e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2023; 15(10); 186-194

Original Research Article

# A Clinical Study of Lung Cancer in Non Smokers with Special Reference to Histopathology

**Farjana Begum[1], Basanta Hazarika[2], Aishwarya Nair[3]**

[1]MD DNB, Assistant Professor, Department of Pulmonary Medicine, Gauhati Medical College
[2]Professor and HOD, Department of Pulmonary Medicine, Gauhati Medical College
[3]Senior Resident, Department of Pulmonary Medicine, Gauhati Medical College

**Received: 25-07-2023 / Revised: 28-08-2023 / Accepted: 30-09-2023**
**Corresponding author: Dr. Farjana Begum**
**Conflict of interest: Nil**

**Abstract:**

**Introduction:** Lung Cancer is the most common cause of cancer related deaths in men and women worldwide, responsible for 1.8 million deaths in 2020. There are two broad categories of lung cancer, Small cell lung cancer (SCLC) and Non-small cell lung cancer(NSCLC) .Adenocarcinoma is the most common of the NSCLC.[1,2] For study purpose, the term Non-smoker is considered same as the term Never smoker, which is defined as a person who smokes less than 100 cigarettes in life time including lifetime non-smokers.

**Aims and Objectives:** To study the clinical and radiological profile of lung cancer in Non-smokers and to study the histopathologic type of lung malignancy occurring in Non smokers

**Materials and Methods:** A total of 342 cases of Lung Malignancy were studied out of which 279 cases were smokers and were excluded from the study. The rest 63 patients who were non-smokers were included in the study. Proper history, physical examination, relevant investigations, bronchoscopy, biopsy was done to obtain a histopathological examination.

**Results:** Total of 63 cases who fulfilled the inclusion criteria were included in the study, 68.3% were females and 31.7% were male. It was observed that most of the cases in this study were housewives and majority of the patients in our study had exposure to biomass fuel, seen in 54% of cases, followed by exposure to passive smoke, seen in 30.2% cases., Adenocarcinoma (74.6%) cases, Squamous cell carcinoma in 8 (12.7%) cases, Non-small cell Lung carcinoma in 4 (6.3%) cases, Small cell carcinoma in 2 (3.2%) cases, Carcinoid tumour in 1(1.6%) case, Mesothelioma in 1(1.6%) case.

**Conclusion:** Lung cancer in non-smokers is common among middle aged females who were housewives and had exposure to biomass fuel. Lung mas is ,peripheral in location in most cases and ct guided biopsy was the most common modality used for getting diagnosis. Adenocarcinoma was the most common type followed by squamous cell carcinoma.

**Keywords:** NSCLC-Non Small Cell Lung Cancer, SCLC-Small Cell Lung Cancer, TBNA-Trans Bronchial Needle Aspiration, TBLB-Transbronchial Lung Biopsy, BAL- Broncho Alveolar Lavage.



## Introduction

Lung Cancer is the second most common cancer globally with 2.21 million new incident cases in 2020.[4] NSCLC which accounts for the remaining 85% of cases, is further divided into, three major pathologic subtypes, Adenocarcinoma, Squamous cell carcinoma and Large cell carcinoma. Adenocarcinoma by itself accounts for 38.5% of all lung cancer cases, with squamous cell carcinoma accounting for 20% and large cell carcinoma accounting for 2.9% [5,6] Although one year survival has improved over the past fewdecades, overall, five year survival relatively remains unchanged. SCLC which is a highly malignant tumor derived from cells exhibiting neuroendocrine characteristics, accounts for 15% of lung cancers. In the past several decades incidence of adenocarcinoma has increased greatly, and it has replaced squamous cell carcinoma as the most prevalent type of NSCLC. An estimated 15% of lung cancers in men and up to 53% in women worldwide occur in nonsmokers, accounting for 25% of all lung cancer cases. Adenocarcinoma of lung is more common than squamous cell carcinoma in nonsmokers[6,7] Risk factors considered to be important for nonsmokers include environmental tobacco exposure, environmental exposure to carcinogens such as radon, arsenic asbestos, a history of lung disease, including interstitial lung disease and family history of early onset cancer. A multivariate analysis of lung adenocarcinoma found that non smoking status was an independent predictor of improved survival and

such findings have suggested that, cancer in nonsmokers may display a distinct biologic behaviour and natural history. Aim of the study was the clinical and radiological profile of lung cancer in Nonsmokers and to study the histopathologic type of lung malignancy occurring in Nonsmokers.

