

## Demographic Trends and Different Modes of Diagnosis of Lung Malignancy: A Tertiary Care Experience in Central India

Anand Bhadkariya\*, Satyendra Mishra\*\*, Anil Gupta\*\*\*, Anil Baghel\*\*\*\*

\*Assistant Professor \*\*\*Junior Resident, Department of Pathology, \*\*\*\*Assistant Professor, Department of PSM, R.D. Gardi Medical College, Ujjain, Madhya Pradesh, India. \*\*Junior Resident, Pulmonary Medicine, MGM Medical College, Indore, Madhya Pradesh.

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### Abstract

*Introduction:* Lung carcinoma stands among one of the most common malignancies causing higher mortality. Like other parts of the world, there is an increase in the incidence of lung carcinoma in India as well. Lung malignancy has been categorized into non-small cell (NSCLC) and small cell (SCLC) lung carcinoma. Lung malignancy has been categorized into non-small cell (NSCLC) and small cell (SCLC) lung carcinoma. These histological types of lung malignancies have an importance lying on the clinical presentation, prognosis, and response to treatment. *Material and Methods:* This descriptive retrospective study was performed using the records of 110 patients with lung cancer proved by histo-pathological examination. The demographic information was obtained from their requisition form for cytology and histopathology examination of specimens. *Results:* The results of this study were based on the analysis of 110 case-records of patients who had proven to have lung cancer. The age of the patients ranged between 22-95 years. Smoking habit was found in the majority of the male patients, 81 patient out of total 91 male were smoker which constitute about 89% were smoker. Our revealed that the adenocarcinoma is the most common type in our center, it was found in 63 patients (57.3%) common in both male and female, followed by squamous cell carcinoma in 31 patients (28.2%). Large cell carcinoma was the least commonly found only in a single case in our study. *Discussion:* The mean age of lung cancer patients has remained nearly constant over the years. The present study showed a smoker: non-smoker ratio of 2.8:1 in patients of lung cancer. The present study has observed that adenocarcinoma accounted for 57.3% of lung carcinoma, squamous cell carcinoma for 28.2%, small cell carcinoma for 3.6%, undifferentiated carcinoma for 10.9% and large cell ca 0.9%. In our study, we found adenocarcinoma to be the commonest histological subtype, accounting for 57.3% of all lung carcinoma cases. Over the last few years there has been a shift of histological profile towards adenocarcinoma worldwide. *Conclusions:* Lung carcinoma is a very serious public health problem and a preventable disease. With an increasing incidence and cigarette smoking is responsible for at least 90% of lung carcinoma.

**Keywords:** Lung Malignancy; Adenocarcinoma; Squamous Cell Carcinoma; NSCLC; SCLC.

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### Introduction

Lung carcinoma stands among one of the most common malignancies causing higher mortality. Like other parts of the world, there is an increase in the incidence of lung carcinoma in India as well. Lung

malignancy has been categorized into non-small cell (NSCLC) and small cell (SCLC) lung carcinoma. The major histological divisions of NSCLC carcinoma include adenocarcinoma, squamous cell (SCC) carcinoma, large cell carcinoma and other less common tumor subtypes[1,2]. These histological types of lung malignancies have an importance lying on the clinical presentation, prognosis, and response to treatment. The investigation are to be done to establish the diagnosis, establish the histological cell type, and define the stages of the disease[3,4]. Diagnostic tools for evaluation of lung cancer can be divided into two

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**Corresponding Author:** Anand Bhadkariya, R. No.309 RMO Hostel R.D.Gardi Medical College, Ujjain, Madhya Pradesh, India 456006.

E-mail: [anandbhadkaria@gmail.com](mailto:anandbhadkaria@gmail.com)

categories- imaging and tissue microscopy. Imaging includes chest X-ray, ultrasound, bone scan, Computerized Tomography (CT)-scan, Magnetic Resonance Imaging (MRI) and PET scan. Conventional tissue microscopy includes- sputum cytology, bronchoscope, pleural fluid cytology, lymph node FNAC and biopsy, lung and pleural biopsy[5]. These are the most useful investigations for the diagnosis as well as staging in the majority of cases.

#### *Chest X-ray*

This is an important and initial tool for early detection of carcinoma lung. It is too useful in follow up. Simplicity, easy availability and low cost make chest X- ray as initial investigation of choice for respiratory diseases including carcinoma lung.

#### *Ultrasound*

This had used to identify metastasis to lymph nodes and abdominal organs. Lymph nodes include retroperitoneal lymph nodes and superficial lymph node like supraclavicular lymph nodes. It can differentiate solid and cystic lesions on the chest wall or lung parenchyma nearby. USG provides guidance for biopsy as well as USG-guided pleural fluid aspiration.

