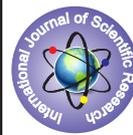


ASSESSMENT OF SERUM ZINC STATUS IN CARCINOMA OF LUNG AND ESOPHAGUS PATIENTS



Biochemistry

KEYWORDS: Lung and Esophagus Carcinoma, Zinc, Atomic absorption spectrophotometer

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ABSTRACT

Background: The association of serum trace element like Zinc has been found in different types of cancer. This study was conducted to see the serum level of trace element (Zn) in carcinoma of lung and esophagus patients.

Material and methods: Study group consisted of 50 clinically diagnosed subjects (Biopsy confirmed 25 cases with Lung carcinoma and 25 cases with Esophageal carcinoma). The control group consisted of 50 Healthy subjects were included in the study. Both study and control group patients were of same socio-economic status and dietary habits. Venous blood samples of each lung and esophagus cancer were obtained and serum Zn levels was analysed by Atomic Absorption Spectrophotometer measurements.

Results: The serum Zn level was significantly lower in serum of lung and esophagus cancer group than controls ($P < 0.0001$).

Conclusions: Serum trace element like zinc, might be play a role in the patients of cancers. Zn may protective as potent lung cancer. In addition, it is suggested that low levels of zinc can induce the pathogenesis of cancer.

INTRODUCTION

Lung Cancer is the second most common cancer in women after breast cancer and is also the second leading cause of cancer-related deaths in women worldwide.¹ Uncontrolled cell growth in tissues of the lung, may lead to metastasis, which is the invasion of adjacent tissue and infiltration beyond the lungs. The vast majority of primary lung cancers are carcinomas of the lung, derived from epithelial cells. And Esophageal cancer is the eighth most common cancer and sixth leading cause of cancer deaths in the world, with the majority of cases occurring in developing countries.¹ About 90% of esophageal cancers worldwide are Squamous Cell Carcinomas (SCC), mostly occurring in defined high-incidence areas of low and middle-resource countries. Historically, the highest incidences are reported in regions of Central Asia. One such region is Kashmir Valley in Northern India. Some minerals & Trace-heavy elements play an significant role in human health and disease. Trace elements at optimum levels are required for numerous metabolic and physiological processes in the human body.² Zinc is an essential trace element required by the human body for more than 300 cellular processes³ but can be toxic in excess and therefore requires a high level of regulation. Zinc importer (Zip) and transporter (ZnT) proteins facilitate cellular zinc homeostasis⁴ and several proteins within these families appear disturbed in breast cancer cells. Zinc which is essential for DNA polymerase activity is particularly important in cell proliferation encountered in growing cell tumor.⁵

Importantly, Zinc deficiency results in an increased sensitivity to oxidative stress⁶ and may, in part, account for the mechanism by zinc deficiency increase the risk for cancer development. There is now increasing evidence that oxidative stress is an important contributing factor in several chronic degenerative diseases, such as cancer. This hospital based study is aimed to see the blood (serum) level of Zn in cancer of lung and esophagus patients.

MATERIAL AND METHODS

The study group consisted of 50 clinically diagnosed subjects (25 cases with Lung carcinoma and 25 cases with Esophageal carcinoma). The control group consisted of 50 Healthy subjects. Both study and control group were of same socio-economic status with similar diet habits. Both study and control group were of same socio-economic status with similar diet habits.

The criteria for the selection of patients were:-

- (i) Biopsy proved cases of Lung carcinoma and Esophageal carcinoma.

- (ii) Who had not undergone any treatment i.e. chemotherapy or radio-therapy.
(iii) Who has not taken long course of any mineral supplement during last six months.

The criteria for the selection of controls:-

- (i) Who were not suffering from any cancerous lesions.
(ii) Who has not taken any course of mineral supplement.

Blood samples were obtained by vein puncture and collected in a clean dry centrifuge tube. Standard precautions for trace element determination were taken, haemolysed samples were discarded. The blood was centrifuged at 3000rpm for 10 minutes and serum was stored at -4°C until the day of the test, serum zinc concentration was determined by direct measurement method using Atomic absorption spectroscopy.⁷

Analytical reagent grade chemicals, standards were used. Water used for washing laboratory apparatus and for preparing solutions and standards was purified by deionization of redistilled water.