## Materials and Methods

A total of 342 cases attending the outpatient and inpatient Departments of Pulmonary Medicine, Internal Medicine and other allied departments were diagnosed as lung malignancy. Out of 342 cases, 279 cases were smokers and were excluded from the study. The rest 63 patients who were nonsmokers were included in the study. The sixty-three patients included in the study were subjected to history taking and with pretested proforma (annexure 3) with emphasis on the presenting symptoms and its duration, course of illness, co morbidities, occupational history and previous medications were recorded. Smoking status and biomass exposure of the patients were also evaluated. Patients were thoroughly examined for general physical and respiratory signs of the underlying disease. Routine blood examination, sputum analysis, radiological investigations and bronchoscopy, thoracoscopy or CT-guided biopsy for histopathological examination.

## Results and Observations

It was a hospital based observational study carried out for a period of one year from 1st August 2021 to 31st July 2022. Both indoor and outdoor patients were included in the present study. Ethical clearance was obtained from the Ethical Committee of the Institution prior to the onset of study. The results and observations of the data were recorded in tabular form.

**Table 1: Age Distribution of Patients with Lung Carcinoma**

| Age group | No. of cases | Percentages |
|---|---|---|
| 21-30 | 1 | 1.5% |
| 31-40 | 3 | 4.7% |
| 41-50 | 15 | 23.8% |
| 51-60 | 25 | 39.6% |
| 61-70 | 11 | 17.5% |
| >70 | 8 | 12.6% |
| TOTAL | 63 | 100% |
| Mean±SD | 56.5±10.98(Median= 55yrs) | |

In the present study majority of the cases, (39.6%) belonged to the age group of 51-60 years, followed by 23.8% cases were present in the age group 41-50yrs. There were 10 patients each in the age group 61-70 years and >70years. Only 1 patient was present in the age group of 21-30yrs. Maximum age recorded was 79 years and the minimum was 27 years. The mean age in this study was 56.5 10.98 years.

**Table 2: Sex Distribution**

| Sex | No. of cases | Percentage |
|---|---|---|
| Female | 43 | 68.3% |
| Male | 20 | 31.7% |
| Total | 63 | 100% |

In the present study out of 63 patients, 68.3% cases were females, and 31.7% cases were males. The male to female ratio was 1:2.15.

**Table 3: Age and Sex Wise Distribution of Patients**

| Age Group(in yrs) | Male | | Female | | Total |
|---|---|---|---|---|---|
| | No. of cases | Percentages | No. of cases | Percentages | |
| 21-30 | 0 | 0 | 1 | 1.50% | 1 |
| 31-40 | 0 | 0 | 3 | 4.70% | 3 |
| 41-50 | 4 | 6.30% | 11 | 17.40% | 15 |
| 51-60 | 9 | 14.20% | 16 | 25.40% | 25 |
| 61-70 | 4 | 6.30% | 7 | 11.11% | 11 |
| >70 | 3 | 4.70% | 5 | 7.90% | 8 |
| Total | 20 | 31.7% | 43 | 68.3% | 63 |

Of the total cases, majority of the cases, (39.6%) belongs to the age group of 51- 60 years of which most of the cases (66.6%) were females.

**Table 4: Occupation of the Patients**

| Occupation | No. of cases | Percentages |
|---|---|---|
| House Wife | 26 | 41.30% |
| Farmer | 15 | 23.80% |
| Cook | 4 | 6.30% |
| Factory Worker | 4 | 6.30% |
| Shopkepper | 4 | 6.30% |
| Teachers | 4 | 3.20% |
| Business | 2 | 3.20% |
| Manual Labourer | 2 | 3.20% |
| Asha Worker | 1 | 1.60% |
| Student | 1 | 1.60% |
| Total | 63 | 100% |

From this table, it was observed that the highest number of cases (41.3%) were House wives , followed by 23.8% cases were observed to be Farmers. Four cases were found in each group - Cook, Factory worker, Shopkeeper and Teacher. On the other hand, 1 Student and 1 Asha worker also suffered from lung cancer.

