# Clinical and radiological profile of primary lung malignancies attending tertiary care center

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## Abstract
**Background:** To study the clinical and radiological profile of patients diagnosed to have primary lung cancer in our tertiary care centre.
**Methodology:** 100 patients diagnosed as primary lung cancer were studied by clinical, radiological, biochemical and histopathological examination.
**Results:** 82% patients are males and 18% are females. Average age of the patients was 57.6. 82% of them are smokers and 18% are non smokers. Non smoking females gave the history of exposure to passive smoking or biological fuel. All the patients were symptomatic at the time of diagnosis and commonest symptom was cough. Hemoptysis was seen in 22%. History of Pulmonary tuberculosis was seen in 19.5% of males and 11.1% of females. 79% of patients belong to above 51 years of age. 87.82% of patients gave a smoking history of more than 20 pack years. Right lung, upper and middle lobes are commonly involved. 68% of patients presented with mass lesions. Predominant symptom was cough present in all patients followed by shortness of breath and chest pain. Mass and intrathoracic lymphadenopathy were common presentation. 74% patients presented with contralateral hilar. Sub-carinal, contralateral mediastinal or supraclavicular lymphadenopathy suggesting inoperability. Single or multiple site extra-pulmonary metastasis was seen in liver, bone, brain and adrenals.
**Conclusions:** Primary lung cancer is a disease of 6th decade. Smoking is a significant causative factor. Most of the patients presented in inoperable state. Measures to discourage smoking habits among youth can prevent the dreadful disease to some extent.

**Keywords:** Primary lung cancer; Hemoptysis; Mass lesion; Lymphadenopathy; Metastasis.

## Introduction
Primary lung cancer is increasingly diagnosed in respiratory practice. Lung cancer is the commonest cause of cancer death both among males and females the world over [1]. Prevention of smoking and early diagnosis can help to reduce the morbidity and mortality [2].

The present study was undertaken to study the demographic profile, smoking history, symptomatology, radiographic patterns of the patients of primary lung cancer and to assess the operability and improving the morbidity and mortality by early diagnosis and prevention of the disease by discouraging smoking.

## Material and Methods
The present study comprises of 100 patients who are admitted in the Department of Tuberculosis and Chest Diseases, Katuri Medical College, Guntur, from November 2014 to September 2017. An ethical committee approval and a written informed consent from study subjects was obtained.

### Study Design
It is a prospective study of clinical and radiological profile of 100 cases of diagnosed primary lung cancer.

### Inclusion Criteria
Patients with clinical symptoms (symptoms suggestive of malignancy) of cough, hemoptysis, fever, dyspnea, hoarseness of voice, chest pain, weight loss, facial swelling, headache, arm swelling, and / or with any radiological features like space occupying lesion, hilar prominence, mediastinal widening, and collapse with consolidation, attending Pulmonology department of our tertiary care centre aged more than 18 were included

### Exclusion Criteria
1. Patients whose sputum is positive for AFB
2. Patients having clinical and radiological features suggestive of Tuberculosis and negative for AFB
3. Patients with poor general condition who are not amenable to any procedure
4. Patients with pulmonary hypertension
5. Patients with suspected vascular lesion
6. Patients with Bleeding disorders
7. Non-cooperative patients
8. HIV positive patients

### Study Protocol
All the patients having symptoms and radiological features suggestive of primary or secondary malignancy of lung and pleura are included in the study. Detailed demographic and clinical parameters including age, sex, occupation, and habits like smoking and alcoholism were taken. Patients with clinical symptoms suggestive of primary pulmonary malignancy were investigated. Routine biochemistry, hematology, chest X-Ray PA and lateral view, CECT Scan chest were taken. Patients were subjected to bronchoscopy, bronchial washings, bronchoscopic biopsy, accessible lymph node biopsy, pleural fluid analysis and radiology guided trans thoracic needle aspiration and biopsy. Specimen were subjected to histopathological examination. In selective cases immune-histochemical studies were undertaken to confirm the diagnosis. PET-CT was done only in selective patients. Some patients of adenocarcinoma were subjected to EGFR

mutation testing with fluorescent in situ hybridization technique (FISH). Baseline Pleural fluid analysis including TC, DC, ADA, sugar, protein, AFB, malignant cytology, cell block.

