



A STUDY OF CARCINO EMBRYONIC ANTIGEN (CEA) LEVELS IN LUNG CANCER

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ABSTRACT

BACKGROUND - Lung cancer is a major cause of cancer-related mortality. About 85% of cases are related to cigarette smoking. CEA was one of the tumour markers use to evaluate lung cancer, also elevated levels are seen in 40–80% of patients with lung cancer, showing a high sensitivity for adenocarcinoma and for advanced stage studies show that CEA level in serum is significantly increasing in patients with lung cancer. Serum CEA level can be used as a sensitive and specific screening test for various cancers including lung cancer.

METHOD - 74 patients were studied at Geetanjali Hospital, Udaipur. Only biopsy proven cases of carcinoma lung were interviewed and demographic data such as age, sex & addiction history were noted.

RESULTS - Among 74 patients diagnosed with lung cancer highest cases were seen in patients with Adenocarcinoma 38 (51.35%) followed by Squamous cell carcinoma with 26 (35.14%) followed by Small cell carcinoma 10 (13.51%). 27 (71.05%) out of 38 patients of adenocarcinoma, 10 (38.48%) out of 26 patients of Squamous cell carcinoma and 6 (60%) out of 10 patients of small cell carcinoma showed CEA values more than normal. 30 (71.43%) patients out of 42 of stage IV, all 5 patients of stage IIB 4 (57.14%) Out of 7 of IIIA patients 2 (28.57%) out of 7 patients of both stages IIA & IIB showed higher CEA level than normal. Higher than normal level of CEA was seen in all 3 (100%) patients of pleural metastasis followed by brain metastasis was seen in 5 (83.33%) out of 6 patients, liver metastasis was seen in 5 (71.43%) out of 7 patients, adrenal metastasis was seen in 6 (60%) out of 10 patients, bone metastasis was seen in 4 (57.14%) out of 7 patients showed higher than normal level of CEA.

CONCLUSION - This observation highlights the importance of tumour markers in relation to histological type and tumour staging. Routine serum CEA testing in patients with Nonsmall cell lung carcinoma than Small cell Lung Carcinoma, allows the identification of a significant proportion of patients at high risk of developing a tumour relapse being cost effective.

KEYWORDS : Lung Cancer, Carcinoembryonic Antigen Levels

BACKGROUND

Lung cancer is a major cause of cancer related mortality. About 85% of cases are related to cigarette smoking¹. Biological markers known as tumour markers are used as predictors of response to treatment in several types of malignant tumours including lung cancer. Serial estimation helps in estimating the response to treatment, monitoring the course of the disease, predicting survival rate, surveillance for recurrences². CEA was one of the first tumour markers evaluated in lung cancer, elevated levels are seen in 40–80% of patients with lung cancer. CEA expression and secretion by tumour cells promote metastatic spread thereby, inflammatory environment supporting tumour formation helping in estimating the prognosis of the disease³.

AIMS & OBJECTIVES

- To determine level of CEA in patients with biopsy proven cases of Lung Cancer.
- To evaluate serum CEA levels as a Tumour marker for Lung Cancer.

MATERIALS AND METHODS

This study was conducted from January 2018 to October 2019 at Geetanjali Hospital, Udaipur. Study consisted of 74 patients with proven biopsy of carcinoma lung and demographic data such as age, sex & addiction history were noted. Inclusion criteria comprised of all male and female patients of 18 years and above, Histo-pathologically confirmed Cases of Carcinoma Lung and patients giving informed consent. Exclusion criteria included all other Malignancies, Pancreatitis, Inflammatory Bowel Disease, Pancreatitis, Cirrhosis of Liver. The selected patient underwent Serum CEA level at Geetanjali Medical College and Hospital laboratory with the Normal reference values as per GMCH laboratory protocols being serum CEA: up to 4ng/ml.