**Table 5: Clinical Symptoms in Patients with Lung Cancer**

| Clinical symptoms | No. of cases | Percentage |
|---|---|---|
| Cough | 58 | 92.1% |
| Dyspnea | 48 | 76.2% |
| Chest pain | 32 | 50.8% |
| Fever | 8 | 12.7% |
| Hemoptysis | 12 | 19% |
| Hoarsness of voice | 4 | 6.3% |
| Weight loss | 20 | 31.7% |

In the present study Cough was the most common clinical symptom present in 58 cases (92.1%), followed by Dyspnoea which was present in 48 cases (76.2%). Chest pain was observed in 50.8% cases and weight loss in 31.7% cases, and Haemoptysis in 19% cases. The least common symptom observed was Hoarseness of voice, present only in 4 cases (6.3%).

**Table 6: Clinical Signs in Lung Cancer Patients**

| Clinical signs | No. Of cases | Percentages |
|---|---|---|
| Pallor | 14 | 22.0% |
| Clubbing | 12 | 19.00% |
| Lymphadenopathy | 8 | 12.60% |
| Pedal edema | 5 | 7.90% |
| Superior vena caval obstruction | 2 | 3.17% |

Though all the 63 cases presented with different clinical symptoms, physical signs were seen in only 41 cases. The most common clinical sign found in the present study was Pallor which was seen in 14 cases (22.2%), followed by Clubbing, which was seen in 19% cases. Lymphadenopathy was seen in 8 cases (12.6%) followed by Pedal Edema in 5 cases (7.9%) and Superior Vena Caval Obstruction in 2 cases (3.17%).

**Table 7: Co-morbidities in Patients with Lung Carcinoma**

| Co-morbidities | No. Of cases | Percentage |
|---|---|---|
| T2DM | 14 | 22.20% |
| HTN | 12 | 19.00% |
| Hypothyrodism | 6 | 9.50% |
| CAD | 5 | 7.90% |
| Breast Carcicoma | 1 | 1.60% |
| DCMP | 1 | 1.60% |
| Rheumatoid Arthritis | 1 | 1.60% |

Most common comorbidity observed among the cases was Type 2 diabetes mellitus, observed in in 22.2% cases, which was followed by hypertension, observed in 19% cases. Hypothyroidism was observed in 6 cases and coronary artery diseases in 5 cases. Breast Carcinoma, DCMP and Rheumatoid Arthritis were observed in 1 case each.

**Table 8: Exposure History in Patients with Lung Carcinoma**

| Exposure History | No. Of cases | Percentage |
|---|---|---|
| Biomass/ Cooking Fuel | 34 | 54% |
| Passive Smoking | 19 | 30.25 |
| Metal Dust/ Toxic Fumes & Gases | 5 | 7.9% |
| Outdoor Air Pollution | 4 | 6.3% |

In the present study maximum patients, were exposed to Biomass fuel, which was seen in 54% cases of which majority of the patients were females. This was followed by passive smoking which was observed in 30.2% of cases. Exposure to metal dust/ toxic fumes and gases was seen in 7.9% cases. and exposure to

Outdoor air pollution was observed in 6.3% cases.

**Table 9: Family History of Lung Cancer**

| Family History | No. of cases | Percentage |
|---|---|---|
| Absent | 56 | 88.8% |
| Present | 7 | 11.1% |
| Total | 63 | 100% |

Out of the 63 cases in this study, only 7 cases (11.11%) had positive family history of lung cancer in first degree relatives, rest 56 cases (88.88%) did not have family history of lung cancer.

**Table 10: Underlying Lung Diseases in Patients with Lung Carcinoma**

| Underlying Lung Disease | No. of cases | Percentage |
|---|---|---|
| Absent | 46 | 62.70% |
| COPD | 7 | 11.10% |
| Post TB sequelae | 5 | 7.90% |
| Bronchiectasis | 2 | 3.10% |
| Bronchial asthma | 1 | 1.50% |
| ILD | 1 | 1.50% |
| PMF | 1 | 1.50% |

Of the 63 cases, majority i.e., 43 cases did not have underlying lung diseases while, 11.11% cases had COPD, and 7.9% cases had Post TB sequelae. Two cases had Bronchiectasis. Bronchial Asthma, ILD and PMF were observed in 1 case each.

