

Original Research Article

Chemotherapeutic treatment modalities in the management of lung carcinoma: an observational study in a tertiary care teaching hospital in north India

Salma Koser Bhatt¹, Rohini Gupta^{2*}, Swati Sharma¹

¹Department of Medicine, ²Department of Pharmacology, Government Medical College, Jammu, Jammu and Kashmir, India

Received: 05 June 2018

Accepted: 28 June 2018

*Correspondence:

Dr. Rohini Gupta,

E-mail: rohinigupta299@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Lung cancer is one of the leading causes of cancer related mortality accounting for 1.61 million new cases per year with 1.38 million deaths annually worldwide. In NSCLC, concurrent Chemoradiotherapy is usually employed in stage IIIA and IIIB when performance status of the patients is reasonable and chemotherapy alone in stage IV, if the performance status of the patients is adequate. In SCLC, combination chemotherapy is given in limited stage disease as well as in extensive stage if the performance status of the patients is adequate. The objective is to study the chemotherapeutic treatment modalities in the treatment of lung carcinoma.

Methods: The present cross-sectional prospective study was conducted in the Postgraduate Department of Medicine and Department of Pharmacology in collaboration with the Department of Oncology, Government Medical College, Jammu for a period of one year from November 2012 to October 2013. A total of 80 patients having histopathological documentation of lung cancer, registered under regional cancer centre (RCC) and referred from various departments of the institute and from other hospitals of the region were included in the study. The treatment for each patient was then decided on the basis of performance status, stage and clinical condition. The treatment modalities used were in the form of radiation therapy, surgery and chemotherapy. In the chemotherapy, the details regarding the type of chemotherapeutic regimen employed in particular type of lung cancer variant, their doses, number of cycles given and the duration for which these chemotherapeutic drugs were administered was noted down.

Results: Out of 80 patients in the present study, 68 (85%) were males and 12 (15%) were females. Majority of the patients fall in the age group of 46 to 75 years (81.25%). Staging of the patients with non-small cell lung cancer showed that majority of the patients were in stage IV (31; 45.59%) of the disease. Eighteen (26.46%) patients were in stage III and 10 (14.71%) in stage II and 9 (13.24%) patients in stage I. In patients with small cell lung cancer, 4 (33.33%) patients were in limited stage and 8 (66.67%) patients. Various treatment modalities were employed with maximum number of patients receiving combined treatment (48.75%), followed by chemotherapy alone (22.25%) and radiotherapy alone (11.25%). Among patients who received combination therapy, various combinations of surgery, radiotherapy and chemotherapy were used but maximum number of patients i.e. 37 out of 39 (94.87%) used combination of chemotherapy and radiotherapy.

Conclusions: Most of the patients presented in an advanced stage III and IV (75.9%) and the main treatment modality used in this study was combination therapy of chemotherapy and radiotherapy in (48.75%) followed by chemotherapy alone (22.25%). In the chemotherapy, cisplatin-based combination regimens were most commonly used regimens. Thus, more of such studies need to be done so as to make patients as well as the health professionals more aware of the risk factors and the effective treatment modalities associated with the disease.

Keywords: Chemotherapy, Lung cancer, NSCLC, Radiotherapy, SCLC

INTRODUCTION

Lung cancer is one of the leading causes of cancer related mortality accounting for 1.61 million new cases per year with 1.38 million deaths annually worldwide.¹ In India, lung cancer constituted approximately 41,000 new cases in the year 2001.² In Indian population the lung cancer develops at an earlier age in the 5th or 6th decade of life as compared to western population.³ Moreover, as far as the histological variant is concerned squamous cell carcinoma continues to be the commonest histological variant in India in contrast to adenocarcinoma which is the predominant subtype in the western world.

