Original Research Article

Lung cancer profile at tertiary care hospital, South Tamilnadu

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A R T I C L E   I N F O

A B S T R A C T

There is increase in cancer incidence both globally and country wise. Especially with the increase in air pollution, industrialisation, second hand smoke exposure etc. there is increase in lung cancer cases. Moreover there is trend in pathological shift from squamous cell carcinoma to adenocarcinoma and increasing occurrence of lung cancer in females.
Objective: To find the histological distribution.
Materials and Methods: Cross sectional study involving 50 patients with clinicoradiological suspicion of lung cancer. Diagnosis was reached either by bronchoscopy, CT guided biopsy or both.
Results: Adenocarcinoma is the most common histological type.

1. Introduction

Cancer is the second leading cause of death globally, and is responsible for an estimated 9.6 million deaths in 2018. Globally, about 1 in 6 deaths is due to cancer. Among 9.6 million deaths gloabally, Lung cancer leads the mortality list with 1.76 million deaths occurring in 2018. Also it is most common cancer accounting to 2.08 million cases followed by breast, colorectal and prostate

GLOBOCAN 2018 study reveals that in India, 67795 new cases of lung cancer were diagnosed in 2018,out of which male we re 48,698 and female were 19097.[1] Mortality due to lung cancer in India was 63475 during 2018, out of which males were 45363 and females were 18112. Mean age of lung cancer incidence was 54.6 years in India. Majority of patients were more than 65 years of age. Smoker & non smoker ratio among lung cancer patients is 20:1.

In India Lung cancer is the second most common cancer among males, and fourth among females

Tobacco use is the single most important risk factor for cancer and is responsible for approximately 22% of cancer-related deaths globally.[2] Tobacco use, alcohol use, unhealthy diet, and physical inactivity are major cancer risk factors worldwide**.** Tobacco use in any form is harmful, whether smoked or smokeless. Cigaratte, beedi and hookah smoking[3] is associated with lung cancer

Approximately one third of deaths from cancer are due to the 5 leading behavioral and dietary risks: high body mass index, low fruit and vegetable intake, lack of physical activity, tobacco use alcohol use. Cigarette and beedi smoking is number one risk factor for lung cancer.[4,5] Cigarette smoking increases a person's chance of getting lung cancer by 15 to 30 times and these persons are more likely to die from lung cancer than people who do not smoke.[6] Lung cancer risk increases proportionally with the number of cigarettes smoked each day and duration of years of smoking. Soon after cessation of smoking, risk decreases.[4,7]

In India, 87% of males and 85% of females patients with lung cancer have history of active tobacco smoking. Second hand smoke exposure has been found in 3% of

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patients. Beedi has been found to be more carcinogenic when compared to cigarette smoke[8–10] and the relative risk of developing lung cancer is more (2.64) for beedi smokers compared to that of cigarette smokers (2.23).[11]

Environmental tobacco smoke exposure during childhood is strongly associated with risk of developing lung cancer.[12,13] Exposure to asbestos,[14] arsenic, chromium, silica, nickel at workplace is a risk factor.[15,16] Indoor exposure to coal used for cooking, heating etc is a risk factor.[17] Tb and Chlamydia infection leads to scaring in lung which predisposes to scar carcinoma in lung.[18,19]

Addition of certain dietary factors may be protective for development of lung cancer lung cancer and some may increase the risk of lung cancer. Persons with the reduced intake of beta-carotene containing foods such as carrots, have a higher risk for lung cancer.[20] Vitamin A deficiency increases the chance of developing squamous cell carcinoma of lung in smokers.[21] Arsenic in potable water may increase the risk of lung cancer.[22]

Primary lung cancers are divided into two main type, small cell carcinoma (SCLC) and non-small cell lung carcinoma (NSCLC).

NSCLC accounts for almost 85% to 90% of the primary lung cancers and has 3 major types-Adenocarcinoma accounts for 35% to 40% of NSCLC, Squamous cell carcinoma accounts for 30% of NSCLC and large cell carcinoma accounts for 10% to 20%. Small cell lung cancer (SCLC) represents about 10% to 15% of diagnosed lung cancers. Adenocarcinoma is often linked to smoking but is also the most common lung cancer diagnosed in nonsmokers. Adenocarcinoma is more prevalent in women than in men.