**Table 11: Zone Of Involvement in Chest X-ray**

| CXR | No. Of cases | Percentage |
|---|---|---|
| LLZ | 15 | 23.80% |
| RUZ | 13 | 20.60% |
| LUZ | 10 | 15.90% |
| Multiple zones | 10 | 15.90% |
| RLZ | 7 | 11.10% |
| LMZ | 4 | 6.30% |
| RMZ | 4 | 6.30% |
| Total | 63 | 100% |

Left lower zone involvement was seen in most of the cases (23.8%) followed by, Right upper zone, which was found to be involved in 20.6% cases. Multiple zone involvement and Left upper zone involvement was found in 10 cases each. The least common site involved was Right Middle zone and Left Middle zone found in 4 cases, (6.3%) each.

**Table 12: Site of Lesion in CT Thorax**

| Site of the Lesion in CT | No. Of cases | Percentage |
|---|---|---|
| LL | 15 | 23.80% |
| RUL | 14 | 22.20% |
| LUL | 11 | 17.40% |
| RLL | 7 | 11.10% |
| Biateral | 3 | 4.80% |
| Left Hilum | 3 | 4.80% |
| Right Hilum | 3 | 4.80% |
| Right Pleura | 7 | 11.1% |
| Left Pleura | 5 | 7.9% |
| RML | 3 | 4.80% |
| Left Lingula | 1 | 1.60% |

In the present study the most common site involved in CT scan was Left lower lobe, which was observed in 23.8% cases followed by Right upper lobe, which was seen in 22.2% cases. This was followed by Left upper lobe involvement, seen in 11 cases and right lower lobe involvement, seen in 7 cases. Right side pleura was also found to be involved in 7 cases (11.1%). Left lingula was found to be the least common site involved , observed only in 1 case.

**Table 14: Extrathoracic Involvement in Patients with Lung Carcinoma**

| Extra thoracic Involvement | No. of Cases | Percentage |
|---|---|---|
| Lymph Node Metastasis | 8 | 12.60% |
| Bone Metastasis | 7 | 11.10% |
| Brain Metastasis | 5 | 7.93% |
| Liver Metastasis | 2 | 3.17% |
| Adrenal Metastasis | 1 | 1.58% |

Out of 23 patients with extra thoracic involvement, most common was lymph node metastasis seen in 12.6% cases, followed by Bone metastasis which was seen in 11.1% cases, and Brain Metastasis was observed in 5 cases, of which 2 cases were small cell carcinoma. In this study the least common metastasis, was Adrenal metastasis observed in 1case (1.58%).

**Table 15 (A): Different Modes of Diagnosis of Lung Carcinoma**

| Mode of tissue Diagnosis | No. Of cases | Percentage |
|---|---|---|
| CT guided Biopsy | 26 | 41.20% |
| Endobronchial biopsy | 20 | 31.70% |
| Thoracoscopy | 5 | 7.90% |
| Lymph node biopsy | 5 | 7.90% |
| TBNA (Transbronchial needle aspiration) | 4 | 6.30% |
| TBLB(Transbronchial lung biopsy) | 3 | 4.80% |
| Total | 63 | 100 |

CT guided biopsy was used to diagnose majority of the cases (41.2%). This was followed by Endobronchial biopsy, which was used to diagnose 31.7% cases. Lung cancer was diagnosed by thoracoscopy in 5 cases, TBNA in 4 cases and TBLB in 3 cases. Although 8 patients had peripheral lymphadenopathy, lymph node biopsy was used to diagnose only 5 cases, as procedure could not be done in rest of the cases due to small size and inaccessible location of lymph nodes and as the parenchymal lesion was accessible by other methods.

**Table 15 (B): Cytological Diagnosis**

| Cytology | No. Of cases | Percentage |
|---|---|---|
| BAL | 12 | 19% |
| Pleural Fluid | 9 | 14.2% |
| Total | 21 | 33.3% |

Out of 63 cases, 33.3% cases had cytology positive for malignancy of which 12 cases had BAL cytology positive and 9 cases had Pleural fluid cytology positive for malignancy.