Of all the lung cancer deaths, about 85% deaths are attributable to smoking tobacco which contains harmful carcinogens. Tobacco in our country is used in various forms such as the cigarette, bidi, hooka, chutta, chillum and pan masala. Bidi smoking, which is extremely common in rural India, carries a higher risk of lung cancer compared to cigarette smoking.⁴ It has also been observed that accumulation of several genetic alterations most commonly p53 mutations and deletions on chromosomes 3p, 5q, 9p, 11p and 17p give rise to lung carcinogenesis. The frequency of occurrence of these genetic alterations is more common in smokers than in nonsmokers. Moreover, the rate of recurrence is also more in smokers than in non-smokers.⁵

Based on the biology, therapy and prognosis, lung cancer is broadly divided into two classes – small cell lung cancer (SCLC) and non-small cell lung cancer (NSCLC) which is further subdivided into three histological variants i.e.; squamous cell carcinoma, adenocarcinoma and large cell carcinoma and account for 75-80% of all lung cancer cases. For early stage NSCLC surgical resection is the treatment of choice. Chemotherapy can be given in some patients as an adjuvant treatment after surgery. However, majority of the patients when present to an oncologist have advanced disease which is beyond the surgical resection. Chemotherapy and/ or radiotherapy are the treatment modalities usually employed in such patients. In NSCLC, concurrent Chemoradiotherapy is usually employed in stage IIIA and IIIB when performance status of the patients is reasonable and chemotherapy alone in stage IV, if the performance status of the patients is adequate. In SCLC, combination chemotherapy is given in limited stage disease as well as in extensive stage if the performance status of the patients is adequate.⁵

However, no chemotherapeutic regimen for lung cancer is either completely effective or has conclusively led to cure. Moreover, normal cells are adversely affected by chemotherapy leading to unavoidable, highly toxic side effects. Most of the patients are, therefore, unable to complete the chemotherapy.⁵ As there are very few studies reported in this field from this part of the country, the present study was planned to explore the

chemotherapeutic regimens employed in patients with both small cell and non-small cell lung carcinoma.

METHODS

The present cross-sectional prospective study was conducted in the Postgraduate Department of Medicine and Department of Pharmacology in collaboration with the Department of Oncology, Government Medical College, Jammu for a period of one year from November 2012 to October 2013. A total of 80 patients having histopathological documentation of lung cancer, registered under regional cancer centre (RCC) and referred from various departments of the institute and from other hospitals of the region were included in the study. A detailed history was taken in each case which included the chief complaints, associated risk factors and the co-morbid conditions. Each patient was examined in detail. The examination included general physical examination of the patients, also mentioning the performance status which was assessed by using the ECOG (Eastern cooperative oncology group) performance status score mentioned below.

Table 1: ECOG performance score used.

Performance score	Characteristics
0	Normal activity; asymptomatic
1	Symptomatic; fully ambulatory
2	Symptomatic; in bed <50% of time
3	Symptomatic; in bed >50% of time, not bed-ridden
4	100% bed-ridden
5	Dead

The systemic examination involved all systems with particular attention to respiratory system. Pre-treatment evaluation of patient included: hemogram, liver function tests, renal function tests, serum calcium, X-ray chest (P/A view), bronchoscopy, broncho-alveolar lavage, FNAC, histopathology, CT scan chest, ultrasound abdomen, bone scan and CT scan brain. Using the above investigations, each patient was properly staged. For staging non-small cell lung cancer, TNM staging was used and for small cell lung cancer, patients were divided into limited and extensive stage.

The treatment for each patient was then decided on the basis of performance status, stage and clinical condition. The treatment modalities used were in the form of radiation therapy, surgery and chemotherapy. In the present study, chemotherapy was the second main treatment modality employed after the radiotherapy. In the chemotherapy, the details regarding the type of chemotherapeutic regimen employed in particular type of lung cancer variant, their doses, number of cycles given and the duration for which these chemotherapeutic drugs were administered was noted down. After the completion of treatment, disease status was evaluated by physical

examination, appropriate laboratory and radiological investigations. The data was analyzed with the help of descriptive statistics.

RESULTS

In the present study, eighty (80) patients having histopathological documentation of lung cancer, registered under regional cancer centre (RCC) and referred from various departments of the institute and from other hospitals of the region were included in the study. Out of 80 patients in the present study, 68 (85%) were males and 12 (15%) were females as shown in Figure 1.

