

Incidence of Lung Cancer in North-Western India Over 5 Years & Future Trend

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Abstract

Background: Lung cancer is the most frequently diagnosed cancer worldwide. Lung cancer occurs more frequently in males worldwide and India. There are few studies on the incidence of Lung cancer in Rajasthan state. The present study evaluates its temporal variation and area-wise distribution.

Materials and Methods: Five-year retrospective data on Lung cancer incidence were obtained from Hospital-Based Cancer Registry (HBCR) of Regional Cancer Centre (RCC), Bikaner, from January 2016 to December 2020. Linear regression was applied to determine the trend of Lung cancer incidence over these 5 years. District and tehsil-wise distribution of patients was also analyzed.

Results: Total 4672 cases of Lung cancer were registered at RCC, Bikaner, from January 2016 to December 2020, which accounting for about 13% of total cases, among them 4082 males and 590 females (ratio 6.9:1). The diagnosis of Lung cancer was most commonly at 6th-7th decade of life in both genders. Median age at diagnosis of lung cancer was 62 years and 58 years, in males and females, respectively. 5 years data and linear regression analysis showed that an increasing trend of Lung cancer incidence over 5 years. The highest incidence rate was found in the districts of Bikaner, Churu and Nagaur, with most patients coming from Bikaner tehsil of Bikaner district.

Conclusion: Lung cancer cases have shown an increasing trend in the past 5 years in Rajasthan with a higher incidence in the North-Western districts. It is required to strict implement of rules and regulations of tobacco consumption and also required early diagnosis and effective management for improve survival of these patients.

Keywords: Bikaner, Lung cancer, Incidence, Rajasthan, Trend.

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Introduction

Lung cancer is the most common malignancy worldwide, accounts for 13% (1.8 million) of the total cases of cancer and 18% (1.6 million) of the cancer-related deaths based on 2012 estimates[1]. Among

males, lung cancer is the most commonly diagnosed cancer and leading cause of cancer death. According to globocan 2020 data, India is a single country, which contributing to 6.86% of the global cancer burden. Lung cancer was 2nd most common

cancer in world and 4th most common cancer in India by incidence. Lung cancer was 1st and 4th most common cause of cancer related deaths in world and India respectively. In India, deaths due to Lung cancer was 66,279 in 2020, which was 7.8% of total cancer deaths[2]. Lung cancer demonstrates, five times higher death rate in low socioeconomic status than higher status people[3]. According to recent study, if the nature and symptoms of cancer are correctly identified at an early stage, it can be cured[4-5]. This cancer spreads to other parts of the body through the blood and lymphatic system, which is a process called metastasis, and then quickly causes the development of secondary tumors[6].

Lung cancer arise in the bronchi in response to repetitive carcinogenic stimuli, inflammation, and irritation. Majority of lung cancer cases are due to long-term exposure to tobacco smoke. About 10-15% of the cases occur in people who have never smoked, those cases caused by a genetic factor, exposure to radon gas, asbestos, silica dust or other forms of air pollutants and second-hand smoke. Lung cancer can also be hereditary[5]. In a Surveillance Epidemiology and End Results (SEER) analysis showed that, 15%, 22%, 56% and 7% of all lung cancer cases were localized to the primary site, regional lymph node metastasis, distant metastasis and unknown status, respectively[7]. Most common signs and symptoms include cough, dyspnea, hemoptysis and chest pain[8]. The prognosis is poor with overall 5-year survival rate for lung cancer is approximately 18%[9].

The present study evaluates the temporal variation of Lung cancer incidence over a period of 5 years (2016–2020) and its district- and tehsil-wise distribution in Rajasthan. To study the Lung cancer incidence variation in Rajasthan, a time trend analysis using linear regression model was performed. In addition, the estimated incidence was also forecasted for the next 5 years up to the year 2025.

Materials and methods

It was a single-center, retrospective study which involved 5 years data of Lung cancer incidence from Hospital Based Cancer Registry (HBCR) of Regional Cancer Centre (RCC), Bikaner, India, from January 2016 to December 2020. Being a retrospective study, no ethical approval required for the study as all patients were treated with standard departmental protocol.

