characterized by progressive dyspnea and productive cough with blackish sputum, usually manifesting beyond fourth decade of life. The observational study was conducted in department of Radio-diagnosis and department of pulmonary medicine. A detailed clinical history was taken from all patients. Total 50 patients were selected according to the inclusion criteria. Also rarely tuberculosis and malignancy may occur concomitantly along with Gujjar lung. HRCT findings can help differentiate these entities. This study was helpful in clinching the diagnosis of Gujjar lung in proper clinical setting avoiding unnecessary invasive diagnostic procedures. Bronchial anthracofibrosis has recently been defined in the radiology as a luminal narrowing associated with anthracotic pigmentation on bronchoscopy without a relevant history of pneumoconiosis or smoking. The study comprised of 21 men and 29 women with an average age of 58 years to 65 years with a range of 43 to 87 years. Most cases were seen in the age group of 50 to 69 years. In the present study females were affected more commonly with a female to male ratio of 1.38 : 1. Females were predominantly affected which is similar to studies by Yeon Jae Kim et al, and Hyae Young Kim. The HRCT findings of gujjar lung are non specific and overlap with anthrocofibrosis. However large conglomerate fibrotic masses in midzone and upper zone of lung are typically seen in Gujjar lung in late stages.

KEYWORDS

HRCT Scan, Gujjar Lung, Lung Disorders

INTRODUCTION

Gujjar and bakarwal are the third largest ethnic group in Jammu and Kashmir constituting more than 11.9% of the total population of the state (Census, 2011).

The entity "Gujjar lung" was first introduced in 1991 by Dhar and Pathania from Kashmir when they noticed miliary mottling and reticulonodular pattern in the chest radiographs of patients belonging to Gujjar community. Raison et al defined Gujjar lung as a form of chronic bronchitis associated with radiographic findings of diffuse reticular and nodular markings. About 34 lakh of these people live in the State of Jammu and Kashmir ; located in Anantnag, Pulwama, Srinagar, Baramulla, Kupwara and Ganderbal districts of Kashmir Division and in District Poonch, Ramban and Rajouri of Jammu Division.

The entity "Gujjar lung" was first introduced in 1991 by Dhar and Pathania from Kashmir when they noticed miliary mottling and reticulonodular pattern in the chest radiographs of patients belonging to Gujjar community.

Gujjar lung, is a form of domestic pneumoconiosis caused by deposition of particulate matter of biomass combustion in households. The disease is typically characterized by progressive cough and shortness of breath, onset beyond the fourth decade, radiological features of reticulonodular infiltrates, and histopathological evidence of anthracotic nodules with carbon-laden macrophages and fibrosis. Diagnosis in most of the cases is made by clinical, radiological, physiological, and histopathological findings.

AIM OF THE STUDY

To establish the spectrum of High Resolution CT findings in Symptomatic patients with Gujjar Lung.

MATERIAL AND METHODS

The observational study was conducted in department of Radio-diagnosis and department of pulmonary medicine of Govt. Medical College Srinagar from November 2018 to April 2020 after approval from Institutional Ethical Committee. A detailed clinical history was taken from all patients. Total 50 patients were selected according to the inclusion criteria. History of cough, breathlessness, fever, exposure to indoor smoke, hours of exposure per day, quantity of biomass utilization per day. History of smoking with duration and severity of smoking exposure in terms of pack year was asked. One pack year is one pack of twenty cigarettes for a period of one year. Past history of tuberculosis, recurrent chest infections, chronic bronchitis, was taken. High resolution CT was performed was following protocol: Scans were obtained using 256 slice dual source DECT [Somatom defination FLASH, Siemens]. Volumeteric acquisition was done and patients were examined in supine position in full inspiration.

Examination parameters were 80kV and 140kV, 130mAs, 0.5mm rotation time, detector collimation of 1mm. Scans were reconstructed with high special frequency bone algorithm and 512x512 matrix. These images were viewed with lung window width band central scatting of 1500Hu and -700Hu respectively. Additional images were reconstructed for mediastinal window with slice thickness of 5mm and normal algorithm and viewed using window width and center scatting of 35Hu and 350Hu respectively. Scans were reviewed by two senior radiologists on syngo software. Various post processing techniques were applied.