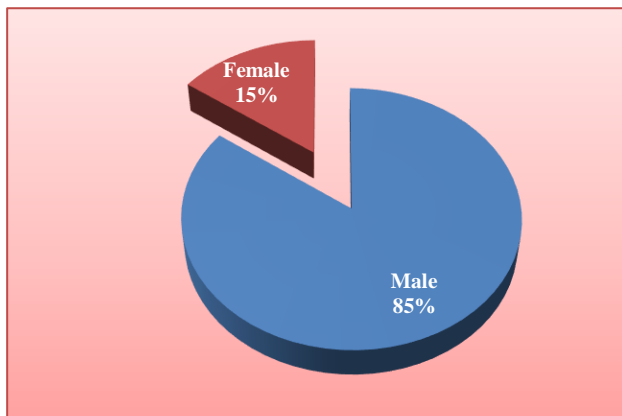


Figure 1: Sex distribution of patients.

Majority of the patients fall in the age group of 46 to 75 years (81.25%) as shown in Figure 2. As far as occupation is concerned, majority of patients were either farmers about 30 (37.50%) or government employees 29 (36.25%) as shown in Figure 3.

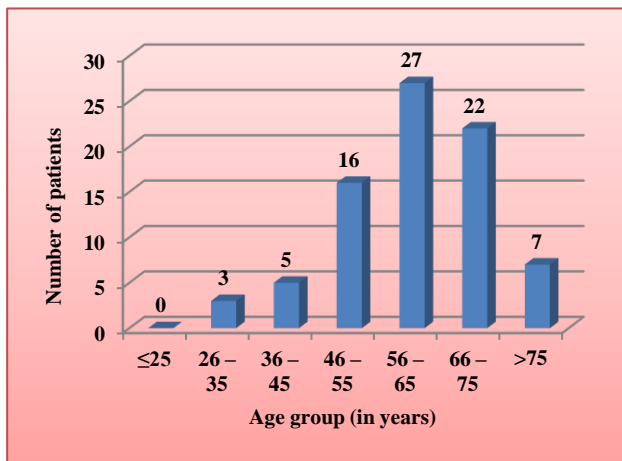


Figure 2: Age distribution of patients.

In the present study, it was observed that many patients had more than one symptoms and signs simultaneously. Those patients had varied clinical presentation with cough – productive and dry, dyspnoea, hemoptysis, chest

pain, fever being the major presenting symptoms. Cough productive in 19 (23.75%) and dry in 18 (22.50%) patients was the commonest symptom observed. Dyspnoea was observed in 34 (42.50%) patients. Breathlessness was observed in patients presenting with various grades and majority 12 (15%) patients were having grade III dyspnoea.

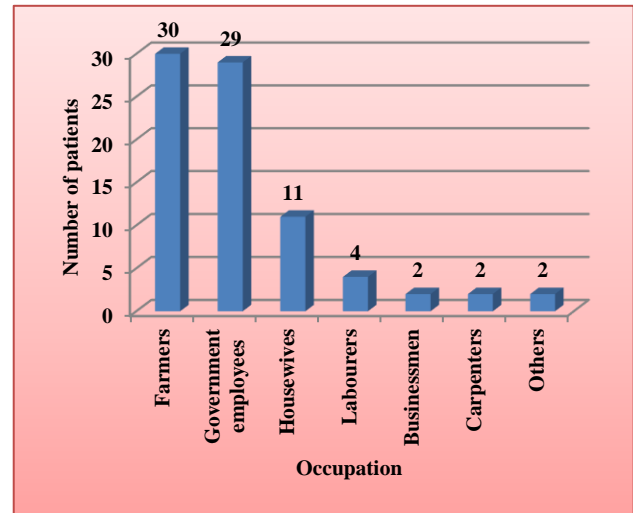


Figure 3: Distribution of patients as per their occupation.