**Table 16: Types of Lung Cancer in Non Smokers – Histopathological Examination**

| Type of lung CA-HPE | No. Of cases | Percentage |
|---|---|---|
| Adenocarcinoma | 47 | 74.6% |
| Carcinoid Tumor | 1 | 1.6% |
| Mesothelioma | 1 | 1.6% |
| NSCLC | 4 | 6.3% |
| Squamous Cell Carcinoma | 8 | 12.7% |
| Small cell CA | 2 | 3.2% |
| Total | 63 | 100% |

Most common Lung malignancy in Non smokers in the present study was Adenocarcinoma, observed in 74.6% cases, followed by Squamous Cell Carcinoma was seen in 12.7% cases, and Non Small Cell Carcinoma was observed in 4 cases. Small Cell Carcinoma was observed only in 2 patients. The least common types were Carcinoid tumour and Mesothelioma which was observed in 1 case (1.6%) each.

**Table 17: Central and Peripheral Lung Involvement in CT Scan Thorax**

| Type of carcinoma | No. Of cases | Site of Lesion | | | |
|---|---|---|---|---|---|
| | | Peripheral | | Central | |
| | | No. Of Cases | Percentage | No. Of Cases | Percentage |
| Adenocarcinoma | 47 | 38 | 80.80% | 9 | 19.20% |
| Squamous cell carcinoma | 8 | 3 | 37.50% | 5 | 62.50% |
| NSCLC | 4 | 2 | 50% | 2 | 50% |
| Small cell carcinoma | 2 | 0 | 0% | 2 | 100% |
| Mesothelioma | 1 | 1 | 100% | 0 | 0% |
| Carcinoid | 1 | 0 | 0% | 1 | 100% |
| Total | 63 | 44 | 68.80% | 19 | 30.20% |

In the present study, out of the 47 cases of Adenocarcinoma, 80.8% cases presented as peripheral lesions and 19.2% as central lesion, while of the Squamous cell carcinomas 3 cases had peripheral and 5 cases had central lung involvement. Of the total cases of NSCLC 50% cases presented as central and the rest 50% cases as peripheral lesions. All the cases of Small cell carcinoma presented as central lesions. Only 1 case each of Mesothelioma and Carcinoid tumor were observed, which presented as peripheral and central lesion respectively in CT scan thorax.

**Discussion**

Total of 63 cases who fulfilled the inclusion criteria were included in the study..In the present study, 63 cases were included whose age ranged from 27 to 79 years..In a study by Tho et al [6] (2006) a younger age, with mean age at diagnosis of 62 years was found for never smokers compared to 72 years and 67 years for ex-smokers and current smokers, respectively. Majority of the cases, (68.3%) were females and 31.7% were males. The male: female ratio was 1: 2.15. In a similar study by Nordquist et al [ (2004)[7] in never smokers there was an increased percentage of female subjects (78%) in the never-smoker category, with a ratio of male: female 1:3.55In the present study it was found that, of the total cases, majority of the cases, (39.6%) belonged to the age group of 51-60 years of which most of the cases (66.6%) were females.In a study by Tho et al [6] (2006) similar result seen. Most cases in my study were House wives, 41.3% cases, followed by 23.8% cases were farmers. In a multicenter descriptive study by K. Thiam et al [8](2018) it was found that of non smokers with bronchopulmonary cancer, 44 % were females and majority (40%), were Housewives. In the present study Cough was the most common clinical symptom, which was present in 92.1% cases, followed by Dyspnoea which was present in 48 cases (76.2%). Chest pain was observed in 50.8% cases, weight loss in 31.7% cases, and Haemoptysis in 19% cases. The least common symptom observed was Hoarseness of voice, which was present only in 4 cases (6.3%). R Prasad et al [9](2015) in a study of 124 patients, which included both smokers and non-smokers, the most common presenting symptom was Cough found in 94% cases, followed by Chest pain and Dyspnea was found in 80% cases and 70% cases respectively. In our study though all the 63 cases presented with different clinical symptoms, physical signs were seen only in 41 cases. The most common clinical sign found in the present study was Pallor, which was seen in 14 cases (22.2%), followed by 19% cases had Clubbing. Lymphadenopathy was seen in 8 cases (12.6%) followed by Pedal edema which was observed in 5 cases (7.9%). The least common sign was Superior Vena Caval Obstruction which was seen only in 2 cases (3.17%). John et al 10 (2015) in their study of 124 patients with lung cancer, which included both smokers and non-smokers, showed that the most common clinical sign was Pallor, which was seen in (42%) cases, followed by Peripheral Lymphadenopathy, seen in (38%) cases and clubbing which was seen in (12%) cases. In the present study the most common comorbidity observed among the cases was Type 2 diabetes mellitus, which was seen in 22.2% cases, which is followed by hypertension, seen in 19% cases. Hypothyroidism was observed in 6 cases and coronary artery disease in 5 cases. Breast Carcinoma, DCMP and Rheumatoid Arthritis were observed in 1 case each. In a cohort study by Leiter A et al 11 (2021) of the 3467 subjects with lung cancer studied, 285 (8.2%) had preexisting T2DM. In the present study maximum patients, were exposed to Biomass fuel which was observed in 54% cases of which majority of the patients were females. This was followed by passive smoking which was observed in 30.2% cases. Exposure to metal dust/ toxic fumes and gases was seen in 7.9% cases. Exposure to Outdoor air pollution was the least common, observed in 6.3% cases. In a study by k.Prasad et al 12 (2015) most common exposure in non smokers was Biomass/Cooking fuel found in 51.5% cases which was followed by passive smoking found in 29% cases.