The most common type of lung cancer is adenocarcinoma; it comprises around 40% of all lung cancer. In western countries, Adenocarcinoma is the most common type of lung cancer in smokers and nonsmokers in men and women regardless of their age.[23] Aden ocarcinoma has surpassed squamous cell carcinoma over years. This shift seems to be attributable partly to the changed smoking pattern and increasing incidence of lung cancer in women. Where as in India it is still squamous cell carcinoma the commonest in both males and females.[24]

With the advent of technology, vast number of modalities are available for diagnosis, staging and treatment of lung cancer. Moreover due to affordable technology and widely available Computerised Tomography machines, increased number of cases are being picked up and subsequently diagnosed. Sputum examination for cytology helps to find the presence of tumour cells/atypical cells in sputum. CT helps in detecting suspicious lesion. Tissue diagnosis is obtained by either image guided biopsy/cytology and bronchoscope guided techniques. Bronchoscopy guided techniques vary from routine fibre optic bronchoscopy, rigid bronchscopy, endobronchial ultrasound etc. Procedures

carried over are bronchial wash over suspicious location, bronchial brush cytology, transbronchial needle aspiration, transbronchial lung biopsy, endobronchial biopsy etc. Treatment modalities vary according to histologic type and staging. Treatment modalities include surgical excision, chemotherapy, radiotherapy, immunotherapy, brachytherapy etc.

The present study was undertaken to evaluate age wise distribution, sex wise distribution, association with smoking, pathological types and diagnostic modality used to reach tissue diagnosis.

2. Materials and Methods

A Cross sectional study was conducted at out patient and inpatient ward of Department of chest and TB, Velammal medical college and research institute, Madurai over period of one year from July 2018 to June 2019. Convenience sampling was done. 50 Patients suspicious of lung cancer based up on symptomatalogy and radiological evidence based up on chest x ray were enrolled in to study.

2.1. Inclusion criteria

Patient with symptoms, signs, and radiological features suggestive of bronchogenic carcinoma aged more than 18 years were included.

2.2. Exclusion criteria

Patients whose sputum is positive for TB.

Patients having clinical and radiological features suggestive of Tuberculosis and negative for AFB.

Patients with poor general condition who are not amenable to any procedure.

Patients with bleeding disorders and diathesis.

Non cooperative patients

Patients with chest lesion suspicious of metastasis from other organs.

The study was conducted after obtaining ethical committee approval from the institute and obtaining informed consent from patients.

Those enrolled patients were subjected to routine investigations like complete blood count, random, fasting and postprandial blood sugar, urea, creatinine, liver function test, bleeding time, clotting time, electrocardiogram, echocardiogram, CT thorax, ultrasound abdomen, urine routine, HIV, Hbsag, HCV.

Those Patients with comorbids like diabetes, hypertension, COPD, CAD, CVA, CKD were provided a speciality consultation and fitness obtained for undergoing Procedure like Image guided biopsy, Bronchoscopy.

Anticoagulatants were withheld temporarily for CAD, CVA patients and started after the successful completion of procedure.

Informed consent was obtained explaining the complication of procedures

Based up on location of mass lesion in CECT, patients were subjected to bronchoscopy or CT guided Trucut biopsy.

Peripheral lesions were approached by CT guided biopsy. Those with central lesion or endobronchial lesion or mediastinal mass underwent bronchoscopy.

Some patient had to undergo both bronchoscopy and CT guided biopsy to reach definitive histological diagnosis.

Bronchoscopic techniques like bronchial wash, bronchial brushing, transbronchial needle aspiration, endobronchial biopsy was carried according to nature of lesion.

3. Results

Majority of patients (40%) were in the age group (50-59 years). There were 18 patients in the 60-69 age group contributing to 36 %. 6 Patients of 70-79 age group contributing to 12 % which is depicted in Table 1

Youngest patient was 29 years of age, while oldest patient was 75 years of age. Mean age of occurrence of lung cancer is 58.3 years

Out of total 50 patients, 39 were males (78%) and 11 were females (22%) which is depicted in Table 2. The ratio of male to female is 3.54:1.