Inclusion Criteria:

All adult symptomatic patients from Gujjar community who were referred from Department of Pulmonary Medicine for undergoing HRCT lung were included in the study after obtaining proper consent. A written and informed consent was taken from all patients in their vernacular language.

Exclusion Criteria:

Age <18 years were excluded and patients with contraindications to CT Scan were excluded from the study.

RESULTS:

Patients were analyzed. The most common presentation was dyspnea in 38% of study patients followed by cough in 34% of study patients as depicted in Figure 1.

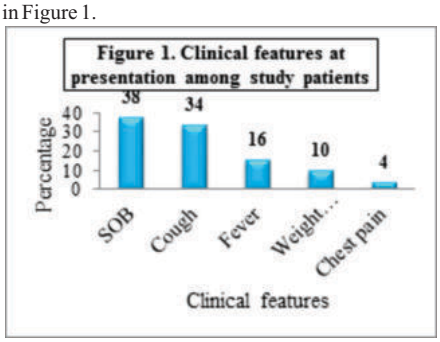


Table 1 depicts that after pulmonary function test, it was observed that 26% of study patients had obstructive pattern of PFT, 36% of study patients had restrictive pattern of PFT and rest 38% of study patients had normal PFT.

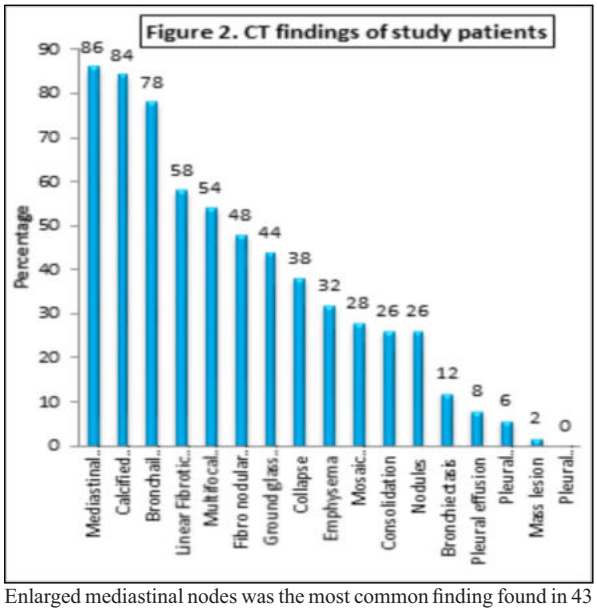
Table 1: Pulmonary function test (PFT) findings of study patients

PFT Findings	Number	Percentage
Obstructive	13	26
Restrictive	18	36
Normal	19	38

Table 2 depicts that after chest radiography, it was observed that 44% of study patients had Nodular opacities, 34% of study patients had collapse, 20% of study patients had consolidation and 8% of study patients had pleural effusion.

Table 2: Chest radiograph findings		
Findings	**Number**	**Percentage**
Nodular opacities	22	44
Consolidation	10	20
Collapse	17	34
Pleural effusion	4	8

CT findings of patients reveals that 86% of study patients had Mediastinal lymphadenopathy, 84 % of study patients had calcified mediastinal lymphadenopathy, 78% of study patients had Bronchial thickening, 58% of study patients had Linear Fibrotic bands, 55% of study patients had Multifocal bronchial narrowing, 48% of study patients had Fibro nodular patches, 44% of study patients had Ground glass opacity, 38% of study patients had collapse, 32% of study patients had emphysema, 28% of study patients had Mosaic attenuation, 26% of study patients had consolidation and nodules, 12% of study patients had bronchiectasis, 8% patients had pleural effusion, 6% of study patients had pleural thickening and 2% of study patients had mass lesion as depicted in figure 2.



Enlarged mediastinal nodes was the most common finding found in 43 study patients (86%). Bilateral para tracheal nodes were most common nodes involved followed by sub carinal and hilar nodes. 42 study patients had calcified nodes with amorphous and dense calcification being most common. Ring calcification was found in 10 study patients. One patient with lung mass had heterogeneously enhancing mediastinal nodes with stippled calcification.

