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Rural Central Maharashtra and Lung Cancer: A Demographic and Clinical Overview

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ABSTRACT

BACKGROUND: Lung cancer is one of the most common causes of cancer- related death in the world. Despite advances in our understanding of risk, development, immunologic control, and treatment options for lung cancer, it remains the leading cause of cancer death. Lung cancer incidence is expected to continue to increase through 2035 in most countries, making it a major public health challenge worldwide. The ongoing transition in the epidemiology of lung cancer highlights the need for resource redistribution and improved control measures to reduce future burden worldwide.

PURPOSE: This study aims to conduct a comprehensive investigation of lung cancer in rural Maharashtra, India. It focuses on examining demographic factors such as age, gender, and socioeconomic status, identifying key risk factors including addictions, lifestyle, and environmental influences, and assessing clinical profiles in terms of presentation, prevalence, and stage at diagnosis. By adopting this holistic approach, the study seeks to improve the understanding of lung cancer in this region, ultimately contributing to better prevention, diagnosis, and treatment strategies tailored to the rural population.

MATERIALS AND METHODS:A descriptive observational longitudinal study conducted atPravara Rural Hospital's oncology outpatientdepartment from March 2023 to February 2025 includedall registered lung cancer patients. Thestudy enrolled 53 patients, and the collected data underwent straightforward statistical analysis.

RESULTS: Thepatients typically belong to the middle-aged group (28.3%), primarily falling within the age range of 60 to 69 years. There is a significant male predominance (75.4%), and a significant portion of patients are literate (64.1%) and engaged in farming occupation (71.6%). Primary risk factors identified include the use of smokeless tobacco (26.1%), tobacco smoking (20.7%) and chulha use (7.5%). Cases of right sided lung cancer (58.49%) outnumber those of left sided cancer (41.4%). The prevailing histopathological type is undifferentiated adenocarcinoma (37.7%). Advanced stage presentation, particularly at stage IV (66.03%), is common among patients. Metastasis is frequently observed, with the skeletal being the most common site (16.1%), a pattern prominently seen in cases of lung cancer.

CONCLUSION: Lung cancer remains a major public health challenge due to its aggressive nature, late-stage diagnosis, and limited treatment options. While advancements in diagnostics and therapies have been made, the five-year survival rate is still low. It often starts with subtle symptoms, making early diagnosis challenging and leading to poorer outcomes when the disease reaches advanced stages. Understanding the causes of these delays and implementing effectiveearly detection strategies is crucial for managing the increasing burden of lung cancer in India.

KEYWORDS: Lung Carcinoma, Epidemiology, Risk factors, Clinical Profile, Maharashtra, India

I. INTRODUCTION

Lung cancer is one of the most common causes of cancer- related death in the world.[1]Despite advances in our understanding of risk, development, immunologic control, and treatment options for lung cancer, it remains the leading cause of cancer death. Modifiable Risk

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Factors includeTobacco use (active and passive), Occupational exposure to carcinogens (e.g., asbestos, silica, radon), Air pollution and environmental toxins, Poor diet and sedentary lifestyle, Chronic respiratory conditions such as COPD.[2]Non-Modifiable Risk Factors includeGenetic predisposition, Advanced age, Family history of lung cancer, Gender differences, with higher susceptibility in males.[2]

Lung cancers are categorized as small cell carcinoma or non-small cell carcinoma (e.g., adenocarcinoma, squamous cell carcinoma, large cell carcinoma). These categories are used for treatment decisions and determining prognosis.[3] Adenocarcinoma has become the most frequent histologic type (approximately 50%) while squamous, previously the most common, accounts for approximately one third of lung cancers, and small cell cancer for 15%.[4]Lymphatic spread is the most common leading to brain, liver, bones, and adrenal glands metastasis.

II. METHODOLOGY

Following approval from the institutional ethical committee, all diagnosed cases of colorectal carcinoma presented to the oncology department, after meeting inclusion and exclusion criteria, were included in the study. Each patient underwent a comprehensive evaluation, including detailed history-taking with emphasis on substance abuse patterns, dietary habits, family history, and thorough general and systemic examination. Haematological and relevant radiological investigations were conducted, followed by TNM staging, collected data underwent straightforward simple statistical analysis.