#### *Sputum Cytology*

Sputum cytology is a simple, non-invasive diagnostic method for detection of ca lung. The sample must come from deep in the lungs, so it should be produced by a deep cough in which the cytological result is obtained through smear examination. Early morning samples should be obtained for three to four consecutive days. If cancer cells are seen in a sputum cytology sample, a diagnosis of lung carcinoma is almost certain [5]. But even if cancer cells are not detected, the possibility of lung carcinoma cannot be ruled out due to its low sensitivity.

#### *Transthoracic Needle Aspiration Biopsy (TTNA)*

This is a specific and sensitive detection tool for peripheral lesion performed under CT or ultrasound guidance[5].

#### *Thoracentesis*

Pleural effusion cytology after thoracentesis in case of malignant pleural effusion useful in diagnosis and definite staging of ca lung.

#### *Pleural Biopsy*

In case if thoracentesis fails to give positive result pleural biopsy is used to increase the production of positive detection rate.

#### *Superficial Lymph Node Biopsy*

Enlarged superficial lymph nodes like supraclavicular lymph node in patients of ca lung may be the first sign. Superficial lymph node biopsy is an easy accessible site for pathological diagnosis and staging of lung cancer.

*CT Chest:* This is an essential investigation for the location and extension of any lesion. It helps in identification of benign and malignant tumors [5]. Low-dose spiral CT chest is an effective screening instrument for early detection of lung cancer, while CT-guided transthoracic biopsy is really useful for histopathological diagnosis.

*MRI:* it is used for identification of metastases to the ribs, spine and brain, thus very helpful in staging of lung carcinoma.

*Bone Scan:* it is a routine used to rule out bone metastases. When a bone metastasis is suggested by bone scan, MRI of that area could be conducted for confirmation.

*PET-CT:* This is highly specific and sensitive tool in diagnosing mediastinal lymph node metastases. This investigation is not done routinely, but preoperatively in curable patient to rule-out metastasis.

#### *Transbronchial Needle Aspiration (TBNA) & Endobronchial Ultrasound-Guided Transbronchial Needle Aspiration (EBUS-TBNA)*

TBNA and EBUS-TBNA are usually not recommended as routine screening methods. These are helpful to the accurate N2 staging of lung carcinoma before treatment [5]. EBUS-TBNA is indicated for the diagnosis of lung mass and mediastinal and hilar lymph node assessment.

#### *Mediastinoscopy*

Mediastinoscopy is often employed for sampling the lymph nodes of the mediastinum. It is an important in determining the lung cancer N staging, and is regarded as the gold standard for clinical mediastinal lymph node assessment.

#### *Thoracoscopy*

It is mainly used in diagnosis of peripheral lesions situated over pleural surface from which pathological

specimen to be obtained [5]. Medical thoracoscopy is very useful in undiagnosed pleural effusions.

*Bronchoscopy:* this is commonly used tool for cytological and histological diagnosis of lung carcinoma. It enables brush cytology, biopsy, bronchial aspirate and bronchoalveolar lavage under direct vision using a bronchoscope.

*Bronchoalveolar Lavage (BAL)*

After insertion of a bronchoscope a segment of the lung is 'washed' with sterile saline, thereby allowing recovery of both cellular and non-cellular components of the epithelial surface of the airways.

*Bronchial Aspirate (BA)*

With the help of bronchoscope, material are directly aspirated from the larger airways.

*Bronchial Brushing*

The technique of bronchial brushing uses a protected brush catheter in the bronchoscope to this material from the airways.

The purpose of this study is to know about the demographic profile and to assess the conventional tissue microscopy in diagnosis and histological classification of lung carcinoma in a tertiary care medical college hospital of central India.

**Material and Methods**

This descriptive retrospective study was performed using the records of 110 patients with lung cancer proved by histo-pathological examination, performed under the department of Pathology, R. D. Gardi Medical College, Ujjain for the period from 1<sup>st</sup> January,

2012 to 31<sup>st</sup> December 2015.

The demographic information was obtained from their requisition form for cytology and histopathology examination of specimens. The cytology slides were studied by performing routinely Romanowsky stain & Papanicolaou stain and histo-pathological slides were studied using Hematoxylin Eosin stain. Organization, summarization and statistical analysis of the data were done by using descriptive statistics.

**Results**

The results of this study were based on the analysis of 110 case-records of patients who had proven to have lung cancer.

*Age and Sex Distribution*

The majority of the patients 91 (82.7%) were male with male: female ratio 4.8:1. The age of the patients ranged between 22-95 years with a mean of 58 years, youngest patient was 22 year male with adenocarcinoma, while age of youngest female was 25 years old also having adenocarcinoma. 70% of the patients were above 50 years as shown in Table 1.

