

Evaluation of Lung Tumors by Cytopathology in Ajmer Region Rajasthan

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ABSTRACT

Objectives: To know the age, sex incidence, cytological features of various malignancies of lung diagnosed in Ajmer.

Methods: This retrospective study was conducted over a period of five year from Jan 2010 to Dec 2014 in the department of pathology JLN Medical College, Ajmer. During the course of study the patients were subjected to FNAC, BAL and Bronchial brushing whichever investigation considered appropriate for that case. These were followed by biopsy wherever it was possible.

Results: A total of 352 cases were studied. Of which 192 males and 65 females were diagnosed as malignant lung neoplasm thereby giving a male to female ratio of 2.95. Peak incidence of tumors was seen in 5-6th decade. A diagnosis of adenocarcinoma was made in 91 cases (35.4%), squamous cell carcinoma 90 cases (35%), small cell anaplastic carcinoma 20 cases (7.78%), large cell anaplastic carcinoma 9 cases (3.5%), Undifferentiated large cell carcinoma in 9 cases (3.5%), mesothelioma 7 cases (2.72%), adenosquamous carcinoma 5 cases (1.94%), 3cases of NHL (1.16%), 2 cases of carcinoid (0.77 %), 21 cases of metastasis (8.17 %) one each from

Ewing's sarcoma, ductal carcinoma breast, metastatic sarcoma, two metastatic squamous cell carcinoma, 16 metastatic adenocarcinoma cases were observed.

Conclusion: Cytologic subtyping of lung carcinoma is feasible and reasonably accurate.


Keywords: Adenocarcinoma, Cytology, Lung Tumor.

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INTRODUCTION

Lung cancer is the leading cause of cancer-related deaths in men and women.¹ Cytology is a major, and sometimes, the only diagnostic modality used in the initial evaluation of patients with lung cancer. An early, accurate diagnosis is of paramount importance for initiating specific therapy. Most patients with lung cancer present with clinically advanced disease and therefore are not candidates for surgery with curative intent but are rather treated with systemic therapy. In the age of personalized medicine, cytological material from fine-needle aspiration cytology (FNAC) may be the only available diagnostic specimen, and the only material available for molecular studies, necessary for current therapeutic decision making.² New recommendations for screening of high-risk population coupled with the ongoing development of minimally invasive techniques and procedures for sampling lung lesions will most likely further increase the need for accurate diagnosis and molecular characterization of malignant tumors on small biopsy/FNAC specimens. These advances in the

understanding of molecular mechanisms underlying lung cancer and the development of new targeted therapies challenge the traditional diagnostic dichotomization between small cell lung carcinomas (SCLC) and non-SCLC (NSCLC) and prompt a more specific characterization of NSCLC into squamous or adenocarcinoma (ADC) category.³

Traditionally, NSCLC sub-classification has been based on morphologic assessment of routine hematoxylin and eosin (H and E)-stained histological specimens. Because cytology specimens, such as FNAC, differ in the preparation and technique from traditional histology, and the accuracy of subtyping these specimens has been challenged, there is considerable evidence supporting the utility of cytology in both subtyping NSCLC and providing material for predictive and prognostic studies so far.⁴ The present study aimed at determining the diagnostic accuracy of FNAC in the diagnosis, subtyping of primary lung carcinoma, checking the reliability of certain cytological parameters.

AIMS AND OBJECTIVES

To know the age, sex incidence, cytological features and their association of various malignancies of lung diagnosed in Ajmer Region.

MATERIALS AND METHODS

This retrospective study was conducted on 352 cases suspected of malignant neoplasm of lung clinically, radiologically and by other laboratory investigations from various wards and outpatient Departments of JLN Medical College and Associated Group of Hospitals, Ajmer from Jan 2010 to Dec 2014. During the course of study the patients were subjected to FNAC, BAL and Bronchial brushing whichever investigation considered appropriate for that case. These were followed by biopsy wherever it was possible.