III. RESULTS

Our study, conducted in a rural area of Maharashtra, India, registered 53 patients with lung cancer at the Pravara Rural Hospital's oncology outpatient department over a two-year period (March 2023 – February 2025). This study uncovered significant demographic and clinical characteristics of lung cancer within the patient cohort. The key demographic characteristics are summarized below

Age-wise distribution of patients

Age Range (Years)	Number of patients (n=53)	Percentage (%)
<40	0	0
40-49	6	11.3
50-59	13	24.52
60-69	15	28.3
70-79	13	24.52
80+	6	11.3
Total	53	100%

The distribution of patient ages reveals that the highest proportion with 15 patients (28.3%) falls within the 60-69 age range, with the 50-59 age group and 70 – 79 age group both following closely with 13 patients each (24.52%). The remaining age groups, including 40-49, and 80 years and above representing 6 patients (11.3%) each of the total cohort. The mean age of patients in the study is 64.3 years, with a standard deviation of 14 years.

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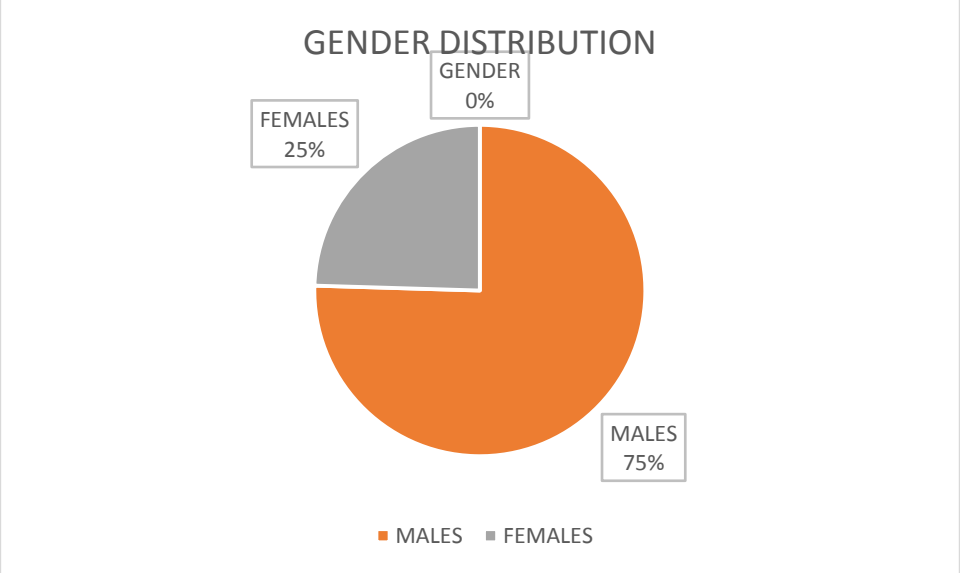
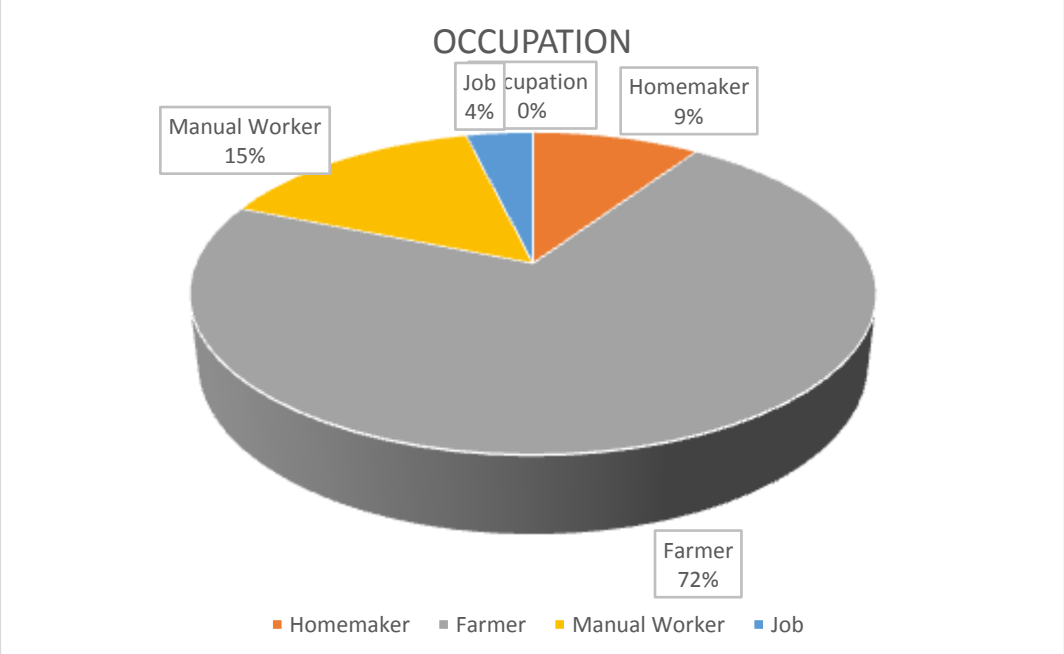
Gender-wise distribution



