Section: General Medicine

Original Research Article

CLINICOPATHOLOGICAL SPECTRUM OF LUNG CANCER IN A TERTIARY CARE CENTRE

Received : 05/09/2024
Received in revised form : 24/10/2024
Accepted : 08/11/2024

Keywords:
Lung cancer, Squamous cell carcinoma, Adenocarcinoma, Sputum cytology, Bronchoscopy.

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DOI: 10.47009/jamp.2024.6.6.3

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2024; 6 (6); 9-13

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Abstract

Background: Lung cancer is the most common cancer globally and accounts for significant mortality, with an increasing incidence, particularly in India, where it represents 6.9% of new cases and 9.3% of cancer-related deaths. This study aimed to investigate the clinicopathological spectrum of patients with lung cancer. **Materials and Methods:** This prospective study included 50 patients from Kanyakumari Government Medical College Hospital for 12 months. A detailed clinical and smoking history was obtained. Clinical examination, sputum analysis, and chest radiographic findings were also evaluated. Bronchoscopy was performed and histopathological findings from the biopsies were documented. **Result:** The most common tumour site was the right upper lobe (34%), and clubbing was the most frequent sign in 31 (62%) patients, followed by lymphadenopathy in 10 (20%). According to radiological features, hilar prominence was noted in 50% of patients, and a mass was detected in 38 patients (76%). Histopathologically, squamous cell carcinoma was the most prevalent type, diagnosed in 30 (60%) patients. Sputum cytology results were positive in 38 (76%) patients and negative in 12 (24%) patients. Sex, age, smoking, and alcohol consumption were not significantly associated with the type of carcinoma (p=0.58, p=1, p=0.1, and p=0.4, respectively). No significant association was observed between the different histological types and the smoking index (p=0.77). **Conclusion:** A higher prevalence of bronchogenic carcinoma was observed in males, primarily linked to smoking and occupational exposure to pesticides among farmers. The most common histological type was squamous cell carcinoma, with most patients presenting stage 4.

INTRODUCTION

Lung cancer is the most common cancer and one of the biggest causes of cancer mortality worldwide. Its incidence has increased globally at a rate of 0.5% per year. In India, lung cancer constitutes 6.9% of all new cancer cases and 9.3% of all cancer-related deaths in both sexes.[1] Tobacco smoking remains the most significant risk factor. Historically, squamous cell variants have been the most common type, comprising 35-45% of all lung cancers. Adenocarcinoma appears to replace the squamous cell variety as the most common type worldwide. Non-small cell lung cancer accounts for 80% of lung cancer cases and the remaining 20% of small-cell lung cancers. Non-small cell lung cancer is a type of lung cancer other than small-cell lung cancer. Non-small cell lung cancer grows and spreads more slowly than small-cell lung cancer. Small cell lung cancer is the most aggressive form of lung cancer.[2]

Squamous cell carcinoma usually arises centrally in larger bronchi. Adenocarcinomas formed from glandular structures in the epithelial tissues are often found in the periphery of the lungs. Large cell carcinomas can occur in any part of the lung and tend to grow at a faster rate than the other two types. Despite advances in surgical techniques and combined therapies, lung cancer remains a disease with a dismal prognosis, and the overall 5-year survival rate has remained relatively unchanged at 12-16% over the past 30 years.

Various studies suggest that radiation levels in and out of Kanyakumari district are very high, with natural radiation being 40 times higher than other places in Tamil Nadu. The people of Kanyakumari are also affected by silicosis due to sand mining as an occupation because lung cancer is increasing in this district. Hence, this study was designed to evaluate the clinicopathological spectrum of lung cancer in patients attending Kanyakumari Medical College for early diagnosis, intervention, effective management, and improvement in survival rates.

Aim: This study aimed to investigate the clinicopathological spectrum of lung cancer in

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patients of Kanyakumari Government Medical College.

MATERIALS AND METHODS

This prospective study was conducted on 50 lung cancer patients in the outpatient department of thoracic medicine, at Kanyakumari Government Medical College Hospital, from January 2019 to December 2019. This study was approved by the Institutional Ethics Committee before initiation, and informed consent was obtained from all patients.