A detailed clinical history including age, sex, residence, smoking status and occupational history were recorded. Apart from general and respiratory symptoms, these patients were evaluated for any kind of paraneoplastic syndrome. Imaging procedures of these

patients included skiagram chest, computed tomography chest, ultrasonography of pleural space, mediastinum and abdomen were done for better evaluation. Routine and other biochemical investigations were also done. Material obtained by FNAC, BAL and Bronchial Brushing was used to make wet and dry films. Five to ten smears were prepared immediately from the sample. Air-dried smears were stained with Giemsa stain whereas alcohol-fixed smears were stained with routine hematoxylin and eosin stains for rapid cytopathological evaluation of the lesions and Special stains like PAS, PAP etc. is done wherever needed.

Statistical Analysis

Statistical analysis was performed with the SPSS, Trial version 23 for Windows statistical software package (SPSS inc., Chicago, il, USA) and Primer for the generation of descriptive and inferential statistics.. The Categorical data were presented as numbers (percent) and were compared among groups using Chi square test. Probability P value <0.05 was considered statistically significant.

Table 1: Shows sex wise distribution of Malignant Lung Neoplasm

Sex	No. of cases	Percentage	Remarks
Males	192	74.70	
Females	65	25.29	Male : Female ratio 2.95
Total	257		

Table 2: Association of Diagnosis with Gender

Diagnoses	Male (262)		Female (90)		Total	P Value LS
	No	%	No	%		
Primary lung tumors						
Adenocarcinoma	64	70.33	27	29.67	91	0.367NS
Squamous cell carcinoma	77	85.56	13	14.44	90	0.008S
Adenosquamous carcinoma	3	60.00	2	40.00	5	0.819NS
Small cell Anaplastic Carcinoma	16	80.00	4	20.00	20	0.746NS
Large cell Anaplastic Carcinoma	7	77.78	2	22.22	9	0.878NS
Undifferentiated large cell Carcinoma	8	88.89	1	11.11	9	0.535NS
Non Hodgkin's Lymphoma	2	66.67	1	33.33	3	0.723NS
Carcinoid	2	100.00	0	0.00	2	0.985NS
Malignant Mesothelioma	5	71.43	2	28.57	7	0.8NS
Total	184	77.97	52	22.03	236	
Secondary Lung Tumors						
Metastatic Ewing's Sarcoma	0	0.00	1	100.00	1	0.802NS
Metastatic Ductal carcinoma Breast	0	0.00	1	100.00	1	0.802NS
Metastatic Adenocarcinoma	5	31.25	11	68.75	16	0.53NS
Metastatic Sarcoma	1	100.00	0	0.00	1	0.802NS
Metastatic Squamous Cell Carcinoma	2	100.00	0	0.00	2	0.259NS
Total	8	38.10	13	61.90	21	

Table 3: Association of Tumors Type with Gender

Tumor type	Males		Females		P Value LS
	No.	%	No.	%	
Squamous cell carcinoma	77	85.56	13	14.44	0.005S
Adenocarcinoma	64	70.33	27	29.67	0.296NS
Adenosquamous carcinoma	3	60.00	2	40.00	0.807NS
Small cell Anaplastic carcinoma	16	80.00	4	20.00	0.765NS
Large cell Anaplastic carcinoma	7	77.78	2	22.22	0.861NS
Undifferentiated large cell carcinoma	8	88.89	1	11.11	0.545NS
Non Hodgkin Lymphoma	2	66.67	1	33.33	0.73NS
Carcinoid	2	50.00	2	50.00	0.571NS
Mesothelioma	5	27.78	13	72.22	<0.001S
Metastatic carcinoma	8	100.00		0.00	

Table 4: Proportion of the Cases in Males and Females in Different Age Groups

Age (in years)	Males		Females		Total	
	No	%	No	%	No	%
10-19	1	0.52	2	3.08	3	1.16
20-29	2	1.04	3	4.62	5	1.94
30-39	7	3.65	1	1.54	8	3.11
40-49	21	10.94	15	23.08	36	14
50-59	54	28.13	19	29.23	73	28.4
60-69	57	29.69	14	21.54	71	27.62
70-79	43	22.40	7	10.77	50	19.45
80-89	7	3.65	3	4.62	10	3.89
90-99	0	0.00	1	1.54	1	0.38
Total	192	100.00	65	100.00	257	100.00