In present study out of 63 cases, 7 cases, (11.11%) had a first degree relative with lung cancer while the rest 56 cases did not have positive family history of lung cancer. In a study by Shaw GL et al 13 (1991) of 57 non smoking cases and 297 non smoking controls including a study found lung

cancer among individuals with first-degree relative having lung cancer did not increase the risk of lung cancer among non smoking cases but in smokers they increase the risk.

In the present study out of the 63 cases, majority of the cases, i.e.,11.11% cases had COPD as the underlying lung disease,7.93% cases had Post TB sequelae and 2 cases (3.15%) had bronchiectasis. One patient (1.5%) each had Bronchial Asthma, ILD and PMF.In a study by Hubbard et al 14 (2013) out of 11,888 incident cases of lung cancer, 23% had a prior diagnosis of COPD compared with only 6% of the 37,605 controls. The odds of lung cancer in patients who had COPD diagnosed within 6 months of their cancer diagnosis were 11-fold those of patients without COPD. In the present study the most common site involved in CT scan was Left lower lobe, in 23.8% cases followed by Right upper lobe, seen in 22.2% cases. This was followed by Left upper lobe involvement in 11 cases and right lower lobe. involvement in 7 cases. Left lingula was found to be the least common site involved, only in 1 case. Similar to our study, In the study by Prasad et al 152015), among the non smokers Left lower lobe was found to be involved in majority of the cases ie, 35.7% cases. In the present study Lung mass was the most common CT scan feature involved in 40 cases (63.4%), followed by Mediastinal node involvement, which was seen in 57.1% cases.

This was followed by pleural involvement, seen in 19% cases, which included both pleural effusion and pleural nodules. Consolidation was seen in 5.87% cases. The least common feature was SVC involvement which was seen in 2 cases (3.1%). On contrary in a study by Verma et al (2019) in non smokers with lung cancer, 50% presented with pleural effusion in CT scan thorax, followed by 42.9% with lung mass and 21.4% with mediastinal node involvement. In the present study Out of 23 patients with extra thoracic involvement, most common was lymph node metastasis observed in 12.6% cases, followed by Bone metastasis seen in 11.1% cases. Brain Metastasis was observed in 5 cases (7.93%), and Liver Metastasis in 2 cases (3.17%). The least common was Adrenal metastasis observed in 1case (1.58%). On the contrary in the study by Varma et al 16(2019) in non smokers with lung cancer, most common extrathoracic involvement was Liver metastasis and adrenal metastasis, which was found in 14.3% cases each followed by lymph node and bone metastasis, which was found in 7.3% cases each.