Among the 53 patients studied, 40 patients (75.4%) were male and 13 (24.6%) were female resulting in a male-to-female ratio of approximately 3:1.

Occupation



Farmers constitute the majority, comprising 38 patients (71.6%), followed by 5 (9.4%) homemakers. Manual workers account for 8 patients (15%), and individuals in jobs represent the smallest group with 2 patients (3.7%).

In this study, 34 (64.1%) out of 53 patients were Competence in reading and writing, while the remaining 19 (35.8%) patients were classified as illiterate.

In terms of general condition, most patients i.e., 30 of them (56.6%) exhibited a Karnofsky performance score of 80, indicating a relatively normal level of functional ability with some effort required. 14 patients (26.41%) scored 70, suggesting moderate impairment that hinders

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normal activity and work. Additionally, 7 patients (13.2%) scored 60, indicating the need for occasional assistance. And only 2 patients (3.77%) scored 50, indicating a requirement for considerable assistance and frequent medical care.

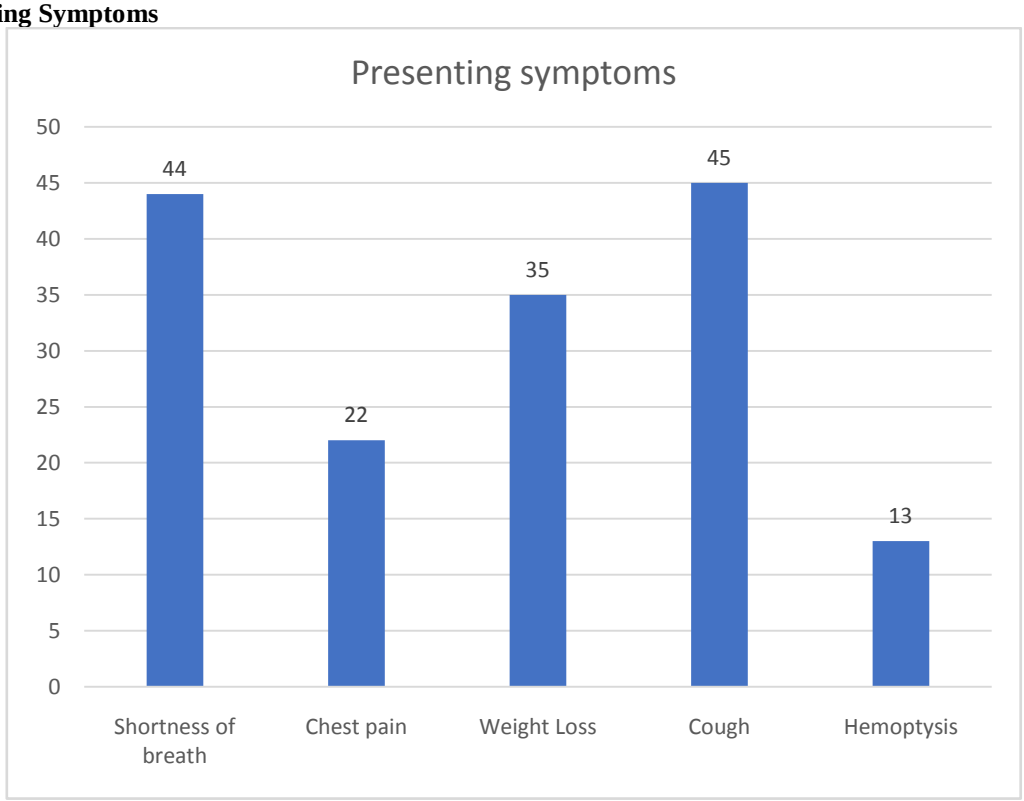
In terms of comorbidities, 4 patients (7.5%) had only hypertension and 5 patients (9.43%) had only diabetes mellitus type 2 whereas, 2 patients (3.77%) had both hypertension and diabetes mellitus, 6 patients (11.32%) had other comorbidities such as cerebrovascular accident, etc., and 36 patients (67.9%) had no comorbidities. Out of 53 patients, only 3 (5.6%) patients had previous history of tuberculosis infection.