Inclusion criteria

Patients with histological or cytological confirmation of lung cancer, determined by fibreoptic bronchoscopy and CT-guided biopsy, were included.

Methods

Patient details, such as age, sex, address, occupation, and inpatient number, were recorded. Detailed clinical and smoking histories were also obtained. Clinical examination, sputum analysis, and chest radiography findings were also evaluated. Bronchoscopy was performed and histopathological findings from the biopsies were documented.

Statistical analysis

Data entry was performed using Microsoft Excel. Statistical analysis was done using SPSS version 22. The proportions and means were calculated using descriptive statistics. Differences between different proportions were calculated using the chi-square test. An ANOVA test was used to determine the differences between means. Statistical significance was set at $p < 0.05$.

RESULTS

The mean age of the study patients was 59.04±7.67. The patients' ages ranged from a minimum of 46 years to a maximum of 72 years, with a median age of 59.5 years.

Many patients 12 (24%) were in the 61-65 years age group and 10 patients (20%) were in the 56-60 years. Males comprised 45 patients (90%) in the group, while females comprised five patients (10%). Occupation-wise, the most common profession was farming, which included 11 patients (22%), followed by masons at 6 patients (12%), and sweepers at 5 patients (10%). 36 (72%) patients were alcohol users and 43 (86%) were smokers. The majority 39(91%) of the smokers had used beedi. Diabetes mellitus was the most common comorbidity, and 33 (66%) patients had diabetes mellitus. Hypertension (44%) was the next most common comorbidity [Table 1].

Cough was the most common symptom, occurring in 46 (92%) patients. Dyspnoea was the next most common symptom, affecting 42 (84%) patients. In terms of clinical signs, clubbing was the most frequent in 31 (62%) patients, followed by lymphadenopathy in 10 (20%). Histopathologically, squamous cell carcinoma was the most prevalent type, diagnosed in 30 (60%) patients, followed by adenocarcinoma in 16 (32%) patients. Sputum cytology results were positive in 38 (76%) patients and negative in 12 (24%) patients. Regarding tumour staging, 21 (42%) of the patients were classified as stage 4, with both stage 3A and stage 3B comprising 13 (26%) patients each [Table 2].

Cavitation was observed in 17 (34%) patients. Lung collapse was noted in 12 (24%), with 38 (76%) patients showing no signs of collapse. Hilar prominence was present in 25 (50%) patients; the remaining 25 (50%) patients did not show this feature. A mass was detected in 38 (76%) patients, whereas 12 (24%) patients did not have a detectable mass. Regarding the tumour site, the right upper lobe was the most common location, which included 17 (34%) patients. This was followed by the left upper lobe and the right lower lobe, each contributing to 11 (22%) patients [Table 3].

Sex, age, smoking, and alcohol consumption were not significantly associated with the type of carcinoma ($p=0.58$, $p=1$, $p=0.1$, and $p=0.4$, respectively) [Table 4].

No significant association was observed between the different histological types and the smoking index (F-value=0.37, $p=0.77$) [Table 5].

Table 1: Demographic details.

		Frequency (%)
Age group in years	46-50	9 (18%)
	51-55	8 (16%)
	56-60	10 (20%)
	61-65	12 (24%)
	66-70	9 (18%)
	71-75	2 (4%)
Sex	Male	45 (90%)
	Female	5 (10%)
Occupation	Business	3 (6%)
	Carpenter	1 (2%)
	Cook	3 (6%)
	Driver	3 (6%)
	Electrician	1 (2%)
	Farmer	11 (22%)
	Fisherman	4 (8%)
	Hotel	2 (4%)
	Housewife	1 (2%)
	Latex company	1 (2%)

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	Maison	6 (12%)
	Painter	1 (2%)
	Rock mining	1 (2%)
	Sand Mining	1 (2%)
	Shop	3 (6%)
	Sweeper	5 (10%)
	Tailor	2 (4%)
	Workshop	1 (2%)
Alcohol use	Yes	36 (72%)
	No	14 (28%)
Smoking	Yes	43 (86%)
	No	7 (14%)
Type of smoking	Beedi	39 (91%)
	Cigarette	4 (9%)
Comorbidities	Coronary artery disease	8 (16%)
	Diabetes mellitus	33 (66%)
	Prior tuberculosis	3 (6%)
	Hypertension	22 (44%)
	COPD	3 (6%)