Out of 50 patients, 36 were smokers (72%) and 14 were non smokers (28%) which is depicted in Table 3. The ratio of smoker to non smoker is 2.57:1

All 36 smokers were males. All females were non smokers. Among 39 males, only 3 were nonsmokers which is depicted in Table 4

There were 25 cases of adenocarcinoma (50%), 18 cases were squamous cell carcinoma (36%), 1 case of small cell carcinoma (2%), 1 case of carcinoid tumour (2%), 2 cases of non small cell carcinoma (4%), 1 case of mucoepidermoid carcinoma (2%), 2 cases of poorly differentiated carcinoma (4%). Histology wise distribution is depicted below in Table 6 and Figure 1
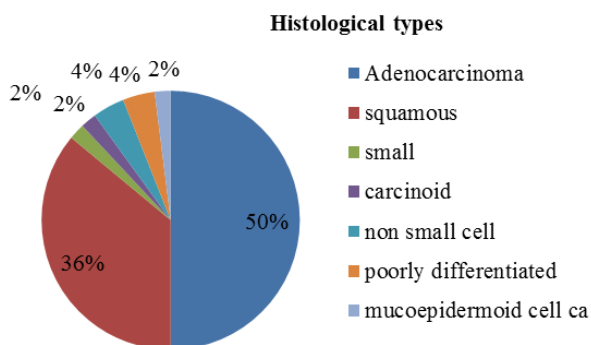

Fig. 1: Histological types

In our study there were 39 males, out of which 17 had adenocarcioma (43%), 16 had squamoius cell carcinoma (41%). So adenocarcinoma is the most common histological type among males which is depicted in Figure 2.

Out of 11 females, 8 were diagnosed to have adenocarcinoma (72%), 2 were diagnosed to have squamous cell carcinoma (18%). So adenocarcinoma is the most common histological type among females which is depicted in Figure 3
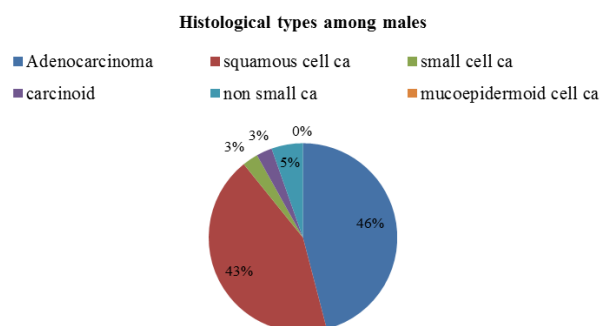

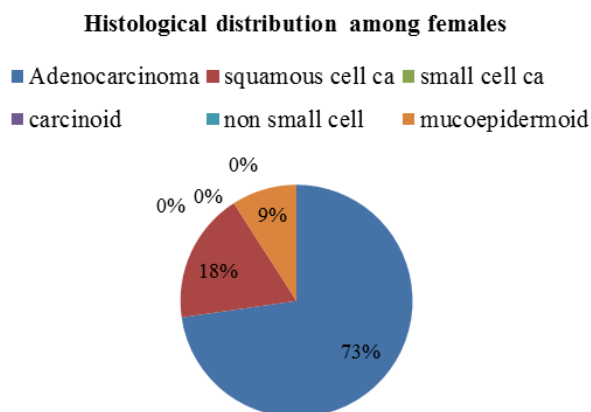**Fig. 2:** Histological distribution among males

Fig. 3: Histological distribution among females

Among 25 adenocarcinoma cases, 17(68%) were males, 8 were females (32%). 18 cases were squamous cell carcinoma, among which 16 were males (88%) and 2 were females (11%) which is depicted in Table 6

Out of 50 patients, 36 were smokers (72%) and 14 were non smokers (28%). The ratio of smoker to non smoker is 2.57:1. Among 36 smokers, 16 had adenocarcinoma (44%), 14 had squamous cell ca(39%), 1 had small cell ca(2.7%), 1 had carcioid (2.7%), 2 had non small cell ca (5.4%), 2 had poorly differentiated ca(5.4%). So adenocarcinoma is the most common cancer among smokers which is depicted in Table 7 andFigure 4.