Risk Factors

RISK FACTOR	NUMBER OF PATIENTS (n = 53)			Percentage
		MALES	FEMALES	
TOBACCO	SMOKELESS TOBACCO	8	6	26.4
	SMOKED TOBACCO	11	0	20.7
ALCOHOL		8	0	15.09
TOBACCO + ALCOHOL		11	0	20.7
CHULHA USE		1	3	7.5
TOBACCO + CHULHA USE		1	4	9.4

Tobacco use, especially smoking was found to be common among 11 patients (20.7%), while alcohol consumption was reported in 8 males (15.09%). Smokeless tobacco consumption was found among 8 males and 6 females, amounting to 26.4% of the cohort. Moreover, tobacco along with alcohol use was found in 11 male patients (20.7%). History of chulha use was present in 1 male and 3 females (7.5%) whereas no patient was found to have an occupational hazard.

Presenting Symptoms



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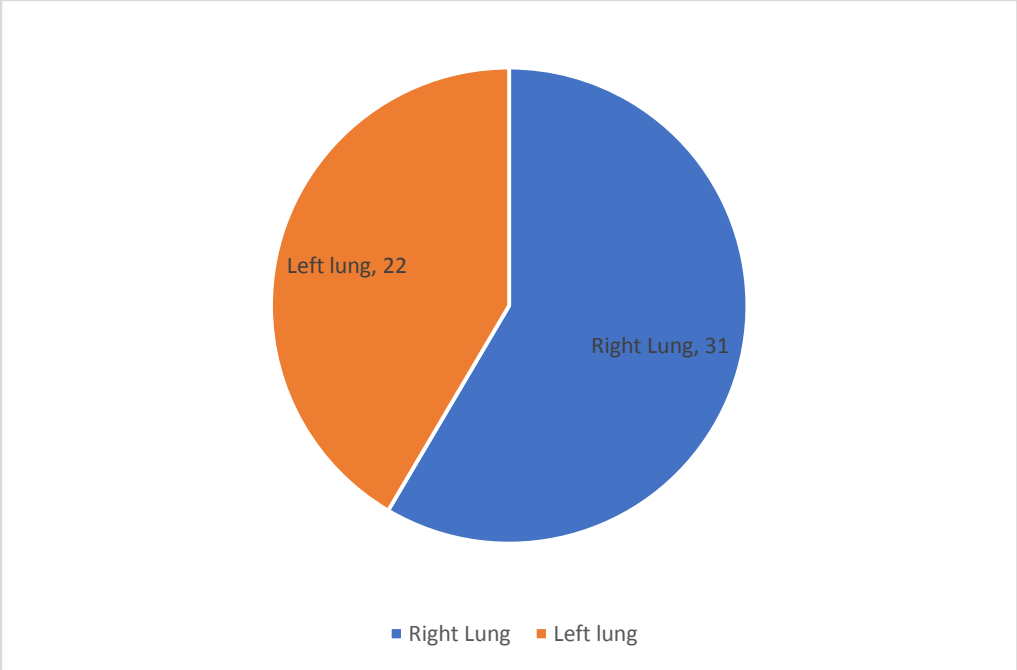
Among 53 patients, 45 patients (84.9%) had cough and 44 (83%) had shortness of breath and has emerged as the most prevalent presenting symptoms. Additionally, 35 patient (66.03%) had weight loss, 22 patients (41.5%) had chest pain, and 13 (24.5%) had haemoptysis.

Site-wise Distribution of Patients



The study also showed that 31 patients had right sided lung carcinoma (58.99%) whereas 22 patients had left sided lung carcinoma (41.1%).