Chi-square = 19.341 with 8 degrees of freedom; P = 0.013S

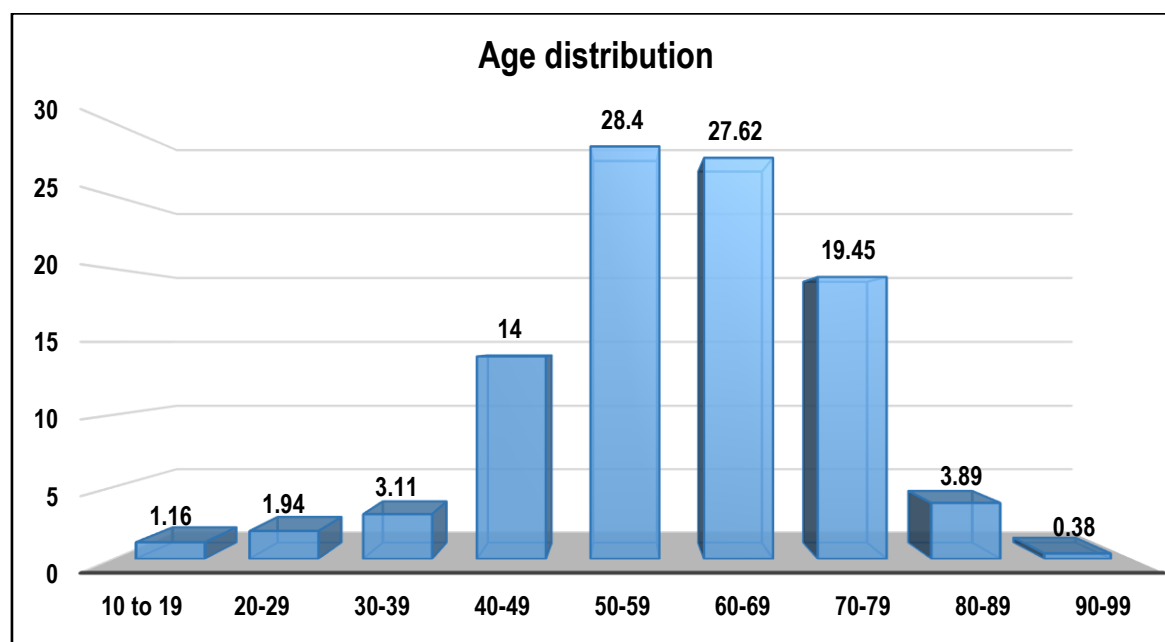


Figure 1: Shows age wise distribution of Malignant Lung Neoplasms.

Table 5: Shows association of smoking with gender Lung Cancer

Smoker	Males	Percentage	Females	Percentage
Yes	166	73.54	23	35.38
No	26	26.45	42	64.62
Total	192	100	65	100.00