Patients included in the study were those who were diagnosed with Lung cancer above age of 15 years irrespective of the stage and histology. Patients from outside the state of Rajasthan or patients with second malignancies were excluded from study. A 4672 Lung cancer cases were collected. The district-wise distribution of Lung cancer was also mapped.

Statistical analysis

Linear regression method was applied to determine the trend of Lung cancer incidence over these 5 years as well as to predict the incidence over the next 5 years until the year 2025.

Results

Lung cancer contributed about 13% of total cancer cases registered at RCC, Bikaner, from January 2016 to December 2020. In last 5 years, 4672 Lung cancer cases, with male (n=4082) to female (n=590) ratio of (6.9:1), were registered [Table 1]. Time trend analysis showed that increase incidence of Lung cancer in next 5 years (2021-2025) [Figure 1]. In this study Lung cancer, more common in right side compared to left side [Table 2], Highest incidence was found in 6th-7th decade of life in both genders [Table 3]. Most common histology overall was squamous cell carcinoma, followed by adenocarcinoma; in smoker was small cell carcinoma, and in nonsmokers was other than small and non-small cell variety [Table 4, Figure 2]. In this study, most common symptom was cough followed by shortness of breath [Table 6]. The area-wise distribution showed a high

incidence rate in the districts of Bikaner, Churu and Nagaur [Table 7 & Figure 2], among which the maximum cases were

reported from Bikaner tehsil of Bikaner district [Table 8].

Table 1: Year-wise distribution of Lung cancer patients in Rajasthan

Year	Lung cancer patients		
	Male	Female	Total
2016	648	81	729
2017	779	105	884
2018	918	151	1069
2019	877	133	1010
2020	860	120	980
Total	4082	590	4672

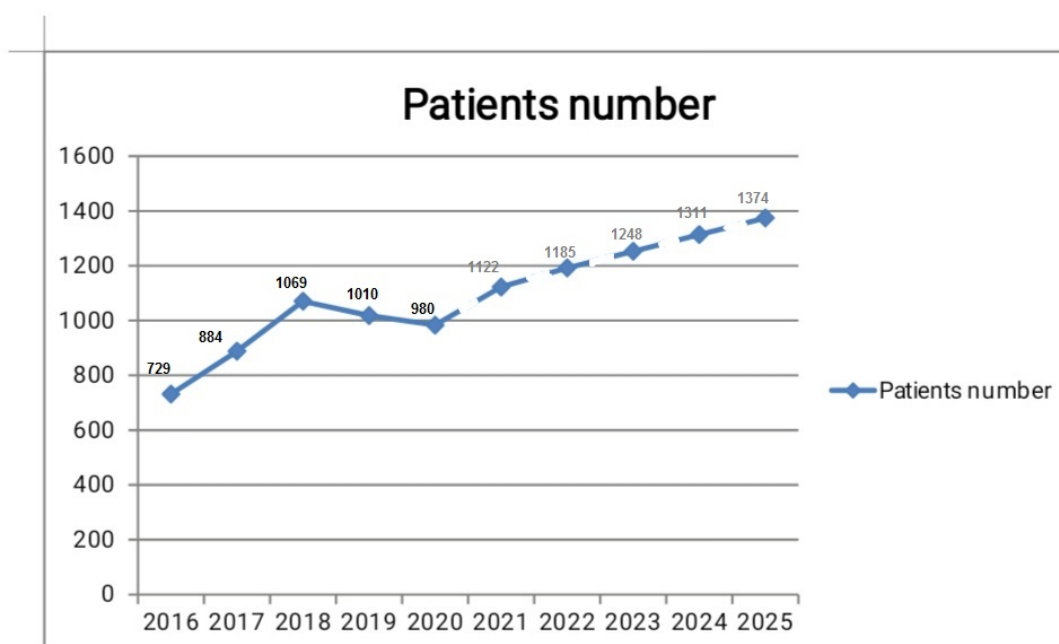


Figure 1: Time trend analysis of Lung cancer cases in Rajasthan

Table 2: Tumor laterality of Lung cancer in patients

Year	Right side	Left side	Total patients
2016	444	285	729
2017	522	362	884
2018	672	397	1069
2019	586	424	1010
2020	628	352	980
Total	2852	1820	4672