RESULTS

In the present study, maximum number of patients were of the age group between 51 to 60 years (41.89%). 68 (91.89%) males and 6 (8.11%) female patients were affected. Maximum number of patients were in stage IV accounting for 42 (56.76%) patients. 38 (51.35%) patients were of Adenocarcinoma followed by 26 (35.14%) with Squamous cell carcinoma and 10 (13.51%) with Small cell carcinoma. 27 (71.05%) out of 38 patients with adenocarcinoma, 10 (38.48%) out of 26 patients with Squamous cell carcinoma and 6 (60%) out of 10 patients with small cell carcinoma showed CEA values more than normal. On applying chi square test, the difference was found statistically significant with p value of (.034). 30 (71.43%) patients out of 42 of stage IV, all 5 patients of stage IIB, 4 (57.14%) out of 7 cases of IIIA and 2 (28.57%) out of 7 cases of both stages IIA & IIB showed higher CEA level than normal. On applying chi square test, the difference was found statistically significant with p value of (.005). 42 out of 74 patients developed metastasis wherein highest number of cases were seen with Adenocarcinoma being 24 patients and Highest frequency of metastasis was seen to adrenals in 10 patients. Higher than normal level of CEA was seen in all 3 (100%) patients of pleural metastasis followed by brain metastasis was seen in 5 (83.33%) patients out of 6 patients, liver metastasis was seen in 5 (71.43%) patients out of 7 patients, adrenal metastasis was seen in 6 (60%) patients out of 10 patients, bone metastasis was seen in 4 (57.14%) patients out of 7, 7 (77.78%) patients out of 9 patients of multiple metastasis showed higher than normal level of CEA. On applying chi square test, the difference was found statistically non-significant with p value of (0.679).

Table 1 - Types of Distribution

Type	No.	%
Adenocarcinoma	38	51.35

Squamous Cell Carcinoma	26	35.14
Small Cell Lung Carcinoma	10	13.51
	74	100.00

Table 2 - Comparison between various types of lung cancer & CEA

Type	CEA Level		Total	% of patients with CEA level higher than normal
	No. of cases with CEA <4 ng/ml	No. of cases with CEA >4 ng/ml		
Adenocarcinoma	11	27	38	71.05
Small Cell Lung Cancer	4	6	10	60
Squamous Cell Carcinoma	16	10	26	38.46

Table 3 - CEA level in correlation with Metastasis

CEA Level	Metastasis						Total
	Adrenal	Bone	Brain	Liver	Pleural	Multiple	
CEA level <4 ng/ml	4	3	1	2	0	2	12
CEA level >4 ng/ml	6	4	5	5	3	7	30
% of patients with CEA level higher than normal	60	57.14	83.33	71.43	100	77.78	71.43

Table 4 - Comparison between various stages of lung cancer & CEA

Stage	CEA Level		Total	% of cases with CEA level higher than normal
	No. of cases with CEA <4 ng/ml	No. of cases with CEA >4 ng/ml		
IA	2	0	2	0
IB	3	0	3	0
IIA	5	2	7	28.57
IIB	5	2	7	28.57
IIIA	3	4	7	57.14
IIIB	0	5	5	100
IV	12	30	42	71.43

DISCUSSION

Serum tumour markers are of significance to the clinician in treating patients with cancer. In oncology set up serum tumour markers aid in the diagnosis, pathologic classifications, and evaluation of the stage of disease and prognosis. Lung cancer being the leading cause of cancer death in both men and women needs to be evaluated based on indices used for diagnosis, prognosis, choice of therapy⁴The general trend of male patients is due to various reasons including tobacco smoking and most commonly seen in the age group of 30-60yrs and due to lack of awareness of the ill effects of tobacco smoking⁵ In our study observed age group among patients with lung cancer is in between 51-60 years (41.89%) range with male preponderance (91.89%). **Oscar Arrieta et al⁶** study in the year 2013 documented the male preponderance (54.4%) and age group being in between 47-60years (59.4%) to be affected more than other age groups, which is similar to the present study. Our study conducted on 74 patients showed 69 patients (93.24%) to be associated with smoking while remaining 5 (6.75%) were found to be non-smokers by history and examination. In **Konstantinos Charalabopoulos et al⁷** study, 46 patients were smokers (92%) among 50 patients suffering from lung cancer, remaining 4 patients (8%) were non-smokers. Adenocarcinoma is the most common histolo-

gical group in men and women worldwide. Studies conducted by **Jae Jun Kim et al⁸**, **Chen et al⁹** **Zaleska et al¹⁰** all showed that Adenocarcinoma is the commonest type of lung cancer with 51.8%, 72.9% and 48.10% respectively which is similar to the present study where 51.35% were Adenocarcinoma.