Chi-square = 62.500 with 1 degree of freedom; P = 0.000S

Table 6: Shows Association of Various Lung Tumors with smoking in Females

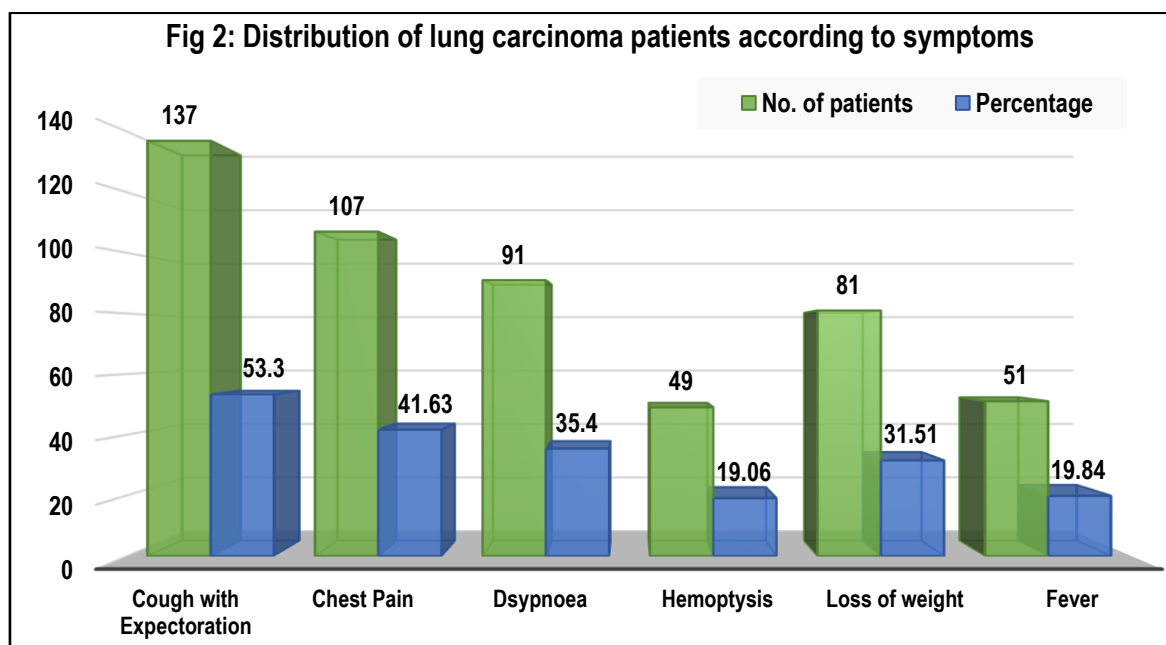
Tumor Type	Males(N=166)		Females N=23)		P Value LS
	No.	%	No.	%	
Adenocarcinoma	55	33.13	5	21.73	0.389NS
Squamous Cell Carcinoma	74	44.57	13	56.52	0.393NS
Adenosquamous carcinoma	2	1.2	2	8.69	0.117NS
Small cell carcinoma	18	10.84	1	4.34	0.548NS
Large cell carcinoma	7	4.21	1	4.34	0.601NS
Mesothelioma	2	1.2	1	4.34	0.81NS
Undifferentiated large cell carcinoma	5	3.01	0	0	0.88NS
Metastatic carcinoma	3	1.8	0	0	0.81NS
Total	166		23		

Table 7: Shows percentage of patients with tumor having smoking history

Sex	Males %	Females %
% Associated with Lung Tumor	86.45	35.38

Table 8: Shows distribution of lung carcinoma patients according to symptoms

Symptoms	No. of patients	Percentage
Cough with Expectoration	137	53.30
Chest Pain	107	41.63
Dyspnoea	91	35.40
Hemoptysis	49	19.06
Loss of weight	81	31.51
Fever	51	19.84



OBSERVATIONS

Of 352 cases, included 262 males of which 192 were diagnosed as malignant lung neoplasms and 90 females of which 65 were diagnosed as malignant lung neoplasms thereby giving male to female ratio of 2.95 as shown in table 1.

Significant difference was observed according to gender distribution in adenocarcinoma only, Males predominance were observed in Adenocarcinoma, Squamous cell carcinoma, Adenosquamous carcinoma, Small cell Anaplastic Carcinoma, Large cell Anaplastic Carcinoma, Undifferentiated large cell Carcinoma, Non-Hodgkin’s Lymphoma, Carcinoid, Malignant Mesothelioma (primary lung tumour). Among secondary lung tumour, Males predominance were observed in Metastatic Sarcoma, Metastatic Squamous Cell Carcinoma.

A diagnosis of adenocarcinoma was made in 91 cases (35.4%), squamous cell carcinoma in 90 cases (35%), small cell anaplastic carcinoma in 20 cases (7.78%), large cell anaplastic carcinoma in 9 cases (3.5%), Undifferentiated large cell carcinoma in 9 cases (3.5%), mesothelioma in 7 cases (2.72%), adenosquamous carcinoma in 5 cases (1.94%), NHL in 3 cases (1.16%), carcinoid in 2 cases (0.77%), 21 cases of Metastatic carcinoma (8.17%) as shown in table 2.

Significant difference was observed according to gender tumor type in Squamous cell carcinoma and Mesothelioma only, Males predominance were observed in Squamous cell carcinoma while females predominance were observed in Mesothelioma. Although most of the tumour type were observed significantly male predominance. Proportion of the cases were significantly more in 50 to 79 age groups among males as compared to 40 to 69 age groups, (P=0.013S). Significant association of smoking with

gender among the Lung Cancer, males were 73.54% as compared to females were observed 35.38%.