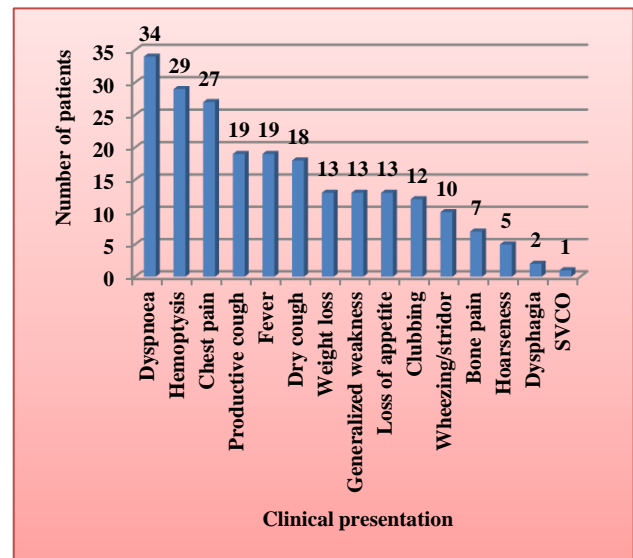


Figure 4: Distribution of patients according to clinical presentation.

Hemoptysis was observed in 29 (36.25%), chest pain in 27 (33.75%) and fever in 19 (23.75%). As shown in Figure IV. Other symptoms observed were weight loss, generalized weakness and loss of appetite in 13 (16.25%) patients each, clubbing was present in 12 (15%), wheezing/stridor in 10 (12.50%), bone pain in 7 (8.75%) patients, hoarseness of voice was observed in 5 (6.25%) patients. Dysphagia was observed in 2 (2.50%) patients, while 1 (1.25%) patient had SVCO. Four (5%) presented

with hemiparesis, 1 (1.25%) with paraparesis and 2 (2.50%) had seizures/altered sensorium at the time of presentation.

Table 1: ECOG performance score of patients (n=80).

ECOG performance score	No. of patients	%
0	14	17.50
1	22	27.50
2	27	33.75
3	10	12.50
4	7	8.75
5	0	0
Total	80	100.00

33.75% of patients were having an ECOG performance score of 3, 27.50% had performance score of 2 as shown in Table 1. Histopathological profile of the patients revealed that majority (70%) had squamous cell carcinoma, 15% each had small cell carcinoma and 13.75% adenocarcinoma. Anaplastic carcinoma was seen in 1.25% patients as shown in Table 2.

Table 2: Distribution of patients according to histopathology of lung cancer (n=80).

Histopathology of lung cancer	Number of patients	Percentage
Squamous cell carcinoma	56	70.00
Small cell carcinoma	12	15.00
Adenocarcinoma	11	13.75
Anaplastic carcinoma	1	1.25
Total	80	100.00

Table 3: Distribution of patients as per stage of lung cancer (n=80).

Stage	Number of patients	Percentage
A. Non-small cell lung cancer (n=68)		
I	9	13.24
II	10	14.71
III	18	26.46
IV	31	45.59
Total	68	100.00
B. Small cell lung cancer (n=12)		
Limited	4	33.33
Extensive	8	66.67
Total	12	100.00

Staging of the patients with non-small cell lung cancer showed that majority of the patients were in stage IV (31; 45.59%) of the disease. They presented with distant metastasis. Eighteen (26.46%) patients were in stage III and 10 (14.71%) in stage II and 9 (13.24%) patients in stage I. In patients with small cell lung cancer, 4 (33.33%) patients were in limited stage and 8 (66.67%) patients were in extensive stage as shown in Table 3.

Table 4: Treatment modality used in study population.

Treatment modality	No. of patients n=80 (%)
Chemotherapy: alone or combination with radiotherapy and/ or surgery	57 (71.3)
Radiotherapy alone	9 (11.3)
Surgery alone	0 (0)
No treatment	14 (17.5)

Out of 80 patients who were enrolled in the study, only 66 patients agreed to receive treatment and 14 did not agree for any specific treatment. Treatment modalities were decided on the basis of clinical stage, ECOG performance status, age and histopathology. Various treatment modalities were employed, out of which chemotherapy alone and in combination with other treatment modalities was prescribed in 57(71.3%) patients, radiotherapy alone was prescribed in 11.3% patients and 17.5% patients received no treatment as shown in Table 4.