*The Residence*

The distribution of ca lung was almost equal in both rural and urban as shown in Table 2

*Smoking Habit*

Smoking habit was found in the majority of the male patients, 81 patient out of total 91 male were smoker which constitute about 89% were smoker. On the other hand none of female patient ever smoked as shown in Tables 3

**Table 1:**

Age group (years)	Male	Female	Total No.	Frequency %
21-30	4	1	5	4.5
31-40	4	3	7	6.4
41-50	14	7	21	19
51-60	30	3	33	30
61-70	27	3	30	27.3
71-80	10	2	12	10.9
Above 80	02	0	2	1.8
Total	91 (82.7%)	19 (17.3%)	110	

**Table 2:**

Residency	Total No.	Frequency %
Rural	56	50.9
Urban	54	49.1
Total	110	

**Table 3:**

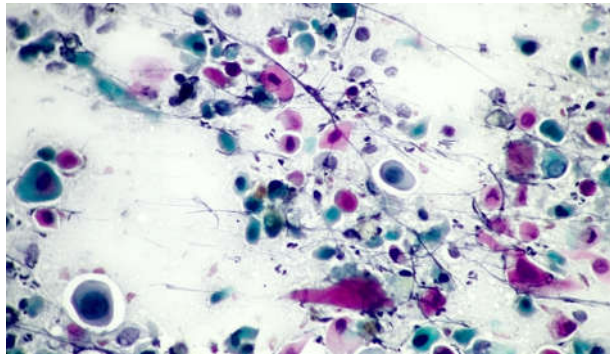
H/o smoking	Total No.	Frequency %
Male	81	89
Female	00	00

**Table 4:**

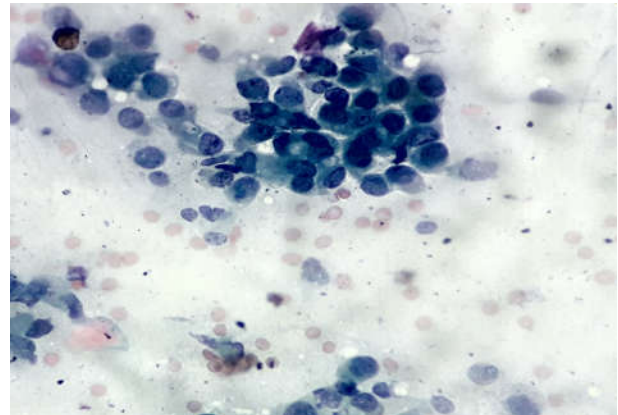
Mode of diagnosis	Adenocarcinoma	Squamous	Small cell	Large cell	Undifferentiated	Total	%age
Sputum Cytology	1	0	0	0	0	1	0.9
Trans-thoracic FNAC/ Biopsy	4	3	2	1	2	12	10.9
Lymph node FNAC/Biopsy	15	18	2	0	6	41	37.3
Bronchoscopic Biopsy /BAL/BA/Brush Cytology	37	9	0	0	3	49	44.5
Pleural Fluid cytology	6	0	0	0	1	7	6.4
	63	31	4	1	12	110	

**Table 5:**

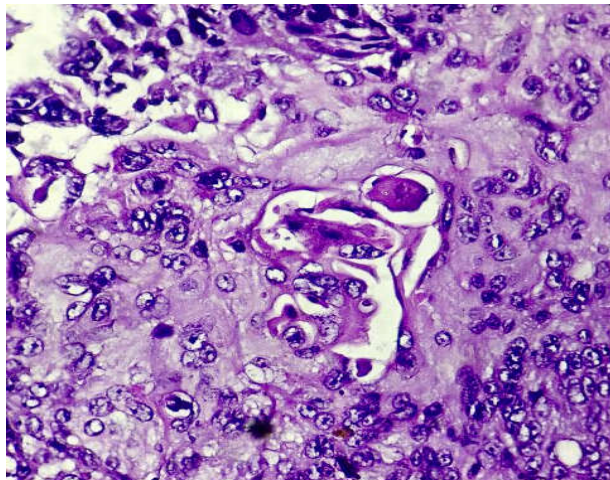
Types	Male No. (%)	Female No. (%)	Total No. (%)
Adenocarcinoma	50 (54.9)	13 (68.4)	63 (57.3)
Squamous cell carcinoma	28 (30.8)	3 (15.8)	31 (28.2)
Small cell carcinoma	3 (3.3)	1 (5.3)	4 (3.6)
Large cell carcinoma	1 (1.1)	0 (0)	1 (0.9)
Undifferentiated	10 (11)	2 (10.5)	12 (10.9)
Total	91 (100)	19 (100)	110 (100)