Out of 25 adenocarcinoma cases, 16 occurred in smokers (64%) and 9 were non smokers (36%). There were total of

Table 1: Age and gender wise distribution

S.No	Age in years	Total(n=50)	Percentage age wise	Males	Percentage of males	Females	Percentage of females
1	21-30	1	2%	1	100%	0	0
2	31-39	1	2%	0	0	1	100%
3	40-49	4	8%	3	75%	1	25%
4	50-59	20	40%	16	80%	4	20%
5	60-69	18	36%	14	77%	4	22%
6	70-79	6	12%	5	83%	1	17%

Table 2: Gender wise distribution

S. No	Sex	No of Patients	Percentage
1	Male	39	78%
2	Female	11	22%

Table 3: Smoking status

	No of patients	Percentage
Smokers	36	72%
Non smokers	14	28%

Table 4: Smoking and gender distribution

	Male(n=39)	Percentage	Female(n=11)	Percentage
Smokers(n=36)	36	92%	0	0
Non smokers(n=14)	3	7%	11	100%

Table 5: Histology wise distribution

S. No	Type of Cancer	No of cases	Percentage
1	Adenocarcinoma	25	50%
2	Squamous	18	36%
3	Small cell	1	2%
4	Carcinoid	1	2%
5	Non small cell	2	4%
6	Mucoepidermoid	1	2%
7	Poorly differentiated	2	4%

Table 6: Histological types and gender wise distribution

S.No	Type of cancer	No of cases	Males(n=39)	Percentage	Females(n=11)	
1	Adenocarcinoma	25	17	68%	8	32%
2	Squamous	18	16	88%	2	11%
3	Small cell	1	1	100%	0	-
4	Carcionoid	1	1	100%	0	-
5	Non small cell	2	2	100%	0	-
6	Mucoepidermoid	1	0	-	1	100%
7	Poorly differentiated	2	2	100%	0	-

18 squamous cell carcinoma cases, out of which 14 occurred in smokers (78%) and 4 were non smokers (22%). While small cell carcinoma, carcinoid, non small cell carcinoma, poorly differentiated carcinoma occurred in smokers.

Out of 50 patients, 14 were non smokers, out of which 9 had adenocarcinoma (64%), 4 had squamous cell ca(28%). 1 had mucoepidrmoid cell ca(7%). So adenocarcinoma is most comm on lung malignancy among non smokers. It is depicted in Table 7 and Figure 5.
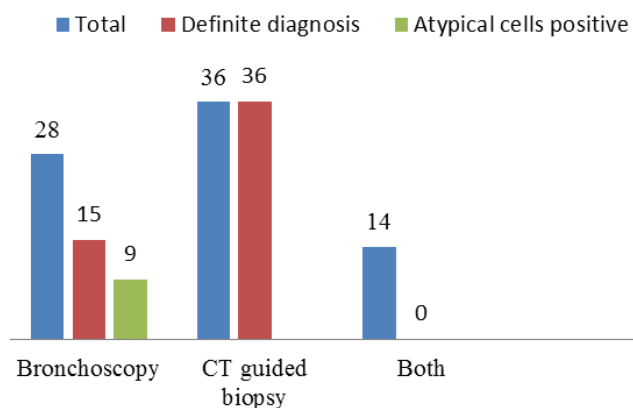
Bronchoscopy was carried out in 28 patients (56%), out of which 15(53%) had definite diagnosis-Proven malignancy, atypical cells were seen in 9 patients(32%). CT guided biopsy was done on 36 patients (72%). While 14 patients (28%) underwent both bronchoscopy and CT

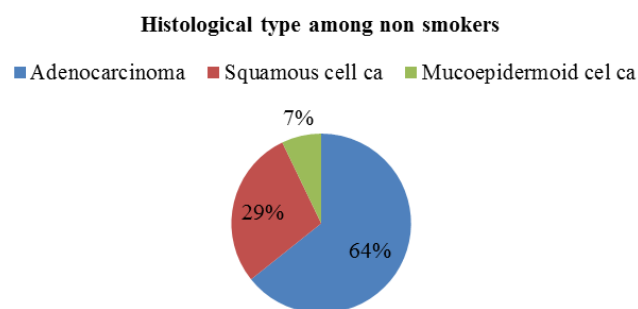**Table 7:** Association between histological types and smoking status