Table 5: Chemotherapeutic treatment modalities followed in patients of lung cancer.

Chemotherapy	No. of patients n=57 (%)
1. Alone	18 (31.6)
2. Combination	39 (68.4)
(a) Chemotherapy + Radiotherapy	37 (64.9)
(b) Chemotherapy + Surgery	1 (1.8)
(c) Chemotherapy + Radiotherapy + Surgery	1 (1.8)

Out of 57 patients who received chemotherapy, 18 (31.6%) patients received chemotherapy alone whereas 39 (68.4%) patients received chemotherapy in combination with other modalities of treatment.

Out of 39 patients, 37(64.9%) patients received concurrent chemotherapy and radiotherapy as shown in Table 5, Table 6 and Table 7.

DISCUSSION

Lung cancer is one of the most common cancers in the world and is the leading cause of cancer death. In developing countries like India, the incidence of lung cancer is increasing. In the present study, majority of the patients (79%) were in the age group of 46 to 75 years with majority (32%) in the age group of 56 to 65 years. These observations were in accordance with studies conducted by Rawat et al in which 92.1% of patients with lung cancer were in the age group of 40 to 80 years.⁶ Koul et al also observed similar distribution in whom study lung cancer was found more prevalent in 3/4th of their patients in the age group of 40 to 69 years.⁷ In this

study, majority of the patients (85%) were males as compared to 15% females. The male: female ratio was

5.7:1. This observation is consistent with the studies done by Rawat et al and Bhattacharyya et al.^{6,8}

Table 6: Type of chemotherapeutic regimen followed in small cell carcinoma lung cancer.

	Regimens	No. of patients n (%)
Limited (4 cycles)	(a) Cisplatin (D ₁) + Etoposide (D ₁ to D ₅) 75mg/m ² 100mg/m ²	1 (1.8)
3-week cycle (I/V) 2=radio alone	(b) Carboplatin (D ₁) + Etoposide ((D ₁ to D ₅) 4mg/ml/min AUC 100mg/m ²	1 (1.8)
Extensive 3-week cycle (6 cycles) (I/V)	(a) Cisplatin (D ₁) + Etoposide (D ₁ to D ₃) 75mg/m ² 120mg/m ²	3 (5.3)
	(b) Carboplatin (D ₁) + Etoposide (D ₁ to D ₃) 6 AUC 120mg/m ²	2 (3.5)
Three patients refused to take treatment		

Table 7: Type of chemotherapeutic regimen followed in non-small cell carcinoma lung cancer.

Squamous cell Ca	Regimens	No. of patients n (%)
3-week cycle (2 cycles)	Paclitaxel (D ₁) + Carboplatin (D ₁) 200 mg/m ² I/V 6 mg/ml/min AUC I/V	16(28.1)
	Cisplatin (D _{1,8,29,36}) + Etoposide (D _{1-5,29-33}) 50mg/m ² I/V 50mg/m ² I/V	21(36.8)
3-week cycle	Gemcitabine (D ₁ and D ₈) + Carboplatin(D ₁) 1gm/m ² I/V 4-6 mg/ml/min AUC	1(1.8)
Adenocarcinoma 3-week cycle	Pamitrexed (D ₁) + Carboplatin (D ₁) 500 mg/m ² 6 AUC	7(12.3)
	Gemcitabine (D ₁ and D ₈) + Carboplatin(D ₁) 1gm/m ² 5 AUC	3(5.3)

In the present study, the majority of patients (85%) were smokers. Cigarette was smoked in majority of (37.5%) patients. Ratio of smokers to non-smokers in the present study was 6.8:1. This is consistent with the previously published studies.^{6,9} Chronic cigarette smoking retards mucociliary clearance of foreign particles and respiratory tract secretions, evokes an inflammatory response accompanied by fibrosis and thickening in the membranous and respiratory bronchioles and causes mucus gland hypertrophy, hyperplasia and dysplasia in proximal airways.¹⁰ In the present study the patients presented with chief complaint of cough in (46.25%) followed by breathlessness (42.5%) and hemoptysis (36.25%) patients. These results are consistent with the previously published reports.^{6,8}