In our study, 30 (71.43%) cases out of 42 of stage IV showed higher CEA level than normal. **Zaleska et al¹⁰** in the year 2010 showed that 33 (41.77%) cases out of 79 of stage IV showed higher CEA level than normal with p value (< 0.024). Study by **Arrieta et al⁶** also showed similar observation where stage IV showed higher CEA Levels than normal with a p value (< 0.03) All 5 cases of stage IIIB showed higher CEA level than normal. Out of 7 cases of IIIA 4 (57.14%) showed higher CEA level than normal. A study conducted by **Aoyagi K¹¹** in the year 1999 observed that CEA levels estimation in stage I-III lung cancer patients to be statistically significant with p value of (0.041) Some studies have reported that serum CEA levels were significantly higher in patients with metastatic disease as compared to patients with non-metastatic disease. (91) (92) (93) Study by **Ahmet et al¹²** did not show significant difference in serum CEA levels between stage III and stage IV, which is similar to our study. In the present study 24 out of 42 patients were adenocarcinoma type with distant metastasis which is similar to the study conducted by **Arrieta et al (73)**. Higher than normal level of CEA was seen in all 3 (100%) patients of Pleural metastasis followed by Brain metastasis were 5 (83.33%) out of 6 patients, Liver metastasis were 5 (71.43%) out of 7 patients, Adrenal metastasis were 6 (60%) out of 10 patients, Bone metastasis were 4 (57.14%) out of 7 patients showed higher than normal level of CEA, 7 (77.78%) in the present study.

A study by **Arrieta et al¹³**-studying metastasis to brain showed that Brain metastasis in patients with adenocarcinoma subtype and higher than normal level of CEA at diagnosis. Study by **Ahmet et al¹²** concluded that higher than normal level of serum CEA were significant for predicting distant metastases, which is similar to the present study where it was found that distant metastasis was seen in higher than normal level of CEA levels in 30 (71.43%) patients out of 42 patients of metastasis. High serum CEA levels suggest micro metastatic disease, also prognostic values of high CEA serum levels can be accounted for by tumour change^{13,14}

A study conducted by **Jiasi Wang et al¹⁵** observed that 128 out of 213 patients showed metastasis in which 49 (38.3%) patients were adenocarcinoma, 47 (36.7%) patients were squamous cell carcinoma and 24 (18.8%) patients were small cell carcinoma and corresponds with our study.

This study suggested that serum CEA as a valuable marker in the assessment of tumour metastasis in lung cancer patients. Early identification and location of metastasis with the help of such tumour markers such as serum CEA levels can be useful for clinical selection of treatment and can therefore create better prognosis¹⁶

CONCLUSION

Tumour markers are related to histological type and tumour staging. Routine serum CEA testing in patient with Non-Small Cell Lung Carcinoma than Small Cell Lung Carcinoma, allowing the identification of a significant proportion of patients at high risk of developing a tumour relapse being cost effective. CEA level estimation can be used as a biomarker and as a combination with other tumour markers to suggest the histological diagnosis and metastasis risk. In cases of SCLC, serum CEA estimation can get affected by various factors and is not being used as an ideal marker. Differentiation and staging of the different types of lung cancer based on serum CEA levels varies greatly as serum CEA levels get affected by various factors such as smoking

etc. Hence serum CEA level estimation can be considered as a tool for prognosis and grading than as a marker for predicting the nature of the disease.

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