From the study on 352 cases it was found that in 257 cases diagnosed as lung tumors, 189 (73.54%) gave history of smoking. In males 166 cases (86.45%) out of 192 had history of smoking. In females 23 out of 65 cases had history of smoking. Squamous cell carcinoma was the predominant type of carcinoma amongst heavy smokers. Adenocarcinoma occurred predominantly in moderate to light smokers and in non-smokers. Hence it was concluded that smoking acts as an important etiological factor in lung cancer.

In this study, maximum patients presented with complaint of cough with expectoration. 137 cases (53.3%) had symptoms of cough with expectoration. Second most common symptom was chest pain. It was seen in 107 cases (41.63%). Dyspnoea in 91 cases (35.40%), loss of weight in 81 cases (31.51%), fever in 51 cases (19.84%), Hemoptysis in 49 cases (19.06%).

DISCUSSION

Lung cancer is the most malignant disease worldwide and is a major cause of death from cancer particularly amongst males. It was a rare disease until the beginning of 20th century and since then the occurrence of lung cancer has increased rapidly. Lung cancer has shown astonishing 15 fold increase in males and 9 fold increase in females. The global incidence of lung cancer is increasing at the rate of 0.5% per year. In India lung carcinoma accounts for 6.8% of all malignancies and the prevalence shows much variability from one region to another. In a study published from Jammu in 1953, lung was the most common site of malignancy.⁵ In the present study on 352 cases it was found that in 257 cases diagnosed as lung tumors, 189 (73.54%) gave

history of smoking. In males 166 cases (86.45%) out of 192 had history of smoking. It correlates well with other studies where 80-90% cases had history of smoking. The retrospective study of 352 cases of lung malignancies was conducted during a period of Jan 2010 to Dec 2014 in the Department of Pathology, J.L.N Medical College and Associated Groups of Hospitals, Ajmer. A total of 352 cases of malignant neoplasms of lung, scanned in the light of distinctive clinicoradiological features, were selected to study the diagnostic accuracy of fine needle aspiration cytology, bronchoalveolar lavage cytology and bronchial brush cytology. These cases were followed by biopsy wherever possible.

In the present study there were 262 males of which 192 were diagnosed as malignant lung neoplasms and 90 females of which 65 were diagnosed as malignant lung neoplasms thereby giving male to female ratio of 2.95 as shown in table 9. The incidence of lung cancer has been reported to be low before the age of 40 years in both the sexes and after that is increased up to the age of 70 years. In the present study, the mean age was 59 years in males and 55 years in female patients and is found to be comparable to other studies as shown in Table 10.

Table 9: Comparison of M:F ratio in present study with other studies

Study By:	Male : Female Ratio
Zubair and Clancy ⁶	1.9
Devesa and Bray ⁷	2.5
Martini & Bains ⁸	2.1
Cancer Research UK ⁹	1.4
Matteis & Consonni ¹⁰	2.8
Olak & Colson ¹¹	2.16
Ferguson & Skosey ¹²	1.63
Gaur et al ¹³	3.6
Tuladhar & Pant ¹⁴	3.1
Present Study	2.95

Table 10: Comparison of Mean age with other studies

Author	Mean Age (in years)
Guleria et al ¹⁵	57.2
Jindal and Behra ¹⁶	54.3
Huhti et al ¹⁷	62
Bahader and Jazieh ¹⁸	64
Gupta et al ¹⁹	56.7
Shetty et al ²⁰	60.5
Tuladhar & Pant ¹⁴	59.5
Wei et al ²¹	64
Present Study	59

Table 11: Comparison of Incidence with other studies

Author	Peak Incidence (in years)
Basnet et al ²²	60-69
Sethi T et al ²³	75-80
Hammerschmidt and Wirtz ²⁴	75-80
Gadgeel SM and Ramalingam S ²⁵	50-70
Wallace E et al ²⁶	65-75
Present Cases	50-70

Bronchogenic carcinoma occurs most commonly in the middle aged people; however it can occur at any age as also seen in the present study in which 3 cases were seen in 10-20 years age group. Of all the cases of malignant lung neoplasms maximum were in the age group of 50-70 years as shown in the Table 11.