In the present study, histopathologic profile of patients revealed 70% with histopathology of squamous cell carcinoma, 15% small cell carcinoma, 13.75% adenocarcinoma and 1.2% anaplastic carcinoma. These findings were consistent with the previously published studies.^{6,7} Also, the majority of non-small cell lung cancer patients were in stage III (26.4%) and stage IV (45.5%). Among small cell lung cancer (33.33%) patients were in limited stage and 66.67% patients in extensive stage. In the present study, only 82.5% of patients were

on treatment whereas 17.5% patients did not receive any treatment. 48.75% of patients were on combination therapy, out of which (94.87%) were on combination of chemotherapy and radiotherapy, 22.5% received chemotherapy alone and 11.25% received radiotherapy alone. These results are consistent with the previously published studies.^{6,8} Also in a study done by Capewell et al.¹¹ It was reported that cisplatin containing regimens were superior to best supportive care in improving outcome in non-small cell lung cancer patients.⁷

CONCLUSION

In the present study, majority of the patients (76.5%) had squamous cell carcinoma. Majority of the patients (85%) were smokers stressing the smoking to have a major role in the development of lung cancer in this study. Most of the patients presented in an advanced stage III and IV (75.9%) and the main treatment modality used in this study was combination therapy of chemotherapy and radiotherapy in (48.75%) followed by chemotherapy alone (22.25%). In the chemotherapy, cisplatin-based combination regimens were most commonly used regimens. Thus, more of such studies need to be done so as to make patients as well as the health professionals

more aware of the risk factors and the effective treatment modalities associated with the disease.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Ferlay J, Shin HR, Bray F, Forman D, Mathers C, Parkin DM. Estimates of worldwide burden of cancer in 2008: GLOBOCAN 2008. *Int J Cancer*. 2010;127:2893-917.
2. NCRP. Consolidated Report of Population Based Cancer Registries 1990-1996. National Cancer Registry Programme. New Delhi: Indian Council of Medical Research. 2001:56-7.
3. Jindal SK, Behera D. Clinical spectrum of primary lung cancer: review of the Chandigarh experience of 10 years. *Lung India*. 1990;8:94-8.
4. Prasad R, Singhal S, Garg R. Bidi smoking and lung cancer. *Bio Science Trends*. 2009;3(2):41-3.
5. NSCLCC Group. Chemotherapy in non-small cell lung cancer: a meta-analysis using updated data on individual patients from 52 randomized clinical trials. *Br Med J*. 1995;311:899-909.
6. Rawat J, Sindhwani G, Gour D, Dua R, Saini S. Clinico-pathological profile of lung cancer in Uttarakhand. *Lung India*. 2009;26(3):74-6.
7. Koul PA, Kaul SK, Shah A. Lung cancer in the Kashmir valley. *Lung India*. 2010;27:131-7.
8. Kumar BS, Debasis D, Abinash A, Ghoshal AG, Kumar DS. Clinico-pathological profile of lung cancer in a tertiary medical centre in India: Analysis of 266 cases. *J Dentistry Oral Hyg*. 2011 Mar 31;3(3):30-3.
9. Behera D, Balamugesh T. Lung cancer in India. *Indian J Chest Dis Allied Sci*. 2004;46:269-81.
10. Raviv S, Hawkins KA, Decamp Jr MM, Kalhan R. Lung cancer in chronic obstructive pulmonary disease. *Am J Resp Crit Care Med*. 2011;183(9):1138-46.
11. Capewell S, Sankaran R, Lamb D, McIntyre M, Sudlow MF. Lung cancer in lifelong non-smokers in Edinburgh Lung Cancer Group. *Thorax*. 1991;46(8):565-8.

Cite this article as: Bhatt SK, Gupta R, Sharma S. Chemotherapeutic treatment modalities in the management of lung carcinoma: an observational study in a tertiary care teaching hospital in north India. *Int J Adv Med* 2018;5:1047-52.