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Original Research Article

CLINICAL, PATHOLOGICAL AND RADIOLOGICAL PROFILE OF LUNG CARCINOMA IN A TERTIARY CARE CENTER OF SOUTH INDIA

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Abstract
Background: Lung cancer refers to tumors originating in the lung parenchyma or within the bronchi. It is one of the leading causes of cancer-related deaths in developing countries. This may be due to changes in the life-style habits, increased use of tobacco, environmental and air pollution. Early diagnosis is missed in many patients due to non-specific disease presentation. This study aims to assess the clinical, pathological and radiological profile of lung cancer in Southern Tamilnadu so as to educate the primary care physicians and pulmonologists to have an understanding about the disease causation and presentation for early diagnosis. The aim & objective is to evaluate the clinical, pathological and radiological profile of primary lung cancer patients and to assess the association of smoking with lung cancer in Southern Tamilnadu, India. **Materials and Methods:** This observational cross-sectional study was conducted in the Department of TB & Respiratory Medicine, Government Thiruvarur Medical College Hospital during the time period December 2020 to May 2021. All patients with histopathological evidence of primary lung cancer were included in the study. Patients who were not willing for the study, those with secondaries in the lung and patients with pleural malignancy were excluded. Informed consent was obtained from all the patients and ethical clearance was obtained from the Institutional ethical committee. **Result:** A total of 103 patients were studied, out of which 74.8% (n=77) were males and 25.2 (n=26) were females. The overall mean age of the study subjects was 58.9 years. 64% (n=66) were smokers, with an average smoking index of 1402.7 and about 36% (n=37) were non-smokers. Symptoms like cough, breathlessness, chest pain, haemoptysis, hoarseness of voice, weight loss and loss of appetite was observed in the patients. Squamous cell carcinoma was the most common histological subtype encountered (n=42, 41%) followed by adenocarcinoma (n=38, 37%) and small cell carcinoma (n=6, 6%). Most common radiological presentation was a mass lesion present in 75% patients (n=77) followed by unilateral hilar prominence present in 45% of patients (n=46). **Conclusion:** Smoking is the principal risk factor of lung cancer and squamous cell carcinoma remains the commonest histological subtype signifying the unchanging histological trends in developing countries in contrast to developed countries.The reason behind this histological shift in the developed countries is due to changes in the smoking behavior of the population, method of manufacturing and composition of cigarettes being marketed in these regions.Old age and advanced disease stages are associated with risk of poor prognosis.

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INTRODUCTION

Lung cancer accounts for 13% of all new cancer cases and is responsible for 19 % of cancer related deaths globally.[1]Tobacco exposure is the leading cause of lung cancer and in India an increase in incidence of lung cancer has been observed in the last decade. Smoking is found to have a strong association with small cell and squamous cell carcinomas. About 85% of the lung cancer cases present with early symptoms like cough, chest pain and dyspnoea which mimic other lung problems like infection or effects of smoking.[2] This makes diagnosis difficult at an early stage and patients most often present with serious symptoms at an advanced and non-curable disease stage. High-resolution computed tomography (HRCT) has been used to screen lung cancers in the recent times and very faint and small lesions called ground-glass opacity nodules (GGN) are alsofrequently encountered. GGNs are classified as pure GGNs (pGGN) and mixed GGN (mGGN) and the frequency of malignancy was found to be higher in those with mixed GGNs.[3] The incidence and mortality rates of lung cancer are tightly linked to smoking patterns. Differences in the rate of metabolism of tobacco-related carcinogens and their metabolites, hormonal differences and genetic predisposition increase the susceptibility of lung cancer.[4,5] Apart from smoking, factors such as passive smoking and indoor pollutants including radon and air pollution are other important causes of lung cancer. In spite of the important advances in lung cancer screening, primary prevention through tobacco control remains the main approach in the fight against lung cancer in low-income countries.[6] Lung cancers are categorized by pathological features into small cell and non-small cell lunger carcinomas. Clinical manifestations result from local tumor growth, lymphatic spread, distant metastasis and paraneoplastic effects.[7] The remaining percentage of lung cancer is detected by accidental radiological evaluation for an unrelated problem. Hence, a knowledge on the clinical, pathological and radiological profile of lung cancer is mandatory for physicians and pulmonologists to understand the spectrum of lung cancer and start treatment at the appropriate stage.

Lung cancer also imposes severe economic breakdown in the developing countries. In USA and UK, the mortality rates due to lung cancer have been falling since 1990s according to a study report. In contrast, developing nations including Brazil, Russia, India, China, and South Africa (BRICS), the mortality rates seem to be increasing. This may be due to the delay in diagnosis and sociocultural barriers.[8] Although several Indian studies on demography have been published, the changes in clinical pathological patterns of lung cancer with reference to southern Tamilnadu has been done in this study, so as to identify and treat lung cancer at an early stage. The aim of this study was to analyse the clinical pathological and radiological trends in lung cancer patients from a tertiary care center.