In the present study CT guided biopsy was used to diagnose majority of the cases (41.2%), followed by Endobronchial biopsy, which was used to diagnose 31.7% cases. Lung cancer was diagnosed by thoracoscopy in 5 cases, TBNA in 4 cases and TBLB in 3 cases. Although 8 patients had peripheral lymphadenopathy, lymph node biopsy was used to diagnose only 5 cases, as procedure could not be done in rest of the cases due to small size and inaccessible location of lymph nodes and as the parenchymal lesion was accessible by other methods.

Out of 26 patients with positive cytology 9 patients had pleural fluid cytology positive and 12 patients had BAL cytology positive for tumor cells.Rawat et al (2009) 17showed in his study of both smokers and non

smokers with lung malignancy, Bronchoscopic biopsy, brushings and lavage had the maximum yield in diagnosis, and was used to diagnose 48.77% cases, which was followed by radiography guided FNAC and biopsy which was used to diagnose 43.8% cases.

In the present study most common Lung malignancy in Non smokers was Adenocarcinoma, found in 74.6% cases, followed by Squamous Cell Carcinoma seen in 12.7% cases. Non Small Cell Carcinoma was found in 4 cases (6.3%), and Small Cell Carcinoma was seen in 2cases (3.2%). The least common types were Carcinoid tumour and Mesothelioma observed in 1 case (1.6%) each.

RC Brownson et al 18(1995) in case-control study of lung cancer among non smoking women in Missouri showed Adenocarcinoma was the most common histologic type among former smokers and lifetime non-smokers, accounting to 65.6% of total cases. The never-smoking NSCLC group had a significantly higher incidence of adenocarcinoma (87.8%) in comparison to the smoking NSCLC group (49.1%) ($P < .0001$) In the present study, of the total cases of Adenocarcinoma, 47 cases which is the predominant histopathological type in the study, 38 cases (80.8%) presented with peripheral lung involvement and 9 cases (19.2%) presented with central lung involvement, whereas majority of the cases of squamous cell carcinoma 5 cases (62.8%) presented with central lung involvement and all cases of small cell carcinoma (100%) had central lung involvement in CT scan.

In a similar study by Verma et al(2019) Adenocarcinoma presented as peripheral mass in 61% cases and in 38.3% cases as a central lesion. Presentation as a central mass was more common among squamous cell carcinoma, which was seen in 72.2% cases, than as a peripheral lesion, which was seen in 27.8% cases. Small cell cancer also presented more commonly as a central lesion, which was observed in in 83.6% cases, than as a peripheral lesion seen in 16.4% cases. These findings were almost similar to our study.

**Conclusion**

Clinico-Radiological examination and Histopathological evaluation of lung carcinoma is

required for accurate diagnosis. Lung cancer in nonsmokers is a different medical entity. From the present study, it can be concluded that among non-smokers middle aged females who were housewives were more commonly affected with lung cancer. Cough and dyspnea were the common presenting complaints among patients. Majority of the patients had exposure to biomass fuel, and some patients also had history of passive smoking and\ underlying COPD which can be risk factors to the development of lung cancer in nonsmokers. The most common radiographic presentation in patients was lung mass. Most of the patients in our study presented with peripheral lung involvement and were diagnosed using CT guided biopsy. From the present study, it was concluded that the most common histopathological type of lung carcinoma occurring in non-smokers was Adenocarcinoma followed by Squamous cell carcinoma. As there are very limited studies done on lung cancer in non-smokers and considering all the limitations of this study, more elaborate and larger studies are needed to establish the clinical, radiological and histopathological profile of lung cancer in nonsmokers.