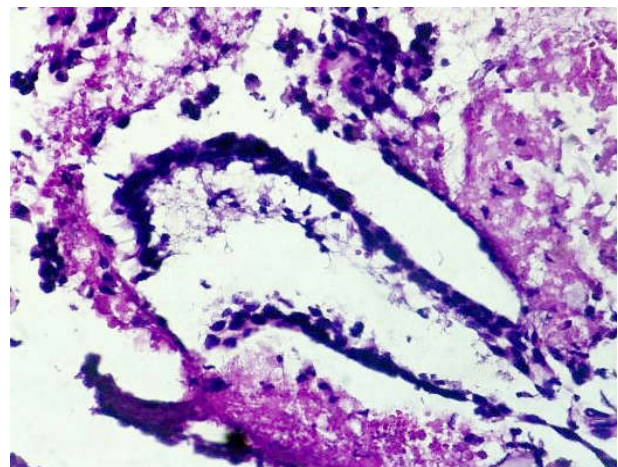
**Fig. 1:** Microphotograph of Squamous cell carcinoma (x40 PAP Stain)



**Fig. 3:** Microphotograph Adenocarcinoma (x40 PAP Stain)



**Fig. 2:** Microphotograph of Squamous cell carcinoma (x40 same case in H&E Stain)



**Fig. 4:** Microphotograph Adenocarcinoma (x40 H & E Stain)

### Investigation

Sputum cytology was positive only in a single patient (0.9%) with adenocarcinoma, whereas pleural fluid cytology were positive in 7 (6.4%) cases. About 11% (12) patients, lung carcinoma were diagnosed by Trans-thoracic fine needle aspiration and trans thoracic needle biopsy, whereas 41 cases of lung carcinoma were diagnosed by lymph node samplings. The majority of case 41 (44.5) was diagnosed by a bronchoscopy procedure which includes bronchoscopic biopsy, broncho-alveolar lavage, bronchial aspirate and brush cytology as shown in Table 4.

### Histo-Pathological Results

Our revealed that the adenocarcinoma is the most common type in our center, it was found in 63 patients (57.3%) common in both male and female, followed by squamous cell carcinoma in 31 patients (28.2%). Large cell carcinoma was the least commonly found only in a single case in our study.

The distribution of the histological types regarding the sex is shown in Table 5.

### Discussion

The mean age of lung cancer patients has remained nearly constant over the years. The mean age in this study was 58 years, which is similar to that reported by Dey et al.[6], Guleria et al.[7], and Navin Pandhi et al [2]. The male: female ratio of patients with lung cancer has varied in different studies. The present study observed a male: female ratio of 4.8: 1. The present study showed a smoker: non-smoker ratio of 2.8:1 in patients of lung cancer similar to Guleria et al [7] and Jindal et al [8]. who have reported ratios of 2:1 and 2.4:1 respectively. The present study has observed that adenocarcinoma accounted for 57.3% of lung carcinoma, squamous cell carcinoma for 28.2%, small cell carcinoma for 3.6%, undifferentiated carcinoma for 10.9% and large cell ca 0.9%. In our study, we found adenocarcinoma to be the commonest histological subtype, accounting for 57.3% of all lung carcinoma cases similar to some other studies [9]. Over the last few years there has been a shift of histological profile towards adenocarcinoma worldwide [10]. However, most of the Indian studies still report squamous cell carcinoma to be the commonest subtype [11,12,13]. The shift in the incidence of squamous cell carcinoma to adenocarcinoma may be linked with the change from non-filtered to filtered cigarettes; the depth of inhalation had been altered [2,14] Smoke from

unfiltered cigarettes may be shallowly inhaled that results in central deposition of chemical carcinogen in the bronchial area, giving rise to squamous cell carcinomas. On the other hand, smoke from filtered milder cigarettes may be more deeply inhaled that result in deposition of carcinogen more peripherally, giving rise to adenocarcinomas[15]. Reduction in the nicotine content in cigarette may also promote deeper inhalation as smokers attempt to compensate. The changes in the composition of cigarette has reduced the yield of carcinogenic polycyclic aromatic hydrocarbons (PAHs), inducers of squamous cell carcinomas, but increasing the yields of carcinogenic tobacco-specific N-nitrosamines (TSNAs) that are inducers of adenocarcinoma[16,2]. In our study, Fibreoptic bronchoscopy (FOB) achieved diagnosis in 44.5% of lung cancer patients similar to other studies.

### Conclusions

Lung carcinoma is a very serious public health problem and a preventable disease. With an increasing incidence and cigarette smoking is responsible for at least 90% of lung carcinoma.

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