Table 2: Clinical and histopathological characteristics

		Frequency (%)
Symptoms	Bone pain	6 (12%)
	Cough	46 (92%)
	Chest pain	25 (50%)
	Dyspnoea	42 (84%)
	Haemoptysis	25 (50%)
	Hoarseness of voice	9 (18%)
	Weight loss	35 (70%)
Signs	Clubbing	31 (62%)
	Lymphadenopathy	10 (20%)
	SVC obstruction	3 (6%)
	No signs	6 (12%)
Histopathological features	Adenocarcinoma	16 (32%)
	Small cell lung carcinoma	2 (4%)
	Squamous Cell Carcinoma	30 (60%)
	Undifferentiated carcinoma	2 (4%)
Sputum cytology positive	Yes	38 (76%)
	No	12 (24%)
Stage of the tumour	Stage-2B	2 (4%)
	Stage-3A	13 (26%)
	Stage-3B	13 (26%)
	Stage-4	21 (42%)
	Extensive	1 (2%)

Table 3: Radiological features.

		Frequency (%)
Cavitation	Yes	17 (34%)
	No	33 (66%)
Collapse	Yes	12 (24%)
	No	38 (76%)
Hilar Prominence	Yes	25 (50%)
	No	25 (50%)
Mass	Yes	38 (76%)
	No	12 (24%)
Site of the tumour	Right upper lobe	17 (34%)
	Left upper lobe	11 (22%)
	Right lower lobe	11 (22%)
	Left lower lobe	6 (12%)
	Right middle lobe	4 (8%)
	Left lingular lobe	1 (2%)

Table 4: Comparison of demographic details with histological types of carcinomas.

		Histological type of carcinoma				**P-value**
		Adenocarcinoma	**Small cell lung carcinoma**	**Squamous cell carcinoma**	**Undifferentiated carcinoma**	
Sex	Male	12 (75%)	2 (100%)	29 (96.7%)	2 (100%)	0.58
	Female	4 (25%)	0	1 (3.3%)	0	
Age (years)	> 60	7 (43.7%)	1 (50%)	14 (46.7%)	1 (50%)	1
	≤ 60	9 (56.3%)	1 (50%)	16 (53.3%)	1 (50%)	
Smoking	Yes	12 (75%)	2 (100%)	27 (90%)	2 (100%)	0.1

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	No	4 (25%)	0	3 (10%)	0	
Alcohol	Yes	10 (62.5%)	1 (50%)	23 (76.7%)	2 (100%)	0.4
	No	6 (37.5%)	1(50%)	7 (33.3%)	0	

Table 5: Comparison of means of smoking index with histological types

Histological types	Smoking index		P value
	Mean ± S. D	F-statistic	
Adeno carcinoma	1064.833 ± 452.3108	0.37	0.77
Small cell lung carcinoma	1316 ± 1405.7283		
Squamous cell carcinoma	1221 ± 458.5017		
Undifferentiated carcinoma	1036 ± 0		

DISCUSSION

Primary lung cancer is increasing in India due to increased lifespan and rising incidence and mortality are directly linked to the amount of cigarette use in the population. In recent years adenocarcinoma has surpassed the predominant squamous cell carcinoma in both genders in most Asian countries. In our study, 90% of the patients were male and 10% were female. Viswanathan et al. observed that during the ten years from 1950 to 1959, the sex incidence was higher in males than in females. They found that of a total of 95 necropsies on lung cancer, 78 were males and 17 were females.[3] The median age of our study patients was 59 years. This was a decade younger than that in developed countries, which may be attributed to decreasing smoking habits and increased life expectancy.