**Bibliography**


1. Sharma R. Mapping of global, regional and national incidence, mortality and mortality-to-incidence ratio of lung cancer in 2020 and 2050. International journal of clinical oncology. 2022 Apr;27(4):665-75.
2. Fitzmaurice C, Allen C, Barber RM, Barregard L, Bhutta ZA, Brenner H, Dicker DJ, Chimed-Orchir O, Dandona R, Dandona L, Fleming T. Global, regional, and national cancer incidence, mortality, years of life lost, years lived with disability, and disability-adjusted life-years for 32 cancer groups, 1990 to 2015: a systematic analysis for the global burden of disease study. JAMA oncology. 2017 Apr 1;3(4):524-48.
3. Charles S. Dela Cruz, Lynn T Tanoue, and Richard A Matthay. Lung cancer: epidemiology, etiology, and prevention. Clinics in chest medicine. 2011 Dec;32(4):605-44.
4. Parkin DM, Bray F, Ferlay J, Pisani P. Global cancer statistics, 2002. CA: a cancer journal for clinicians. 2005 Mar;55(2):74-108.
5. Subramanian J, Govindan R. Lung cancer in never smokers: a review. Journal of clinical oncology. 2007 Feb 10;25(5):561-70.
6. Toh CK, Gao F, Lim WT, Leong SS, Fong KW, Yap SP, Hsu AA, Eng P, Koong HN, Thirugnanam A, Tan EH. Never-smokers with lung cancer: epidemiologic vidence of a distinct disease entity. Journal of clinical oncology. 2006 May 20;24(15):2245-51.
7. Nordquist LT, Simon GR, Cantor A, Alberts WM, Bepler G. Improved survival in ever-smokers vs current smokers with primary adenocarcinoma of the lung. Chest. 2004 Aug 1;126(2).
8. Thiam K, Touré NO, Ndiaye EM, Baddredine H, Ndiaye M, Diop M, Niang A, Ba O, Diatta A, Cissé MF, Mbaye FB. Epidemiology of primary lung cancer among non-smokers in Senegal. Revue des Maladies Respiratoires. 2018 Nov 7;36(1):15-21.
9. Prasad R, Srivastava AN, Verma SK. Clinico-pathological profile of bronchogenic carcinoma among females in North India. Indian J Chest Dis Allied Sci. 2015 Jul 1;57(3):161-3.8.
10. Tho S, Mandal SK, Singh TT, Sharma TD, Amrithalingam V. Clinico-pathology of lung cancer in a regional cancer center in Northeastern India. Asian Pacific journal of cancer prevention. 2013;14(12):7277-81.
11. John Dubey N, Arti J, Varudkar H. A clinico-pathological profile of primary lung cancer patients presenting in a rural medical College of central India. Panacea Journal of Medical Sciences. 2016; 5:124-9.
12. Leten Gupta R, Chowdhary I, Singh P. Clinical, Radiological and Histological profile of Primary Lung Carcinomas. JK Science. 2015 Jul 1;17(3).
13. K. Prasad Sareen R, Pandey CL. Lung malignancy: Diagnostic accuracies of bronchoalveolar lavage, bronchial brushing, and fine needle aspiration cytology. Lung India: Official Organ of Indian Chest Society. 2016 Nov;33(6):635.
14. Shaw,Bharate Ramesh Tukaram, D G Mhaisekar, Anil Maske. Clinical profile of lung cancer patients. MedPulse International Journal of Medicine. February 2017.
15. Hubbard, Araujo LH, Horn L, Merritt RE, Shilo K, Xu-Welliver M, Carbone DP. Cancer of the lung: non–small cell lung cancer and small cell lung cancer. InAbeloff's Anurag Agrawal MD, Rajeev Tandon MD, Lalit Singh MD, Piyush Kumar MD, Hema Pant MD, Sumit Prakash MD. Clinical profile of lung cancer in a tertiary care teaching hospital in north india with special reference to acceptance and outcome of treatment. COPD.;50:12-7.
16. Prasad R, Srivastava AN, Verma SK. Clinico-pathological profile of bronchogenic carcinoma among females in North India. Indian J Chest Dis Allied Sci. 2015 Jul 1;57(3):161-3.
17. Verma A, Mitra S, Prasad R, Siddiqui MA, Kacker R. A Study on Lung Cancer in non-Smokers and Smokers in a Tertiary Care Hospital of Eastern India.
18. Rawat, Cancer of the lung: non–small cell lung cancer and small cell lung cancer. In Abeloff's

clinical oncology. Elsevier. 2020 Jan 1; 1108-1158.
19. Brawnson Pietanza MC, Krug LM, Wu AJ, Kris MG, Rudin CM, Travis WD. Small cell and neuroendocrine tumors of the lung. In DeVita, Hellman, and Rosenberg's Cancer: Principles & Practice of Oncology: Tenth Edition 2015 Jan 7. Wolters Kluwer Health Adis (ESP).