**Statistical Analysis**

Data were transferred from data collection sheets to an Excel spread sheet (Microsoft, Redmond, WA, USA). Simple statistics such as percentages were used to calculate the prevalence. Chisquare test of association was used for statistical significance

## Results

This was the prospective clinical study with a total number of patients 100.

**Demographic Data**

18 among 100 patients of primary lung cancer in our study gave a history of pulmonary tuberculosis. Among males 16 out of 82 gave history of pulmonary tuberculosis (19.51%). 2 out of 18 female patients gave history of pulmonary tuberculosis (11.11%)

**Sex Distribution**

**Among 100 patients 82 were male patients, 18 were female patients.**

**Total 1:** No. of patients n=100

| S. No. | Sex | No. of Patients | Percentage |
|---|---|---|---|
| 1. | Male | 82 | 82% |
| 2. | Female | 18 | 18% |

Lung cancer is more common among males than females and the value is statistically significant. The Chi-square statistic is 35.2237. The p-value is <.00001. The result is significant at p value <.001

**Table 2:** Age distribution of primary lung cancer

| S. No. | Age in Years | Males | Females | Percentage |
|---|---|---|---|---|
| 1. | <40 Years | 02 | 01 | 03% |
| 2. | 41-50 Years | 14 | 04 | 18% |
| 3. | 51-60 Years | 40 | 06 | 46% |
| 4. | 61-70Years | 16 | 07 | 23% |
| 5. | >70 years | 10 | 00 | 10% |
| Total | | 82 | 18 | 100% |

In males, the youngest patient was 34 year old and oldest was 83 years old, with an age range of 34 to 83 years. In females, the youngest was 40 year old and the oldest was 66 years.

**Risk Factor Evaluation**

82 (82.00%) patients of this study were smokers. Only 18 (18.00%) patients were non smokers.

**Table 3:** Smoking status

| | No. of patients (n=50) | Percentage |
|---|---|---|
| Smokers | 82 | 82.00% |
| Non smokers | 18 | 18.00%% |

**Table 4:** Smoking status

| Sex | Smokers | Non smokers |
|---|---|---|
| Males (n=82) | 76(92.68%) | 6(7.31%) |
| Females (n=18) | 6(33.33%) | 12 (66.67%) |

**Table 5:** Smoking – pack years

| Pack years | No. of patients | Percentage |
|---|---|---|
| 1-10 | 4 | 4.87% |
| 11-20 | 6 | 7.31% |
| 21-30 | 10 | 12.19% |
| 31-40 | 12 | 14.63% |
| 41-50 | 26 | 31.70% |
| >50 | 24 | 29.26% |

**Table 6:** Clinical presentation

| Symptoms | No. of patients | Percentage |
|---|---|---|
| Cough | 100 | 100% |
| SOB | 68 | 68.00% |
| Chest pain | 54 | 54.00% |
| Hemoptysis | 22 | 22.00% |
| Fever | 16 | 16.00% |
| Hoarseness of voice | 10 | 10.00% |
| Weight loss | 42 | 42.00% |
| Dysphasia | 16 | 16.00% |
| Suggestive of SVCO | 2 | 2.00% |
| Fatigue | 12 | 24% |

**Table 7:** Duration of symptoms: n=100

| Duration of Symptoms at the time of diagnosis | No. of Patients | Percentage | Among Males n=82 | Among Females n=18 |
|---|---|---|---|---|
| 0-3 Months | 42 | 42% | 38(46.34%) | 04(22.22) |
| 3-6 Months | 32 | 32% | 28(34.15%) | 04(22.22%) |
| >6 Months | 26 | 26% | 16(19.51%) | 10(55.55%) |

**Table 8:** Distribution of localization of lesion

| Side of the lesion | No. of patients | Percentage |
|---|---|---|
| Right Lung | 60 | 60.00% |
| Left Lung | 40 | 40.00% |

**Table 8:** Lobar distribution of lung cancer

| | No. of patients | Percentage |
|---|---|---|
| Upper lobe | 42 | 42% |
| Middle lobe | 28 | 28% |
| Lower lobe | 18 | 18% |
| Whole Lung | 12 | 12% |

Lung cancer was seen predominantly in upper lobe.