Histopathological Sub-types

Histopathological Type		**Number of patients (n=53)**	**Percentage (%)**
Non-Small Cell Lung Carcinoma (NSCLC)	Adenocarcinoma (Adeno Ca)	20	37.7
	Moderately Differentiated Adenocarcinoma (MD Adeno Ca)	4	7.54
	Poorly Differentiated Adenocarcinoma (PD Adeno Ca)	4	7.54
	Squamous Cell Carcinoma	15	28.3
	Moderately Differentiated Squamous Cell Carcinoma (MD SCC)	1	1.88
	Poorly Differentiated Squamous Cell Carcinoma (PD SCC)	3	5.66
	Poorly Differentiated Carcinoma (PD Ca)	1	1.88
Small Cell Lung Carcinoma (SCLC)	Small cell lung Carcinoma	5	9.43
	Total	53	100%

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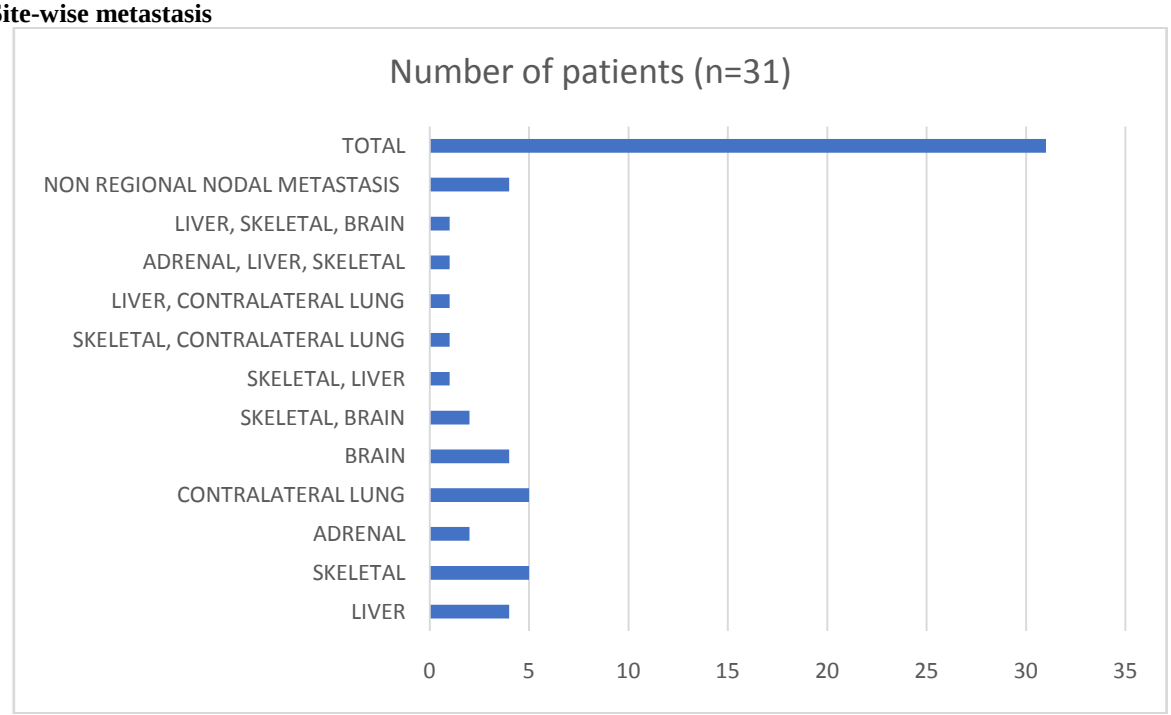
Among 53 patients diagnosed with lung cancer. The most prevalent histopathological type in Non-Small Cell Lung Cancer (NSCLC) is Adenocarcinoma (Adeno Ca), observed in 20 patients (37.7%). Following closely is Squamous Cell Carcinoma (SCC) affecting 15 patients (28.3%). Other noteworthy types include Moderately Differentiated Adenocarcinoma (MD Adeno Ca) and Poorly Differentiated Adenocarcinoma (PD Adeno Ca), present in 4 patients each (7.54%). Other histopathologies include Moderately Differentiated Squamous Cell Carcinoma (MD SCC), and Poorly Differentiated Carcinoma (PD Ca) present in 1 patient each (1.88%). Additionally, less common type such as Small Cell Lung Cancer (SCLC) is prevalent in 9.43% of the cohort demonstrating the diverse histopathological spectrum observed in lung cancer within this study.