Aims & Objectives

1. To evaluate the clinical pathological and radiological profile of primary lung cancer patients in Southern Tamilnadu, India.
2. To determine the association of smoking with lung cancer and to verify the global changing trend in histopathology of lung cancer in our region.

MATERIALS AND METHODS

This observational cross-sectional study was conducted in the Department of TB & Respiratory T Medicine, Government Thiruvarur Medical College Hospital during the time period December 2020 to May 2021. The study began after obtaining approval from Institutional Ethical Committee. The study population included patients selected from outpatient and inpatient departments of Thoracic medicine, Thiruvarur Medical College Hospital.

Inclusion Criteria

All patients with histopathological evidence of primary lung cancer were included in the study.

Exclusion Criteria

- Patients who were not willing for the study,
- Patients with secondaries in the lung and patients with pleural malignancy`

Data collection: After obtaining written informed consent, the initial evaluation of the patients was done and those with high clinical suspicion for lung cancer were subjected to diagnostic procedure. The diagnostic option was decided based on the location of lesion on imaging as follows.

❖ Fiberoptic bronchoscopy guided procedures if the lesion is located centrally.
❖ Ultrasound guided needle biopsy and FNAC if the lesion is peripheral.

The results were analyzed using appropriate statistical software.

RESULTS

A total of 120 cases underwent initial evaluation out of which 103 were included in the study and remaining was excluded due to alternative diagnosis. Out of the 103 cases, 74.8% (n=77) were males and 25.2 (n=26) were females [Figure 1]. There was an overall male predominance with male/female ratio of 5:1.7. Only 15.4% (n=4) of females and 16.9% (n=13) of males were diagnosed at age less than 50 years.

The distribution of age varied from 38 to 80 years. The overall mean age of the study subjects was 58.9 years. Maximum patients were found in the 41 to 60 years age group (51 %, n= 52) followed by > 60 years age group (47%, n=48) and least in < 40 years (3%, n=3) [Figure 2].

64% (n=66) of the patients in our study were smokers, with an average smoking index of 1402.7 and about 36% (n=37) were non-smokers Fig.3. Among males, 85.7% were smokers (66/77) and none of the females were smokers. The overall smoker: non-smoker ratio was 1.6:1. Of the 66 smokers encountered in the present study, majority were exclusive bidi smokers or smoking both bidi as well as cigarette none of the patients were exclusive cigarette smokers. A family history of lung cancer was found in 2 (1.9%) patients.

Types of lung neoplasm were compared with history of smoking in lung cancer patients. Definitely history of smoking has influence upon the type of cancer. Squamous cell carcinoma was the most common carcinoma in males (34 / 77 males, 44%) and smokers (33/66 smokers, 50%). Adenocarcinoma was most common carcinoma in females (14/26 females, 54%) and never-smokers (21/37) never-smokers, 57%).

Symptoms like cough, breathlessness, chest pain, haemoptysis, hoarseness of voice, weight loss and loss of appetite was observed in the patients Fig.4. In our study, the common comorbid conditions present in lung cancer patients were obstructive airway disease (32%) followed by diabetes mellitus (26%), Hypertension (20%). Previous history of ATT for pulmonary tuberculosis was present in 24 patients (24/ 103 cases, 23%).

As per radiological evaluation, right lung was involved (65%, n=67) in majority of cases followed by left lung involvement in 35% of cases (n=36). Upper lobe involvement was predominantly seen in lung cancer in both right and left lung. Middle lobe on the right lung (9.7%) and lingular lobe on the left (2.9%) are least common lobes involved in lung cancer. There was no significant positive correlation between types of lung cancer and lobe involved (significant >0.05, p value: 0.132) [Figure 5]. Central lesions (53%) were found to be more common than peripheral lesion (47%). Squamous cell carcinoma (67%), small cell carcinoma and bronchial carcinoids were commonly manifested as central mass and adenocarcinoma mostly presented as peripheral mass (64%).

All the patients had an abnormal chest radiograph at presentation. Most common radiological presentation was a mass lesion present in 75% patients (n=77) followed by unilateral hilar prominence present in 45% of patients (n=46). Other common finding includes mediastinal widening (38%), cavity (27%), and collapse (25%). Less common findings include pleural effusion (20%), bony erosion (10%) and pericardial effusion (6%) [Figure 6].