Table 3 depicts the nodal stations involved.

Table 3: Nodal stations involved		
Nodal stations	**Number**	**Percentage**
Subcarinal	14	32.6
Paratracheal nodes*	8	18.6
Hilar	2	4.7
Upper paratracheal	7	16.3
Lower paratracheal	8	18.6

66.7 % of study patients with calcified mediastinal LAP show amorphous type of calcification and 1 patient had stippled fine calcification which subsequently proved to have malignancy as depicted in figure 3.

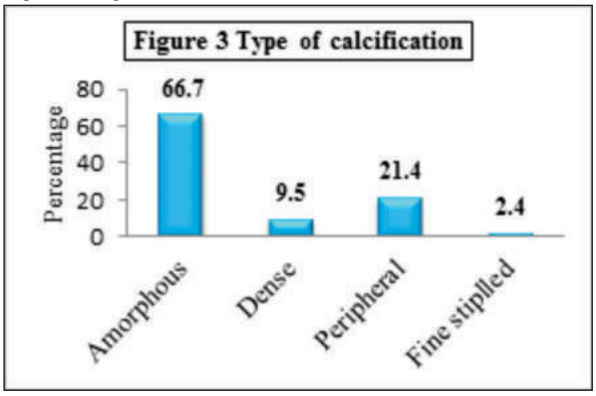


Table 4 depicts, 9 (20.9%) of study patients had necrotic nodes. 7 of them had active tuberculosis at the time of imaging.

Table 4 Presence of necrotic nodes		
Necrotic node	**Number**	**Percentage**
Present	9	20.9
Absent	34	79.1

Table 5 depicts, 58% of total study patients had linear fibrotic bands present and among them Upper lobes were most commonly involved with 68.9% of study patients having upper lobe involvement.

Table 5 Presence of necrotic nodes		
Necrotic node	**Number**	**Percentage**
Present	29	58
Absent	21	42

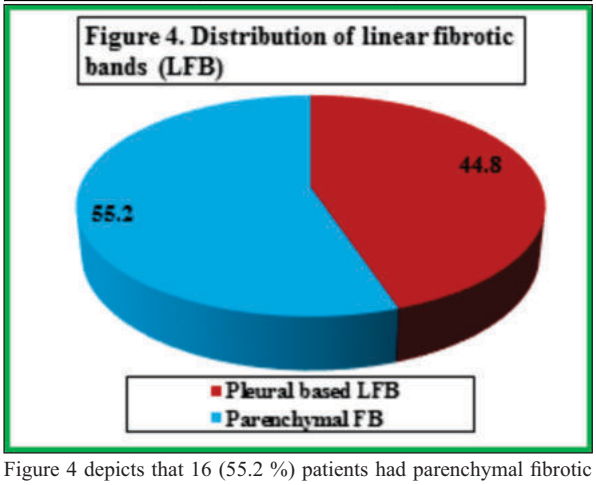


Figure 4 depicts that 16 (55.2 %) patients had parenchymal fibrotic bands and 13 (44.8%) had pleural based linear fibrotic bands.

Table 6 represents, 33.3 patients had multi bronchial involvement, and the most common bronchus involved was RML bronchus.

Table 6: Distribution of involvement of bronchi		
Bronchus	**Number**	**Percentage**
Multiple bronchial involvement	9	33.3
RML	8	29.6
RUL	5	18.5
LUL	4	14.8
Lingula	1	3.7

Table 7 represents, 38% of total patients had collapse of out of which RML collapse was most common present in 47.4 of patients fallowed by RUL.

Table 7: Lobar distribution of collapse		
Lobe	**Number**	**Percentage**
RML	9	47.4
RUL	5	26.3
LUL	3	15.8
Lingula	2	10.5

Table 8 represents, 7.7% of study patients had lobar consolidation and it was mostly multifocal as present in 92.3% of study patients with consolidation.