**Table 9:** Radiological presentation of lung cancer

| Radiological presentation | No. of patients (n=100) | Percentage |
|---|---|---|
| Mass | 68 | 68% |
| Obstructive pneumonitis | 10 | 10% |
| Combined (Mass with collapse) | 22 | 22% |
| Hilar adenopathy | 32 | 32% |
| Mediastinal adenopathy | 26 | 26% |
| Pleural effusion | 24 | 24% |

**Table 10:** Size of the Mass as assessed by CECT Chest n=68

| Size of the mass in Maximum Diameter | No. of Patients | Percentage |
|---|---|---|
| 0-3 cm | 06 | 8.82 |
| 3-5Cm | 12 | 17.65% |
| 5-7 Cm | 28 | 41.17% |
| >7Cm | 22 | 32.35% |

**Table 11:** Intrathoracic Lymphadenopathy as assessed by CECT Lymphnodes>1cm in Diameter n=100 Lymph node stations involved

| Lymph node station | No. of Patients | Percentage |
|---|---|---|
| Paratracheal | 22 | 37.93% |
| Subcarinal | 14 | 24.14% |
| Ipsilateral hilar | 15 | 25.86% |
| Contralateral hilar | 17 | 29.31% |
| Ipsilateral mediastinal | 16 | 27.58% |
| Contralateral mediastinal and Highest mediastinal | 10 | 17.24% |
| Intrapulmonary nodes | 42 | 72.41% |
| Aorto-pulmonary nodes | 06 | 6% |

**Table 12:** Distant metastasis: Distant metastasis at the time of diagnosis was observed by CT scan abdomen, ultrasonography and CT brain and PET scan are as follows in 46%. Multiple metastases were seen in 24%.

| Site of metastasis | No. of patients | Percentage |
|---|---|---|
| Liver | 22 | 22% |
| Vertebrae | 12 | 12% |
| Brain | 06 | 6% |
| Adrenal Gland | 14 | 14% |
| Multiple sites | 24 | 24% |

## Discussion

Primary lung cancer is increasing in incidence throughout the world. Cancer of lung and bronchus is the second commonest cause of cancer among men after carcinoma prostate and women (after carcinoma breast) and the commonest cause of cancer death both among men and women [1]. Predominant number of patients of primary lung cancer in our study are males (82%). 46% of the patients are in the 51-60 years age group. 79% of the patients were in above 51 years age group. Mean age of patients in this study is 58.7 years. Mean age of lung cancer in India is less than in the western countries. Most of the patients (46%) were in the age group of 51-60 years. 72.22% of patients among females and 80.48% among males are in 51 and above age group. 82% of the patients of primary lung cancer are smokers. Among the 18 non-smokers. All the 12 female patients who are non-smokers had either exposure to passive smoking or exposure to biological fuel. Exposure to factors other than smoking are increasingly becoming important.

The prevalence of lung cancer is likely to raise in the first half of twenty first century both among countries of high development index and medium and low development index and tobacco control measures can reduce the burden of lung cancer [2]. Tobacco smoking is an important cause of lung cancer. There is a strong evidence of biological fuel exposure as an important cause of primary lung cancer [3]. Our study also showed that 18% of our study group were nonsmokers. They gave history of passive smoking and exposure to biological fuel. Apart from cigarette smoking other important associated cofactors like second hand smoke exposure, exposure to ionizing radiation, occupational exposure to arsenic, nickel, chromium, asbestos, tar and soot, and indoor and outdoor air pollution are important in the causation of lung cancer. Old age, male sex, African American ancestry, family history of lung cancer, COPD, Tuberculosis, idiopathic pulmonary fibrosis, systemic sclerosis and HIV infection are other risk factors [4]. The average age of our patients of primary lung cancer is less than in the western studies. Lung cancer presents in older age group. But when present in less than 50 years age group its prognosis and period of survival are similar to lung cancer presenting in old age [5]. An Indian study revealed that lung cancer among non smokers is on raise in India and causes other than smoking may be responsible for increased adenocarcinoma among non-smokers [6]. Cancer lung, trachea and bronchus is found to be increasing in men in various Indian studies but relatively less frequent among females. World over non-small cell carcinoma constitutes four fifths of all lung cancers [7]. Primary lung cancer is a disease of old age and the prevalence increases with age [8]. The association of smoking cigarette and beedis is seen among Indian men but no such correlation is seen among Indian women [9]. In the western world more than half of the cases of lung cancer occur in 55-74 years age group and more than a third occur in above 75 years age group [10]. Mean age of diagnosis of lung cancer in Indian studies was 54.6 years after 1985 [11].