S. No	Type of cancer	No of cases	Smokers	Nonsmokers
1	Adenocarcinoma	25	16	9
2	Squamous	18	14	4
3	Small cell	1	1	0
4	Carcionoid	1	1	0
5	Non small cell	2	2	0
6	Mucoepidermoid	1	0	1
7	Poorly differentiated	2	2	0
	Total	50	36	14
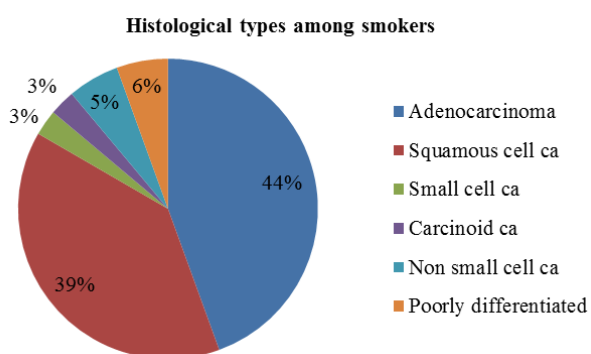
Fig. 4: Histological type among smokers

Fig. 5: Histological type among non smokers

Fig. 6: Diagnostic modality
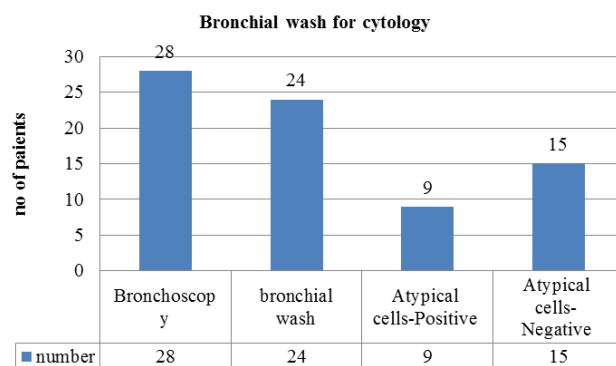
Fig. 7: Bronchial wash atypicals cells

guided biopsy to reach definite diagnosis which is depicted in Figure 6

A total of 28 patients underwent bronchocopy, out of which Bronchial wash cytology was done on 24 patients (85%), in which positive results for atypical cells were seen in 9 patients (37.5%). It is depicted in Figure 7

A total of 28 patients underwent bronchocopy, out of which Bronchial brush cytology was done on 6 patients (21%), in which positive results for atypical cells were seen in 2 patients(33%) which is depicted in Figure 8

A total of 28 patients underwent bronchocopy, out of which Endobronchial Biopsy was done on 20 patients (71%), with positive histopathological results were seen in 15 patients (75%). It is depicted in Figure 9

CT guided biopsy was done on 36 patients (64%) of patients. It is depicted in table 8

4. Discussion

There was a shift in pathological distribution of non-small cell carcinoma over last decade. Prior to 1970's squamous cell carcinoma was most common histological type of non-small cell carcinoma. However since 1975 there has been a dramatic increase in the incidence of adenocarcinoma making it the predominant histological type of non-small cell carcinoma worldwide. In India, studies done prior to