Table 3: Age-wise distribution of Lung cancer patients in Rajasthan

Age (in years)	Numbers of Lung cancer patients (n =4672)		
	Males	Females	Total
30 or less	10	17	27
31-40	74	35	109
41-50	571	98	669
51-60	1221	156	1377
61-70	1488	184	1672
71 or more	718	100	818
Total	4082	590	4672

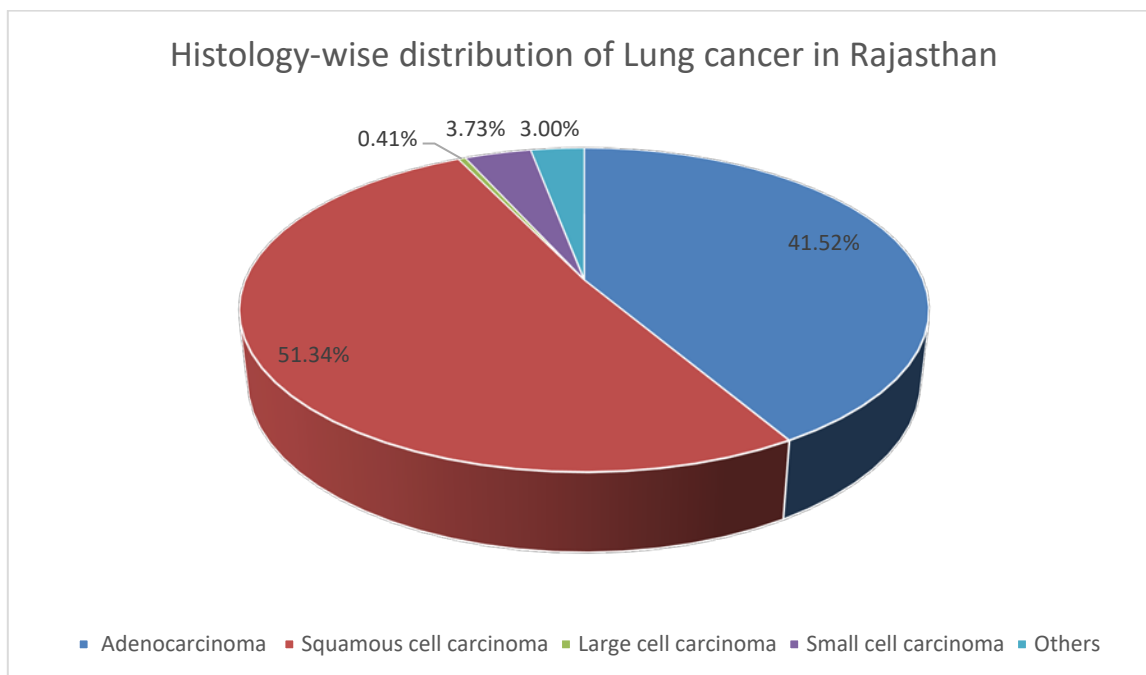


Figure 2: Histology-wise distribution of Lung cancer in Rajasthan

Table 4: Smoking status-wise distribution of Lung cancer in Rajasthan

Smoking status	Histology				
	Squamous cell carcinoma	Adeno carcinoma	Large cell carcinoma	Small cell carcinoma	Other variety
Nonsmoker	264 (11.00%)	659 (33.97%)	4 (21.06%)	12 (6.90%)	58 (41.43%)
Smoker	2135 (89.00%)	1281 (66.03%)	15 (78.94%)	162 (93.10%)	82 (58.87%)
Total	2399 (100%)	1940 (100%)	19 (100%)	174 (100%)	140 (100%)

Table 5: Symptoms-wise distribution of Lung cancer in Rajasthan

Symptoms	Numbers of patients (n=4672)
Cough	3736 (80.0%)
Shortness of breath	2520 (53.9%)
Loss of weight	2111 (45.2%)
Chest pain	2545 (54.4%)
Hemoptysis	1297 (27.7%)