Squamous cell carcinoma was the most common histological subtype encountered (n=42, 41%) followed by adenocarcinoma (n=38, 37%), small cell carcinoma in 6 patients (6%), Large cell carcinoma and bronchial carcinoid in 4 patients each (4%), undifferentiated group found in 9 patients (9%). Squamous cell carcinoma presented at a

slightly older age than adenocarcinoma (60 years v/s 59 years) [Figure 7].
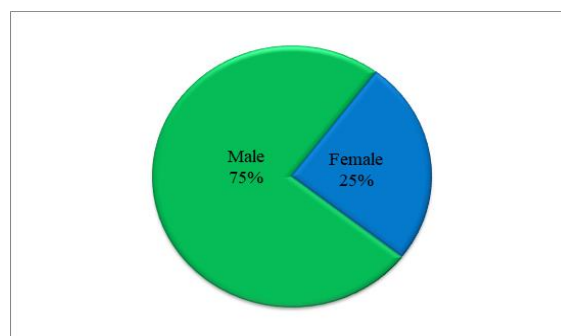

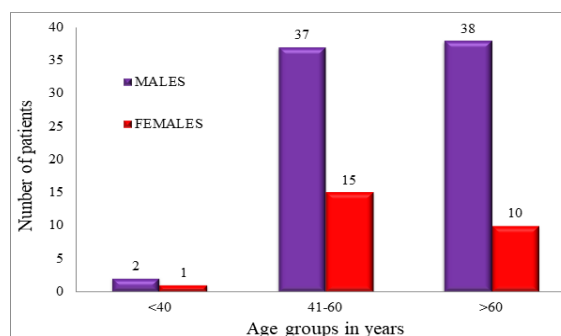Figure 1: Pie diagram showing Distribution of Gender

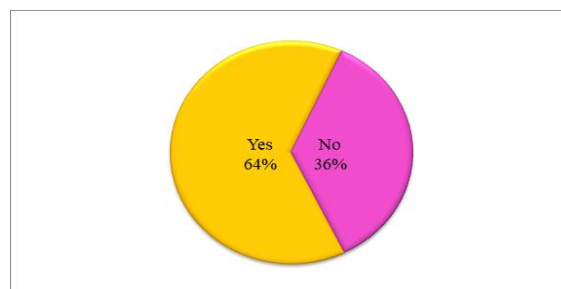Figure 2: Bar diagram showing Age wise Distribution of study Population

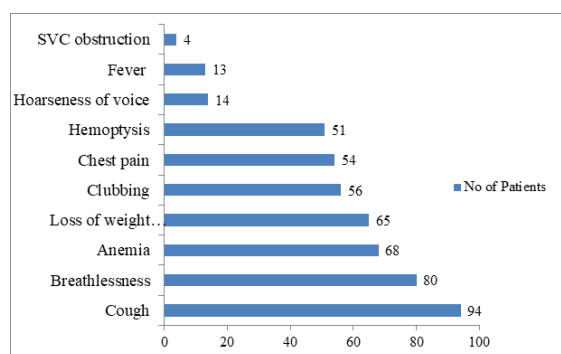Figure 3: Smoking habits in lung cancer patients

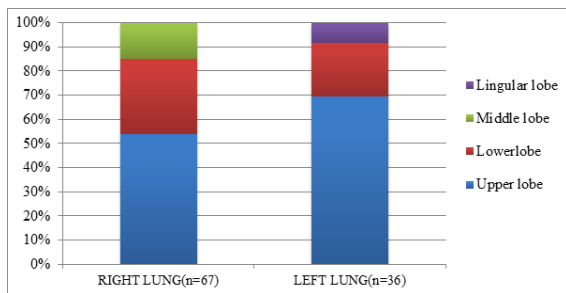Figure 4: Clinical Presentation of patients with lung cancer
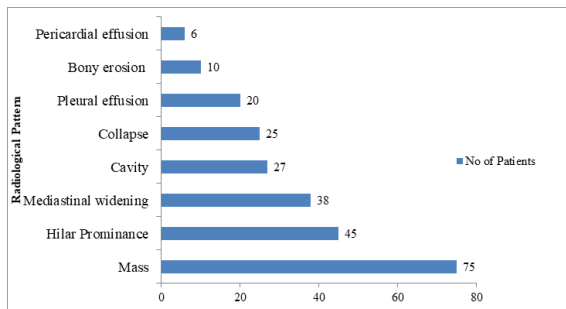
Figure 5: Radiological distribution of lung cancer

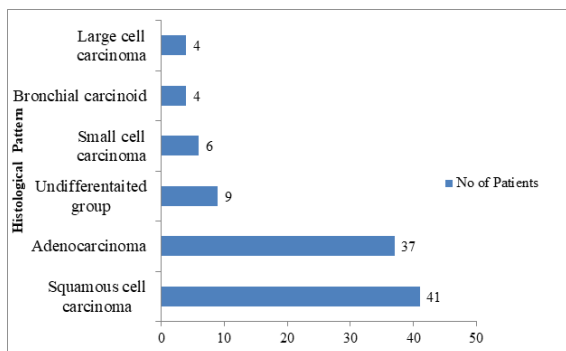**Figure 6: Radiological presentation of lung cancer**