Less than 7% of the patients in the present study were below the age of 40 years at the time of diagnosis. The cause for this early onset of the disease may be due to heavy smoking, environmental exposure to carcinogens and perhaps due to genetic predisposition. Smoking has been associated in 86.45% males and 35.38% females in the present study. The risk of bidi smoking is almost identical or even more than cigarette smoking.

Table 12: Comparison of Lung Cancer Symptoms in present study with other studies

Symptoms	Cohen et al ²⁷	Strug et al ²⁸	Shetty CM ²⁰	William Francis ²⁹	Jindal et al ¹⁶	Present Study
Chest pain	46	38	33	50	52	42
Cough	78	68	55	71	88	53
Dyspnoea	22	48	43	23		35
Hemoptysis	37	35	36	63	69	19
Loss of Weight	40	23	60	39	90	32

Table 13: Comparison of Proportion of Lung Cancer Type in present study with other studies

Author	Squamous cell carcinoma	Adenocarcinoma	Small cell carcinoma	Large cell carcinoma	Others
Tuladhar & Pant ¹⁴	51	11	19	4	15
Schenk and Bryan ³⁰	41	35	12	4	8
Madan and Bann ³¹	53	38	4	1	4
Pyrozinski et al ³²	43	26	20	4	7
Tatar et al ³³	33	40	7	7	13
Rawat and Sindhvani ³⁴	44	25.5	16	4.5	10
Roohi and Haque ³⁵	56	19	16	4	5
Patricia and Mehta ³⁶	35	41	14	5	5
Mukherjee et al ³⁷	40	38	9	4	9
Present Study	35	35.4	7.78	3.5	21.32

Recently numerous studies have shown that bidi's deliver greater amount of nicotine, tar (5 times more) and carbon monoxide (3 times more) than standard cigarette according to centre for disease control. In the present study Squamous cell carcinoma was the predominant type of carcinoma amongst heavy smokers. Adenocarcinoma occurred predominantly in moderate to light smokers and in non-smokers. These findings are similar to as that of Mohammed Sadek Sabour et al in their study of 509 cases of lung cancer.

In the present study major symptoms were cough with expectoration (53.30%), chest pain (41.63%), dyspnoea (35.40%), loss of weight (31.51%), fever (19.84%), hemoptysis (19.06%). Most of other studies also had such type of clinical presentation as shown in Table 12.

In the present study the different cases of lung carcinoma have been subtyped based on WHO classification, as squamous cell carcinoma, adenocarcinoma, adenosquamous carcinoma, small cell carcinoma, large cell anaplastic carcinoma, mesothelioma, NHL, carcinoid and metastatic carcinoma. Of these adenocarcinoma accounted for 35.4%, squamous cell carcinoma 35%, small cell anaplastic carcinoma 7.78%, large cell anaplastic carcinoma 3.5%, undifferentiated large cell carcinoma 3.5%, mesothelioma 2.72%, adenosquamous carcinoma 1.94%, NHL 1.16%, carcinoid 0.77%, and Metastatic carcinoma 8.17%, as comparable in Table 13.

A sensitivity of 43.1%, 61.7% and 88% and a specificity of 83.3%, 80% and 71.4% was achieved in BAL, bronchial brushing and FNAC respectively in our study. Sensitivity to diagnose malignant lung neoplasm increased tremendously when these investigations were used in combination.

CONCLUSION

FNAC of thoracic mass lesions is a safe, rapid, cost effective and reliable procedure with minimal complications. It provides very early diagnosis and sub-classification of various lung tumors on the basis of cytomorphology. The early and accurate diagnosis obtained by FNAC helps to formulate immediate, effective management of thoracic mass lesions.

FNAC proved to be superior in all three modalities i.e. BAL, Bronchial brushing & FNAC and thus can be used as the first line of investigation in patient suspected for malignancy.

In the present study, most patients were taken for treatment on the basis of these three modalities done singly or in combination which shows that the long and complicating procedures of thoracotomy and biopsy is no longer required.

Thus these modality especially FNAC is a valuable procedure for early diagnosis and management of lung carcinoma with improvement in 5 years survival rate of patient.

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