Table 6: Area wise distribution of Lung cancer patients in Rajasthan

District	Numbers of patients		
	Male	Female	Total
Ajmer	36	7	43
Alwar	48	11	59
Banswara	1	0	1
Baran	8	1	9
Barmer	30	1	31
Bharatpur	31	4	35
Bhilwara	14	0	14
Bikaner	789	124	913
Bundi	2	1	3
Churu	746	88	834
Chittorgarh	2	0	2
Dausa	1	0	1
Dholpur	1	0	1
Dungarpur	0	0	0
Hanumangarh	493	91	584
Jaipur	37	3	40
Jaisalmer	35	16	51
Jalore	6	1	7
Jhalawar	0	0	0
Jhunjhunu	441	53	494
Jodhpur	96	12	108
Karauli	0	0	0
Kota	3	1	4
Nagaur	593	81	674
Pali	26	1	27
Pratapgarh	0	0	0
Rajsamand	1	0	1
Sawai madhopur	3	0	3
Sikar	231	37	268
Sirohi	3	0	3
Sri ganganagar	400	57	457
Tonk	3	0	3
Udaipur	2	0	2
Total	4082	590	4672

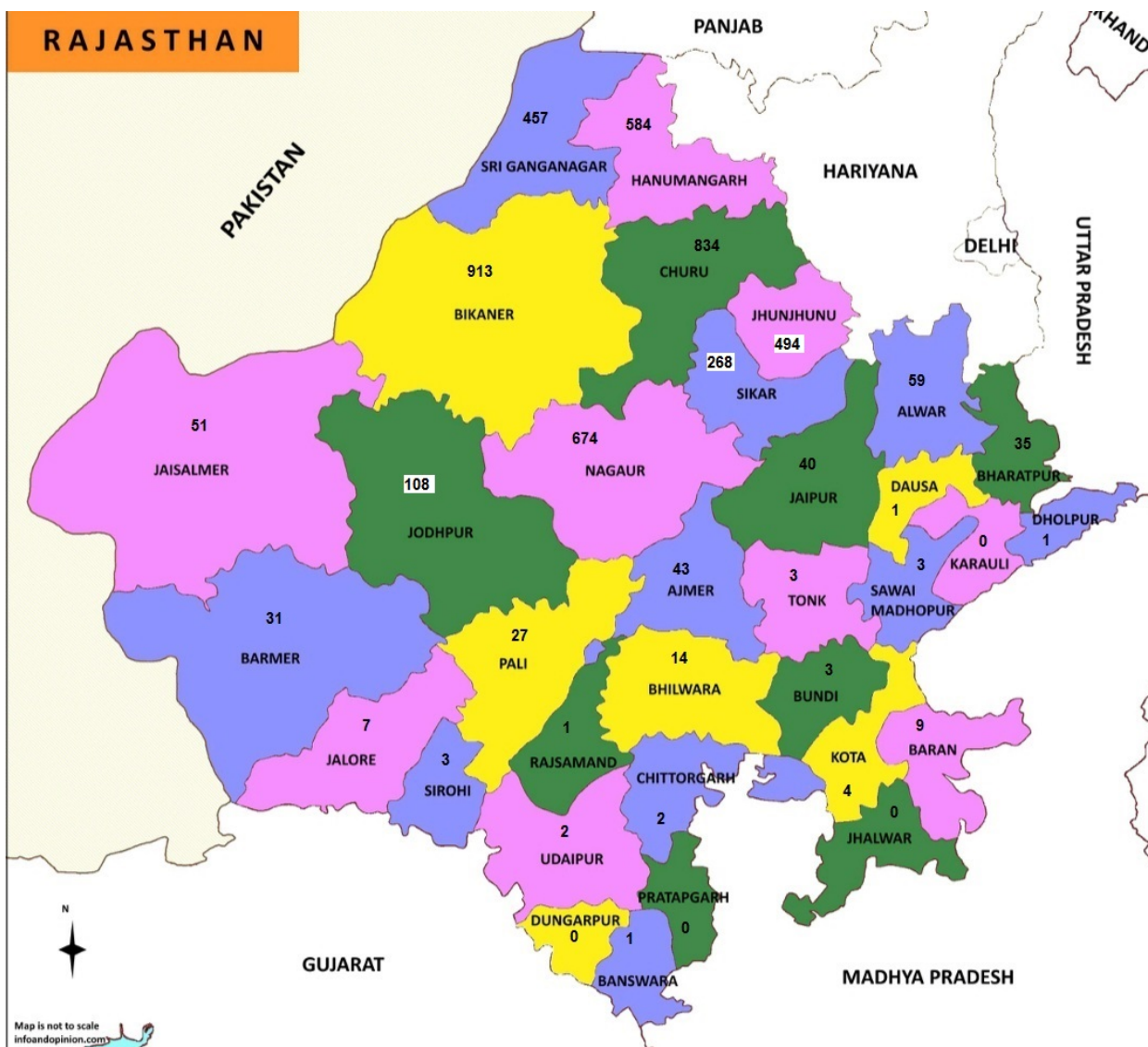


Figure 3: Area wise distribution of colorectal cancer patients in Rajasthan

Table 7: Tehsil-wise distribution of Lung cancer patients in Bikaner district

Tehsil	Number of patients (n=913), n (%)		
	Male	Female	Total
Bikaner	624	101	725 (79.41%)
Nokha	47	9	56 (6.14%)
Sridungargarh	49	5	54 (5.92%)
Kolayat	25	3	28 (3.06%)
Lunkaransar	24	4	28 (3.06%)
Khajuwala	12	2	14 (1.53%)
Chhatargarh	7	0	7 (0.77%)
Poogal	1	0	1 (0.11%)
Total	789	124	913 (100%)

Discussion

Lung cancer is the most common cause of cancer death for both men and women worldwide, also in developing countries

like India. Of the total 4672 patients, 4082 patients were males, and 590 patients were females, with male: female ratio was 6.9:1. In a study conducted by Dey A et al., male

and female ratio was 4.14:1[10]. The most common Histopathology among males was squamous cell carcinoma and among female was adenocarcinoma. The similar results found in other studies conducted in India[11-13]. In this study, most common symptoms were cough in 3736 patients (80.0%) followed by chest pain in 2545 patients (54.4%), shortness of breath in 2520 patients (53.9%), loss of weight in 2111 patients (45.2%), and hemoptysis in 1297 (27.7%) (Table 5). A study, conducted in India in 1998 by Gupta et al. was found that, the respiratory symptoms