

Epidemiology of lung cancer in a tertiary health-care center: A retrospective study

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ABSTRACT


Background: Lung cancer is the most common cancer diagnosed worldwide. Tobacco smoking is the most important environmental factor associated with the development of lung cancer. However, a large number of patients with lung cancer have no history of smoking frequently among female patients. There are no enough data in Eastern India regarding epidemiological study of lung cancer. **Objectives:** The aim of our study was to evaluate the prevalence and pattern of lung cancer in our institution (NRS Medical College and Hospital). **Materials and Methods:** Our study was a retrospective analysis of prospectively collected data for newly diagnosed adult patients. All patients were registered only after lung cancer diagnosis was confirmed by histopathological and/or cytological examination. The following information was collected from the database such as age, sex, smoking status and histological type, disease location, and stage. **Results:** A number of male patients were 786 (82%) and a number of female patients were 172 (18%). 692 (72.2%) patients had a history of smoking and 266 (27.8%) patients had no history of smoking in their life. Among the non-smoker patients, female patients were 147 (55.3%) and male patients were 119 (44.7%). 80% of patients came from rural areas and 20% of patients came from urban areas. In our study; histologically, the adenocarcinoma was 398 (41.6%) found most prevalent which is followed by squamous cell carcinoma 365 (38.1%). **Conclusion:** Adenocarcinoma lung with the right upper lobe involvement was prevalent in our study and non-smoker female patients were predominant. The major etiological factor was smoking. Awareness in the society is needed about cancerous effect of tobacco smoking for reducing the incidence of lung cancer.

KEY WORDS: Lung cancer; Epidemiology; Non-smoker; Adenocarcinoma

INTRODUCTION

Lung cancer is the most common cancer diagnosed worldwide. It is the leading cause of cancer-related deaths in worldwide and also in India. There are 1.61 million new cases of lung cancer per year and 1.38 million deaths in worldwide.^[1]

The new lung cancer case reported approximately 63,000/year in India.^[2] Tobacco smoking is the most important environmental factor associated with the development of lung cancer and other risk factors such as occupational exposure to carcinogens and coal smoke were demonstrated in Africa and Asia.^[3] However, a large number of patients with lung cancer have no history of smoking frequently among female patients. The pathogenesis of lung cancer in never smokers is thought to contribute including environmental tobacco smoke,^[4,5] other environmental exposures including radon,^[6] asbestos, and arsenic,^[7,8] virus-like human papillomavirus (HPV),^[9] lung disease idiopathic pulmonary fibrosis,^[10] estrogen,^[11] and genetic factors.^[12] In worldwide, incidence of adenocarcinoma of lung has been increased compared to

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Table 1: Baseline patient demographics and disease characteristics

Patients characteristics	Number of patients (n=958) (%)
Median age	58 years
Sex	
Male	786 (82)
Female	172 (18)
Smoking history	
Smoker	692 (72.2)
Non-smoker	266 (27.8)
Female	147 (55.3) (n=266)
Male	119 (44.7) (n=266)
Residential area	
Rural area	781 (81.5)
Urban area	177 (18.5)
Histopathology	
Adenocarcinoma	398 (41.6)
Squamous cell carcinoma	365 (38.1)
Small-cell carcinoma	79 (8.3)
Non-small-cell carcinoma, NOS	88 (9.1)
Others	28 (2.9)

Table 2: Lung segments involved by cancer

Segments involved	Number of patients (n=958) (%)
Right lung	
Upper segment	315 (32.9)
Middle segment	98 (10.2)
Lower segment	140 (14.6)
Left lung	
Upper segment	175 (18.3)
Lower segment	230 (24)