As many symptoms of lung cancer except hemoptysis are nonspecific they are not considered serious by the patient and that is a possible cause of delay in diagnosis [12]. In our study >48% of patients presented after 3 months or more of symptoms. In one Indian study Upper zone was involved in 42%, mid zone was involved in 37% and lower zone in 16% and entire lung in 8.8%. The observations are similar to our

study. Lung cancer presented in right lung in a majority of patients. Presentation in their study include, mass, collapse, consolidation, cavitation, calcification, pleural effusions, diaphragmatic palsy, rib erosions and pericardial effusions [13]. In our study also upper and middle lobe lesions were seen in 74% of patients. Yelena study showed late stages of NSCLC stage III and IV were seen among smokers. In their study 70% gave a history of >15 pack years, 15% gave a history of <15 pack years and 16% were non-smokers [13]. In our study also predominant number of patients of lung cancer were seen among patients having a history of more than 21 pack years of smoking. An Eastern Indian study of Day et al. Showed male preponderance and they had higher number of non-smokers having adenocarcinoma in their study [14]. In our study 73% patients presented with T3 or T4 tumors and T3, T4 tumors have poorer prognosis compared to T1 and T2 [15].

In our study 61% of the patients had involvement of contralateral hilar, mediastinal or supraclavicular lymph nodes at the time of diagnosis and N3 lymph node staging precludes surgical prospects [16]. Many of our patients of primary lung cancer presented with metastasis. Liver and CNS metastasis leads to poor prognosis [17].

## Summary

82% of the patients of primary lung cancer gave history of smoking. 88% of them gave a smoking history of >21 pack years. Cough was the predominant symptom accounting for 100% followed by shortness of breath and chest pain noted in 60% and 54% respectively. Hemoptysis was present in 22% of patients. 42% of presented with weight loss. SVCO (Superior Vena Caval Obstruction) was present in 2% of patients. 18% of patients gave a history of pulmonary tuberculosis. 42% of patients presented within 3 months of onset of symptoms, 32% between 3 to 6 months and 26% were diagnosed 6 months after the onset of symptoms. Radiologically 60% had right lung lesions and 40% left lung. Upper lobe and middle lobe accounted for 70% of lesions. Whole lung was involved in 12%. In present study, 32% of patients presented with hilar adenopathy, 26% were with mediastinal lymphadenopathy, Pleural effusion was seen in 24% patients and rib erosion in 8% patients.

In present study, space occupying lesion (mass) was the commonest radiological presentation (68%). Among 68 patients presenting with lung masses more than 90% patients had lung masses of more than 3 cm in highest diameter. 73% of patients presented with masses more than 5cm in highest diameter.

By routine CT scan chest among our patients of primary lung cancer 74% of patients had contralateral hilar, subcarinal or contralateral mediastinal node involvement. Metastasis was seen in liver, vertebrae, adrenal gland and brain at the time of admission. 24% of patients had multiple metastasis at the time of diagnosis.

## Conclusions

Primary lung cancer is increasingly diagnosed in India. Smoking is an important cause. Occurs in the sixth decade. Patients presented in relatively late stage with poor prognosis. Measures to discourage smoking among the youth by campaigning in rural areas can prevent the menace of primary lung cancer.

**Conflicts of Interest:** None declared.

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