

Low serum selenium concentration in patients with cervical cancer

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Citation

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Abstract

INTRODUCTION

Selenium (Se), vitamin E and sulfur amino acids have long been considered to serve as antioxidants that complement one another. So is an essential component of intracellular and extracellular glutathione peroxidases ¹. Vitamin E is a membrane-associated molecule that scavenges free radicals, preventing damage to membrane lipids ¹. In addition to enzymatic antioxidative action, Se is included in other anticancerogenic mechanisms, among which activation-inactivation of cell growth factor is the most important ². In many publications low plasma Se concentrations correlated directly with an increased incidence of different carcinomas

34*

The present study was designed to investigate serum selenium concentrations of patients with cervical cancer and of non-cancer subjects in Haryana (India).

MATERIALS AND METHODS

The study included twenty five women with carcinoma cervix registered consequently in Radiotherapy Clinic at Pt.B.D.Sharma PGIMS, Rohtak (Haryana, India). Twenty five patients aged 37 to 63 years (mean 50.3 years) were treated for primary cervical cancer (Ca cervix). They were in different clinical stages of cervical cancer: four were in stage I_B, two in stage II_B, two in stage III_A and seventeen in stage III_B (FIGO Staging). All patients were in good nutritional condition. Venous samples were taken from these patients before starting treatment. Twenty age-matched healthy volunteers served as controls. Serum was separated by centrifugation and stored at -20 0 C until assayed for selenium. The determination of Se in serum was performed by acid digestion of the samples followed by the reduction of Se to hydrogen selenide which was determined by atomic absorption spectrophotometer. The data is obtained was

analysed statistically using student's t-test.

RESULTS

Carcinoma cervix patients had significantly lower serum concentrations of selenium than controls ($p < 0.001$, Table 1). The ages of the patients and the clinical stages of cervical cancer and the histological grading did not correlate with the serum concentration of selenium.

Figure 1

Table 1. Serum Se concentration (mean \pm SD, ppb/ml)

	S. Selenium
Control	120.57 \pm 13.45
Ca cervix	97.4 \pm 16.0

DISCUSSION

In the present study, carcinoma cervix patients had significantly lower serum Se levels as compared to healthy controls (Table 1, $p < 0.001$). This is in accordance with observations that patients with gastrointestinal or Hodgkin's disease, chronic lymphocytic leukaemia, breast cancer ⁵⁶ had significantly lower blood concentration of Se than their respective controls. Also, epidemiological data suggest that cancer mortality is inversely correlated with Se consumption and that people living in geographic areas with a low Se content have a higher rate of malignancies, especially breast and gastrointestinal cancer ⁷.

Numerous factors influence the appearance and spread of malignant processes in the organisms, among which the immune system, as well as detoxicating cellular enzymes

which contain Se as their essential cofactor (Glutathione peroxidase, phospholipid hydroperoxide glutathione peroxidase, etc.) have important roles in the prevention and correlation of these transformations ².

From big prospective epidemiological studies, it is well known that persons with low serum Se concentrations, as well as population from geographic areas with Se deficiency represent risk group for cancer genesis ⁸⁹. The exact mechanism by which a deficiency of Se is involved with carcinogenetic process is not known. As a cofactor of glutathione peroxidase, selenium prevents peroxidation of polyunsaturated fatty acids and consequently reduces the risk of cellular membrane damage, but other mechanisms are also possible ¹⁰.

On the other hand, Se deficiency might be a consequence of the malignant disease. In Broghamer's study, the serum concentrations of Se in carcinoma patients varied widely and the lowest concentrations of Se tended to appear in patients with distant metastases, multiple recurrences and short survival rates ¹¹.

Robinson et al have postulated that a low concentration of Se in the serum reflects the nutritional state of patients ¹². The present results, however, did not support these theories because there were no difference in serum Se concentrations between various clinical stage, and all of our patients were in good nutritional condition. Our findings suggest that low serum concentration of Se in uterine cervical carcinoma patients might be a contributing factor in the development of

cervical cancer. Selenium supplementation may have a role in chemoprevention of carcinogenesis.

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