Table 3: Stage (AJCC 7th Edition) of lung carcinoma at diagnosis

Non-small-cell carcinoma (n=879)	
TNM staging	Number of patients (%)
I/II	44 (5)
III	396 (45)
IV	439 (50)
Small-cell lung carcinoma (n=79)	
Stage	Number of patients (%)
Disease limited to thorax	28 (35.4)
Extrathoracic disease	51 (64.6)

squamous cell carcinoma of lung and also most prevalent type in developed countries. Approximately 70–80% of lung cancer cases are non-small-cell lung cancer (NSCLC). Most of NSCLC patients present with advanced disease or brain metastasis.^[13] The prognosis of patients with advanced

lung cancer is generally considered poor. According to the geographic region and ethnicity, the pattern and prevalence of lung cancer are varied.^[14] There are no enough data in Eastern India regarding epidemiological study of lung cancer. The aim of our study was to evaluate the prevalence and pattern of lung cancer in our institution (NRS Medical College and Hospital).

MATERIALS AND METHODS

Our study was a retrospective analysis of prospectively collected data for newly diagnosed adult patients who were registered in our radiotherapy department at N.R.S Medical College, Kolkata, West Bengal, India. The study periods were 4 years from January 2014 to December 2017. All patients were registered only after lung cancer diagnosis was confirmed by histopathological and/or cytological examination. The following information was collected from the database such as age, sex, smoking status and histological type, disease location, and stage. Staging for both NSCLC and small-cell lung cancer was done using the 7th edition of AJCC TUM staging system. Investigation was done complete blood count, liver function test, urea, creatinine, sugar (F) and (PP), serum sodium, potassium, chest X-ray posteroanterior view, bronchoscopy and biopsy, computed tomography (CT) scan of thorax and whole abdomen and CT-guided fine-needle aspiration cytology or core biopsy, immunohistochemistry, positron emission tomography -CT scan, and bone scan when indicated.

RESULTS

In our study, a total number of patients with lung cancer were 958 in 2014–2017. The median age of the patients was 58 years. A number of male patients were 786 (82%) and a number of female patients were 172 (18%). 692 (72.2%) patients had a history of smoking and 266 (27.8%) patients had no history of smoking in their life. Among the non-smoker patients, female patients were 147 (55.3%) and male patients were 119 (44.7%). 80% of patients came from rural areas and 20% of patients came from urban areas. In our study; histologically, the adenocarcinoma was 398 (41.6%) found most prevalent which is followed by squamous cell carcinoma 365 (38.1%). The patients with small-cell carcinoma of lung were 79 (8.3%). In our study, there was a higher incidence of adenocarcinoma in the non-smokers patients. Squamous cell carcinoma and small-cell carcinoma histology were more commonly found among the smokers than non-smokers patients. The incidence of lung carcinoma in the right side of lobe was more compare to the left side of lobe. Among the right side of lobes, the upper lobe 32.9% (315/958) was most dominant segment when compared to the lower or middle lobe segment. The incidence in the lower left lobe 24% (230/958) was more compare to the upper lobe 18.3% (175/958). In patients with NSCLC, Stages III and IV

at diagnosis were 396 (45%) and 439 (50%), respectively. In patients with small-cell lung carcinoma, disease limited to thorax and extrathoracic was 28 (35.4%) and 51 (64.6%), respectively, at diagnosis [Tables 1-3].

DISCUSSION

Lung cancer is the most common cancer diagnosed worldwide. It is the leading cause of cancer-related deaths in worldwide and also in India. Tobacco smoking is the most important environmental factor associated with the development of lung cancer and other risk factors such as occupational exposure to carcinogens and coal smoke were demonstrated in Africa and Asia.^[3] However, a large number of patients with lung cancer have no history of smoking frequently among female patients. Genetic, viral, and environmental factors have been involved in the pathogenesis of lung cancer in never smokers, no definite etiologic factor has implicated that can explain the relatively high incidence of lung cancer in never smokers. The median age of the patients was 58 years. A number of male patients were 786 (82%) and a number of female patients were 172 (18%). 692 (72.2%) patients had a history of smoking and 266 (27.8%) patients had no history of smoking in their life. Among the non-smoker patients, female patients were 147 (55.3%) and male patients were 119 (44.7%). 80% of patients came from rural areas and 20% of patients came from urban areas. In our study; histologically, the adenocarcinoma was 398 (41.6%) found most prevalent which is followed by squamous cell carcinoma 365 (38.1%). The patients with small-cell carcinoma of lung were 79 (8.3%). In our study, there was a higher incidence of adenocarcinoma in the non-smokers patients. Squamous cell carcinoma and small-cell carcinoma histology were more commonly found among the smokers than non-smokers patients. The incidence of lung carcinoma in the right side of lobe was more compare to the left side of lobe. Among the right side of lobes, the upper lobe 32.9% (315/958) was most dominant segment when compared to the lower or middle lobe segment. The incidence in the lower left lobe 24% (230/958) was more compare to the upper lobe 18.3% (175/958). In patients with NSCLC, Stages III and IV at diagnosis were 396 (45%) and 439 (50%), respectively. In patients with small-cell lung carcinoma, disease limited to thorax and extrathoracic was 28 (35.4%) and 51 (64.6%), respectively, at diagnosis.