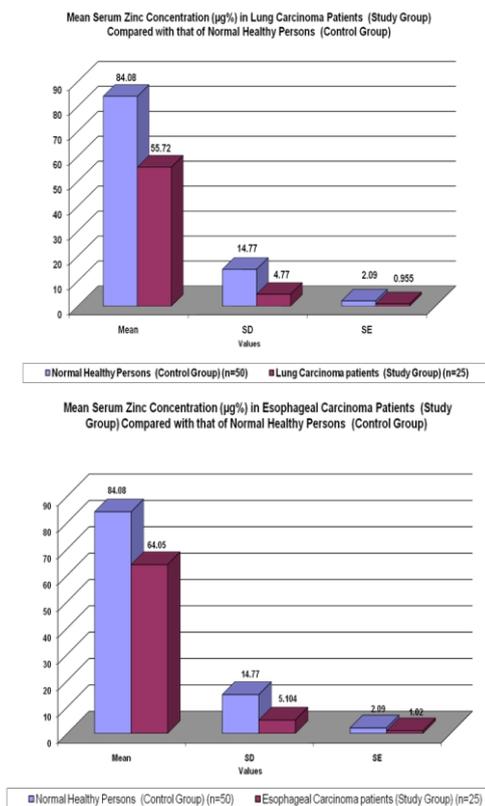
STATISTICAL ANALYSIS:- The results were expressed as the mean \pm standard error (SE). One-way ANOVA was used for the comparison of mean values of the groups. Then, Student-t test was used to determine the difference between groups. In addition, Pearson's correlation analysis was carried out to determine the relationships among the variables.

OBSERVATION TABLE

Mean Serum Zinc Concentration ($\mu\text{g}\%$) in Lung and Esophageal Carcinoma Patients (Study Group) Compared with that of Normal Healthy Persons (Control Group)

Values	Normal Healthy Persons (Control Group) (n=50)	Lung Carcinoma patients (Study Group) (n=25)	Esophageal Carcinoma patients (Study Group) (n=25)
Mean	84.08	55.72	64.05
Range	61.6-126.8	49.2-61.1	55.6-69.9
SD	14.77	4.77	5.104
SE	2.090	0.955	1.020
t		9.325	6.564
p		0.0001***	0.0001***

*** Highly significant

**RESULT:-**

The results as presented in the table show that the level of zinc was altered in subjects having Lung and Esophageal carcinoma. A statistically significantly lower ($p < 0.0001$) in serum zinc levels was observed in patients with Lung and Esophageal carcinoma group than the healthy control group.

DISCUSSION:-

Trace elements and metals are known to play a vital role in metabolism. Zinc is a trace element required for the growth of normal and neoplastic tissues in a variety of species zinc deficiency is associated with alterations in the activity of zinc dependent enzyme essential for cell replication. Dietary zinc deficiency also increases the incidence of certain tumors. The findings of the present study indicates a strong association of zinc with lung and esophageal cancer. The mean serum zinc level was found to be decreased significantly in lung and esophageal cancer patients as compared to that control group. The association of serum trace elements and high cancer risk has been found in many studies. Sadat et al found that serum concentration of zinc was decreased significantly⁸ and Cobanglu et al studied that levels of serum zinc and serum magnesium were significantly reduced in lung cancer patients when compared to control cases.⁹

Ahmad et al studied that the concentrations of zinc and magnesium in blood were significantly decreased in esophageal cancer patients. This suggested that these might play some role in carcinogenesis.¹⁰ Mark *et al.* also observed similar results in which the esophageal cancer patient had significantly lower Zn as compared to the control subjects ($P < 0.01$).¹¹ In lung, colorectal, cervix, larynx cancers also their levels were found to be altered.¹² Zinc and copper are important microelements which not only regulate the physiological functions of various organs but are also associated in the production of pathological changes in these organs. Zinc is mainly required for DNA synthesis, cell division and protein synthesis. Zn directly stimulates DNA synthesis by altering the binding of F and F3 histones to DNA so as to affect RNA synthesis. It has been hypothesised that

Zn could be operating at several different levels and influencing lymphocyte monoclonal proliferation.¹³

Although, the mechanism underlying the deviation of serum zinc in malignancy is not clear but however the decrease in serum zinc level might be due to stress induced by the malignancy. Davies et al reported that many factors including various diseases and stress induce the lowering of serum zinc concentration.¹⁴ our data does not allow us to conclude whether Zn deficiency, preceded or occurred as a result of the cancer. The individuals with abnormal serum levels can be subjected to further investigation to identify precancerous changes or early malignant changes.

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