Table 8: Type of consolidation among study patients		
Type of consolidation	**Number**	**Percentage**
Multi focal consolidation	12	92.3
Lobar consolidation	1	7.7

Table 9 represents, Multilobar presence of consolidation was present in majority of patients 69.2%. RLL consolidation was present in 15.4% of patients with consolidation.

Table 9: Lobar distribution of consolidation		
Lobe	**Number**	**Percentage**
Multi lobar involvement	9	69.2
RLL	2	15.4
RUL	1	7.7
LLL	1	7.7

Figure 5 depicts, Fibro parenchymal opacities were present in 48% of study patients and 62.5% had bilateral involvement rest 37.5% had unilateral involvement. Among them most common involvement was upper lobes as 54.2 % patients were involved followed by multi lobar involvement.

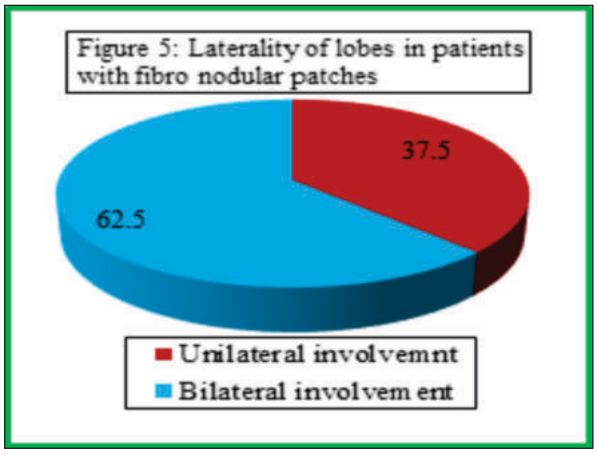


Table 10 represents, 26% of patients had presence of some form of nodules out of which 53.8% had tree in bud pattern and rest 38.4% had perilymphatic/sub pleural pattern of nodules and 7.7% had random nodules.

Table 10: Pattern of nodules		
Pattern of nodules	**Number**	**Percentage**
Tree in bud	7	53.8
Random	1	7.7
Perilymphatic/ Subpleural	5	38.4

Table 11 represents, 18 (36%) of study patients had tuberculosis of them 7 (14%) had active tuberculosis and 11(22%) had healed tuberculosis. Bluish-black mucosal pigmentation was documented in all patients, while 62 percent patients show bronchial narrowing. RML bronchus was most common involved bronchus.

Table 11: Tuberculosis status among study patients		
Tuberculosis status	**Number**	**Percentage**
Active TB	7	14
Healed TB	11	22

DISCUSSION:

The "Gujjar lung" disease is characterized by progressive dyspnea and productive cough with blackish sputum, usually manifesting beyond fourth decade of life. Bronchial anthracofibrosis has recently been defined in the radiology as a luminal narrowing associated with anthracotic pigmentation on bronchoscopy without a relevant history of pneumoconiosis or smoking. The study comprised of 21 men and 29 women with an average age of 58 years to 65 years with a range of 43 to 87 years. Most cases were seen in the age group of 50 to 69 years. In the present study females were affected more commonly with a female to male ratio of 1.38 : 1. Females were predominantly affected which is similar to studies by Yeon Jae Kim et al, and Hyae Young Kim. In a study of 333 patients with anthracofibrosis by Yeon Jae Kim et al. , there were 51 males and 282 females with a female to male ratio of 5.5 : 1. In a study by, Hyae Young Kim, out of total 54 patients with anthracofibrosis , 16 were male and 38 were females with a female to male ratio of 2.4 : 1. Bronchial soft-tissue thickening on HRCT was the most common finding noted in our study. 39 (78%) of study patients showed this feature with RML bronchus most commonly involved in 19 (38%) patients. Chung et al. had reported peribronchial cuffing on CT chest in 24 of 28 patients with BAF. In a series of 333 patients with BAF from Korea by Kim Y Jet al. peribronchial cuffing was present in 80%.