Adenocarcinoma of lung is the most common histologic variant compare to squamous cell carcinoma of lung in the Western countries and most of the Asian countries. This histological shift seems to be the changed smoking pattern and increasing incidence of lung cancer in non-smokers and women. Krishnamurthy *et al.* showed in their study that the most common histology was adenocarcinoma (42.6%) followed by squamous cell carcinoma (15.6%) and adenocarcinoma was seen among non-smokers compared to smokers and squamous cell carcinoma among the smokers compared to

non-smokers.^[15] Malik and Raina reported in their study that the most common histology was adenocarcinoma (43.8%) followed by squamous cell carcinoma (26.2%) and non-smokers were 52%.^[16] In our study, median age of the patients was 58 years, number of smoker patients 692 (72.2%) were more compare to non-smoker patients 266 (27.8%), male patients 786 (82%) were more compare to female patients 172 (18%), and histopathologically, the adenocarcinoma was 398 (41.6%) found most prevalent which is followed by squamous cell carcinoma 365 (38.1%). The principal risk factors for pathogenesis of lung cancer are tobacco smoking such as bidi, cigarette, and smokers which have 15–30-fold increased risk for lung cancer.^[17,18] In India, for women with lung cancer, there are no other risk factors besides smoking. In our study, large number of female patients with lung cancer was non-smokers 55.3%.

Tiwana *et al.* reported in their study that Stage IIIA, Stage IIIB, and Stage IV were 20%, 31%, and 49%, respectively.^[19] In our study, patients with NSCLC Stages III and IV at diagnosis were 396 (45%) and 439 (50%), respectively. In patients with small-cell lung carcinoma, disease limited to thorax and extrathoracic was 28 (35.4%) and 51 (64.6%), respectively, at diagnosis. Patients with Stage IV disease had mostly adenocarcinoma histopathology. The pathogenesis of lung cancer in never smokers is thought to contribute including environmental tobacco smoke,^[4,5] other environmental exposures including radon,^[6] asbestos, and arsenic,^[7,8] virus-like HPV,^[9] lung disease idiopathic pulmonary fibrosis,^[10] estrogen,^[11] and genetic factors.^[12] In our study, most of the patients came from rural area and they may be exposed to indoor air pollutions such as smokes from coal oven, wood-fired oven, kerosene oil stoves, and fumes from cooking oil. Lung cancer in non-smoker patients was diagnosed in late stage due to lack of awareness of lung cancer in non-smoker patients.

However, this study was retrospective in nature, conducted in a single tertiary health-care center, result may not be representative of population-based data and also our study was comparatively short period of study, contains small number of patients and core biopsy could not perform to all patients that represent major limitation for the conclusion.

CONCLUSION

Adenocarcinoma lung with the right upper lobe involvement was prevalent in our study and non-smoker female patients were predominant. The major etiological factor was smoking. Non-tobacco-related risk factors and molecular study are needed in future. Our aims are early diagnosis, treatment of lung cancer, and awareness in the society about cancerous effect of tobacco smoking for reducing the incidence of lung cancer.

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