Stage at First Visit

Stage	Number of patients (n=53)	Percentage (%)
Stage I	0	0
Stage II	1	1.88
Stage III	17	32.07
Stage IV	35	66.03
Total	53	100%

Stage IV is the most prevalent, comprising 35 patients (66.03%), followed by 17 patients presenting at Stage III (32.07 %), followed by 1 patient (1.88%) presenting at Stage II. However, there were no patients presenting with Stage I disease, highlighting the issue of delay in early diagnosis.

Site-wise metastasis



Among the patient cohort, 5 individuals exhibited skeletal metastasis. 5 patients also showed contralateral lung metastasis, while another displayed metastasis affecting the liver, adrenal gland, and brain. Moreover, 4 patients had metastases in the liver and non-regional nodal metastases.

IV. DISCUSSION

The average age of lung cancer patients in this study was 64.3 years, with the highest proportion observed in the 60-69 age group (28.3%) with a standard deviation of 14 years which is in line with findings by Chakraborty et al.[5]

In terms of gender-wise distribution, 75.4% of patients were male and 24.6% were females. This male predominance aligns with findings from Noronha et al.[6]

Comorbid conditions were present in 17 patients (32.1%), with the most common being diabetes mellitus (9.43%), hypertension (7.5%), and combined hypertension and diabetes (3.77%). Additional conditions included chronic obstructive pulmonary disease (COPD) and past tuberculosis infections.

Most patients (56.6%) had a Karnofsky performance score of 80, indicatingrelatively normal functional ability.

Tobacco use, alcohol consumption, and biomass fuel exposure (chulha use) emerged as the most significant risks. Tobacco use was widespread, with 26.4% of patients consuming smokeless tobacco (8 males and 6 females) and 20.7% identified as smokers (all male). Additionally, 20.7% of patients had a history of both tobacco and alcohol use, highlighting how multiple risk factors often coexist, compounding the likelihood of developing lung malignancies.

Alcohol consumption was exclusively reported among male patients, accounting for 15.09% of cases, often in combination with tobacco use. Another noteworthy finding was the role of biomass fuel exposure, particularly from chulha use, which affected 7.5% of patients (1 male and 3 females). This is especially concerning in rural areas, where traditional cooking methods expose individuals to prolonged indoor air pollution, increasing their risk of respiratory diseases, including lung cancer. Similarly, Ghoshal et al. found a strong connection between smoking and lung cancer.[7]

Non-Small Cell Lung Cancer (NSCLC) was the most common histopathological type, accounting for 78.3% of cases. Among NSCLC cases, Adenocarcinoma (37.7%) was the most frequently observed subtype, followed by Squamous Cell Carcinoma (28.3%). Other histological types included Moderately Differentiated Adenocarcinoma (7.54%), Poorly Differentiated Adenocarcinoma (7.54%), and Poorly Differentiated Carcinoma (1.88%). Small Cell Lung Cancer (SCLC) was found in 9.43% of cases, which is slightly lower than the 14% reported by Ramani et al. The increase in the prevalence of Adenocarcinoma, rather than Squamous Cell Carcinoma, has been linked to factors like growing air pollution and shifting smoking habits.[8]

Majority of patients presented at advanced stages, with 66.03% diagnosed at Stage IV and 32.07% at Stage III. Only 1.88% were diagnosed at Stage II, and no patients were diagnosed at Stage I. These findings are like those of Ganesh et al., who noted that early-stage diagnoses in India are rare due to the lack of widespread screening programs.[9] Among these patients, metastatic disease was present in 58.49% of patients, with common metastatic sites including the skeletal system (16.1%), brain (12.9%), liver (12.9%), contralateral lung (16.1%), and adrenal glands (6.45%). These findings are consistent with those of Verma et al., who reported similar patterns of metastatic spread in Indian lung cancer patients.[10]

V. CONCLUSION

Lung cancer rates in India are on the rise, presenting an increasing challenge to cancer-related morbidity despite relatively low absolute numbers. This trend is driven by a complex interplay of risk factors, variations in disease progression, and differences in treatment responses. Common symptoms such as persistent cough, chest pain, and haemoptysis are often misinterpreted, leading to delays in diagnosis. These delays significantly impact prognosis, as early-stage lung cancer has a higher survival rate compared to advanced stages. Therefore, understanding the factors contributing to delayed diagnosis and promoting early detection strategies are essential for improving lung cancer outcomes.

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