In our study, 22% of the patients were farmers, which may suggest increased exposure to pesticides that might have carcinogenic effects on the lungs. In a study by Alavanja et al., the occupational hazard ratio was elevated in the highest exposure category of a lifetime to 3 chemicals used as pesticides, associating it with lung cancer.[4] Chlorophenols, dioxin compounds and related phenoxy acetic acids are pesticide groups that have a carcinogenetic effect on the lung.[5]

The present study showed that 72% of the patients were alcoholic suggesting that alcohol may act as a tumour promoter, especially in chronic smokers. Potter et al. suggested that alcohol and beer may act in the late stage of carcinogenesis.[6] Experimental studies have generally indicated that ethanol acts as a tumour promoter, not as an initiator.[7]

In this study, 90.70% were smokers and 9.30% were non-smokers. Among them, bidi smokers were 86% and 14% were cigarette smokers. As the patients were from rural areas bidi smoking is common among them which is unfiltered and leads to the deposition of carcinogens in the central area causing squamous cell carcinoma. Auerbach et al. found that the respiratory epithelium of tobacco smokers often contains premalignant multifocal lesions that can occur throughout the bronchial tree. These findings have been referred to as the field cancerisation effect and implicate the capacity of tobacco carcinogens to mutagenize the respiratory epithelium extensively.[8] Spira et al. reported that gene expression profiles in histologically normal large airway epithelial cells could serve as biomarkers for the presence of lung cancer.[9] A recent study by Gajalakshmi et al. from Chennai compared 778 lung cancer cases with 3430 controls. The odds ratio was 4.54 and 6.45 for more than 30 years of exclusive cigarette smoking and exclusive bidi smoking respectively.[10]

In this study, the most common comorbid condition was diabetes mellitus, which may be an independent risk factor for lung cancer, followed by chronic obstructive airway disease. A study conducted by Lee et al. found that preexisting diabetes may increase the risk of lung cancer, especially among female diabetic patients.[11]

In our study, the most common presenting complaint was cough, which was present in 92% of patients, followed by breathlessness, which was present in 84% of patients. This outcome was similar to the study by Pandhi et al. where cough (80%) and breathlessness (65%) were the commonest symptoms.[12]

In our study, the most common lung cancer was squamous cell carcinoma which accounts for lung cancer. In Indian studies done by Noronha et al. and Malik and Raina found that there is a rising trend in adenocarcinoma which is now the most common type in India.[13,14] However, in our study, squamous cell carcinoma is the most common type. This could be because the studies were conducted in metropolitan cities where cigarette smoking is common as well as increased exposure to environmental pollutants, whereas, in our study, the patients were from rural areas where unfiltered shallow bidi smoking is common, causing deposition of smoke in the central airways and squamous cell carcinoma.

In our study, sputum cytology was positive in 76% of patients. A study by Ammanagi et al. concluded that the sensitivity of sputum cytology was 60%, which increased with several sputum examinations. It is more for the central lesion compared with the peripheral lesion and for squamous cell carcinoma compared with adenocarcinoma.[15]

In our study, 21% of the patients presented with stage 4 disease followed by 13% in stage 3 A and stage 3B. 34% of the tumour arises from the right upper lobe followed by the left lower and right lower lobe. In a study by Pearson, around 80% of the patients with lung cancer have stage 3 or 4 disease at presentation.[16]

Limitations: This study was conducted on a small group of individuals who had attended the thoracic medicine department at our college. Therefore, the

ISSN (O): 2687-5365; ISSN (P): 2753-6556

results of this study could not be extrapolated to the entire community.

CONCLUSION

Bronchogenic carcinoma is more prevalent in males than females, likely due to lower smoking rates among females in South India. Bidi smoking surpasses cigarette smoking in urban areas and is the leading cause of squamous cell carcinoma, attributed to the central deposition of smoke particles during shallow smoking. Most patients are farmers, possibly due to the combined effects of smoking and pesticide exposure. Sputum cytology often returns positive as most cancers are centrally located squamous cell carcinomas that exfoliate. Diabetes, present in many patients, may promote tumour growth. Cough is the most common symptom, followed by dyspnoea and chest pain, with clubbing strongly correlated with squamous cell carcinoma. Most patients are diagnosed at stage 4, typically presenting with a mass lesion on radiology. The right lung is the most common tumour site, especially the upper lobe.

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ISSN (O): 2687-5365; ISSN (P): 2753-6556