was cough (68%), dyspnoea (59%), chest pain (22%), haemoptysis (20%) and dysphagia (6%)[14]. In this study right side (61.04%) was most commonly involved than left. A study, conducted in India by Mandal SK et al, was found that, the most of the patients had primary lung cancer in the right lung (60.3%)[15].

In this study most common histology was Squamous cell carcinoma 2399 patients (51.34%), followed by Adenocarcinoma 1940 patients (41.52%), Small cell carcinoma 174 (3.73%) and large cell carcinoma 19 patients (0.41%). A study, conducted in India by Mohan A et al. was found that, the Small cell carcinoma was diagnosed in 14.6% (58) of patients while 85.4% (339) had non-small cell lung carcinoma (NSCLC)[11]. Main risk of lung cancer is based on exposures to carcinogens, in which most common is smoking. Voluntary or involuntary cigarette exposure contributes for 80% to 90% of all cases of lung cancer. Some studies have reported that 15.0% of lung cancer cases were caused by genetic factors, air pollution, or exposure to radon gas, asbestos, and pesticides[16-17]. Increase smoking habits, air pollution, increase use of pesticides may cause increase patients numbers of Lung cancer in Bikaner and Churu districts. In this study also showed that, Non-smokers also have chance to develop Lung cancer due to carcinogens. Results suggest that there

must be strict restrictions on the use of tobacco products.

Limitation

Data in the present study have been obtained from a HBCR of RCC, Bikaner, and might not represent the exact area-wise distribution of Lung cancer cases in the state.

Conclusion

Lung cancer cases have shown an increasing trend in the past 5 years in the state of Rajasthan, with high incidence is seen in the North-Western districts. There is need of strict implement of rules and regulations of tobacco consumption and also required early diagnosis and effective management for improve survival of the lung cancer patients.

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