Table 8: CT guided biopsy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Positive	32	64.0	64.0	64.0
	Not done	18	36.0	36.0	100.0
	Total	50	100.0	100.0	
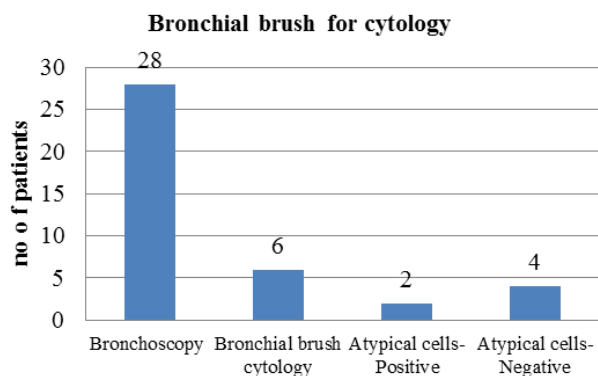
Fig. 8: Bronchoscopy brush atypical cells
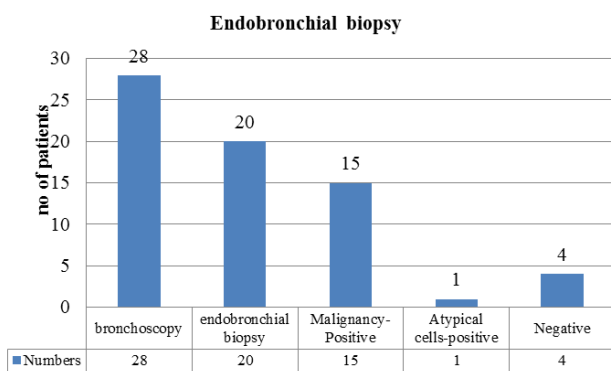
Fig. 9: Endobronchial biopsy

2004 showed predominance of squamous cell CA.

Adenocarcinoma was the most common histological type (50%) in our study, whereas study done by Krishnamurthy et al. Noronha et al. and Mallick et al. observed adenocarcinoma as common histological variant of lung cancer accounting for 42.6%, 43.8% and 37.3% respectively.[25–27] This paradigm shift in histopathology seems to be attributable to certain extent to change in smoking habits and industrialization.

Our study showed that mean age of lung cancer patients was 58 years, which is comparable to study d one by Dhandapani et al.[28] in south India which showed a mean age group close to 60 yrs.

In the present study, 36 were smokers (72%) and 14 were non smokers (28%). The ratio of smoker to non smoker is 2.57:1 which is similar to studies done by Jindal et al. 1979[29] which showed ratio of 2.4:1 and Jindal and Behera

1990[30] reported ratio of 2.7:1.

The ratio of male to female is 3.54:1 where as study done by Arora et al. 1990.[31] reported male to female ratio of 4.05: 1, increased incidence in female in our study may be attributed to increase in pollution, second hand smoke exposure, and genetic factors though all the females in our study were non smokers.

Our present study shows that adenocarcinoma is the most common lung carcinoma among males contributing to 46%, followed by squamous cell carcinoma (41%). The study done by Kalyani et all 2018.[32] showed that adenocarcinoma is the most common histological type among males

Our present study shows that adenocarcinoma is the most common lung carcinoma among females which is similar to study done by schneiderman et al.[33] Among 11 females, 8 were diagnosed to have adenocarcinoma (72%)

Our present study shows that Adeno carcinoma is the most common lung carcinoma - histological variant in nonsmokers contributing to 64% which is consistent with studies conducted by Arora VK et al in 1990.[31]

Our present study shows that Adeno carcinoma is the most common histological variant in smokers contributing to 44% followed by squamous cell ca(39%) which is similar to the study done by Kalyani et al 2018[32] which showed that adenocarcinoma is the most common pathological type among even in smokers

The increase in the incidence of adenocarcinoma may be attributed to cessation of tobacco smoking and change to filtered cigarettes which has globally reduced tobacco related major histological types of lung cancers like squamous cell carcinoma and small cell carcinoma. Smoke from filtered cigarettes may be more deeply inhaled, resulting in carcinogen deposition in lung periphery and hence leading to adenocarcinomas. Study done by Behera et al 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.[13]

5. Conclusion

Adenocarcinoma has become the most common lung cancer surpassing squamous cell carcinoma. This suggests that pathological shift has emerged in India also.

Adenocarcionoma has emerged as most common pathological type among males, females, smokers, non smokers irrespective of gender and smoking status. This clearly depicts that there is steep rise in adenocarcinoma cases which may be attributed to increase in industrialization, air

pollution, decrease in beedi smoking ,changing trend from beedi to cigarette smoking.

6. Conflict of interest

None.

7. Conflict of interest

None.

8. Acknowledgement

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