The second most common HRCT finding in our study was linear fibrotic bands. These appear as linear opacities about 1–3 mm in thickness. This finding was present in 29 (58%) of our study cases. These linear fibrotic bands predominantly involved upper lobes in 18(36%) patients and both upper and middle lobes in 7 (14%) patients. Kahkoueeet al. observed this finding in 53% of patients with BAF and may represent pleuroparenchymal fibrosis. These bands represent areas of fibrosis caused due to exposure to biomass fuel smoke.

In the present study multifocal bronchial narrowing was noted in 27 (54%) cases with right middle lobe bronchus most commonly affected noted in 8 (16%) patients . A study in 58 patients with BAF conducted by Kahkoueeetal reported multifocal bronchial stenosis in 23 (39.7%) with right middle lobe bronchus being most commonly affected.

Fibro parenchymal opacities represented fibrotic patches usually involving upper lobes. Fibro parenchymal opacities were predominately noted in upper lobes which was present in 13 (54.2%) patients out of 24 patients in our study**.** Anandamoyee Dhar et al. studies CT scans of 14 patients of BAF and fibro nodular patches were described in few patients only. The ground glass opacities and mosaic attenuation were noted in a total of 22 (44%) patients and 14 (28%) patients respectively. The distribution of GGOs was diffuse in 11(50%) patients, peripheral in 8 (36.4%) patients and central in 3 (13.6%) patients out of 22 patients. Mosaic attenuation was present in 14 (28%) patients. In a study from Iran by Kahkoueeet al. mosaic appearance was seen in 21 of 58 (36.2%) patients on HRCT.

19 (38%) patients out of 50 patients in our study had collapse. Pilaniyaet et al. prospectively studied a series of 24 patients with BAF and found segmental collapse in 13 (54%) 0f patients. Emphysema both paraseptal and centrilobular was present in 16 (32%) study patients. Kim YJ et al. studied a series of 333 patients with BAF from Korea, 56 (16.8%) patients was seen having features of COPD.

Consolidation was seen in 13 (26%) of our study patients. In a study from Iran by Kahkouee et al. consolidation on HRCT chest was seen among 32 of 58 (55.2%) patients with BAF with right middle lobe being most commonly involved. Nodules were noted in 13 (26%) patients in our study with size less than 3mm. 50 patients, 6 (12%) patients had bronchiectasis. 4 (66.6%) patients had multilobar tubular bronchiectasis and 2 (33.3%) had lobar traction bronchiectasis involving RUL and LUL respectively. In a study from Korea by Kim HY et al. bronchiectasis was reported in 30% of patients with BAF, while a study from Iran by Kahkouee et al. documented bronchiectasis in 24 of 58 (41.3%) patients with BAF.

Mediastinal LAP was noted in 43 (86%) patients in our study. Out of them 42 patients had calcified nodes. In a study from Korea, by Kim HY et al. enlarged lymph nodes were seen in 166 of 252 (66%) patients, of whom 112 had calcification within the nodes. Pleural effusion was noted in 4 (8%) patients and pleural thickening was noted in 3 (6%) patients. In a study on HRCT findings in patients with BAF by Kahkouee et al. in Iran, pleural effusion was seen in 17 of 58 (29.3%) patients while pleural thickening was reported in 14 of 58 (24.1%) patients. 18 (36%) patients had tuberculosis, 31 (62%) patients had abnormal spirometeric parameters and narrowing of involved bronchus was noted in 31 (62%) patients where RML being the most commonly involved bronchus.

CONCLUSION:

Gujjar lung is a distinct clinical entity affecting the Gujjar and bakerwal community only, whose diagnosis can be made on basis of spectrum of hrct findings as described in this study. The HRCT findings of gujjar lung are non specific and overlap with anthrocofibrosis. However large conglomerate fibrotic masses in midzone and upper zone of lung are typically seen in Gujjar lung in late stages. The study suggests that by bronchial thickening, linear fibrotic bands, multifocal bronchial narrowing, fibronodular patches (fibrotic masses), ground glass opacities, segmental/lobar collapse, tuberculosis , emphysema, mosaic attenuation, consolidation , nodules, bronchiectasis,

pleural effusion, pleural thickening with calcified mediastinal nodes in patients of Gujjar community is highly suggestive of Gujjar lung.

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