Figure 7: Histological type of lung cancer

DISCUSSION

Lung cancer remains the leading cause of mortality in developing countries like India since the 21st century. Smoking and tobacco use are directly linked to the incidence of lung cancer. The epidemiological and clinical-radiological trends of lung carcinoma are ever changing since the late 1940s, with the increased prevalence of smoking and other chronic lung conditions and the availability of modern diagnostics.[9] Whether these changing trends represent a global shift in lung cancer demographics or regional variations is still not clear. The present study was conducted to analyse the clinical pathological and the radiological trends of lung cancer in the southern part of Tamilnadu.

Among the 103 study patients, the mean age was 59.8 years and the distribution of age varied from 38 to 80 years. These findings are comparable to other studies in literature.[10,11] However, the average age of the patients in our study was a decade younger when compared to developed countries. This shows that lung cancer onsets at an early age in developing

countries, which may be attributed to an increased smoking habit and genetics. The male to female ratio in this study was 5:1.7, with a clear male preponderance. The sex ratio reported in various Indian studies ranged from 4.6:1 to 8.2:1 compared to a study from USA where the male: female ratio was 3:2.7 which is nearly equal.[12,13] This could be explained because of still lower incidence of female smokers in India as compared to that in the Western countries.

In spite of these facts, a rising lung cancer incidence has been observed among Indian females in the recent years. This was obvious in the current study too where most of them were housewives. The reason is multifactorial such as increasing smoking habits among females, traditional use of unventilated kerosene-fuelled stoves and biomass fuel like cow dung and firewood for cooking, less ventilated house and second-hand smoke.[14] In our study, 64% of the patients were smokers, indicating that smoking is the primary cause of lung carcinoma. When comparing the types of lung cancer with smoking habits, it was found that type of lung cancer changes with smoking habit and was statistically significant (p value: 0.026). Squamous cell carcinoma was common in males (34/77 males, 44%) and smokers (33/66 smokers, 50%) while adenocarcinoma was most common carcinoma in females (14/26 females, 54%) and non-smokers (21/37 non-smokers, 57%). The link between smoking and lung cancer was most apparent among squamous cell carcinoma, small cell carcinoma and large cell and less evident with adenocarcinoma. This result is similar to the study result of Navin Pandhi et al who also stated that smoking is closely associated with incidence of squamous cell carcinoma.[15]

Another interesting factor noted in this study is the increasing incidence of lung cancer among non-smokers. This specifies that passive smoking and multiple environmental risk factors can lead to the pathogenesis of lung carcinoma. Clinical symptoms like cough followed by dyspnoea and chest pain, haemoptysis and weight loss were observed in our study which are comparable to the results of other Indian studies.[16] The most common radiological presentation seen in our study was mass lesion (75%) which was almost similar to that reported by other studies.[17] This may be because most of the patients presented to us at an advanced stage. Next common radiological finding was unilateral hilar prominence (lymphadenopathy) seen in 45% of patients. Other common finding includes mediastinal widening (38%), collapse (25%), and cavity (27%). In the present study, 64.2% of cavitating lesions were of squamous cell subtype which is similar to reports published in the literature.[18]

Diagnostic modalities used in our study varied depending on the site of lesion. Ultrasound guided transthoracic procedures (52%) and fibreoptic bronchoscopy assisted procedures (48%) were

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commonly used. Ultrasound guided procedures showed better yield for peripheral tumors whereas fibreoptic bronchoscopy guided procedures were good for central type of lesions. The pattern of lung cancer is changing in the well-developed countries. However, Squamous cell carcinoma was still the commonest cell type followed by adenocarcinoma and small cell carcinoma which is similar to reports from most Indian studies and contrary to many western studies and few Indian studies.[19]

The reason behind this histological shift in the developed countries is due to changes in the smoking behaviour of the population, method of manufacturing and composition of cigarettes being marketed in these regions. This study is based exclusively on patients attending our department, so results are not representative of the whole community. Another limitation was the sample size which could be increased. Apart from these, treatment profile and follow up in these patients were not done.

CONCLUSION

Our study has shown smoking as the principal risk factor in causing lung cancer. In spite of the plenty of awareness programmes running all across India, the outcomes are disappointing. Hence proper implementation of these programmes should be done to educate the public. Squamous cell carcinoma remains the commonest histological subtype according to our study, which signifies the unchanging histological trends. Old age and advanced disease stages are associated with risk of poor prognosis. This has to be addressed by early screening programmes similar to cervical and breast cancer, which can reduce morbidity and mortality.

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