PLASMA VITAMIN E LEVELS IN CARCINOMA BREAST

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ABSTRACT

Plasma vitamin E levels were estimated in 75 patients each of carcinoma breast and benign breast diseases. Mean plasma vitamin E concentration was found to be significantly reduced in malignancy compared to the controls as well as the non malignant conditions. The decrease in plasma vitamin E in cancer patients was directly related with the TNM stage of cancer. The levels, however, did not vary significantly with respect to histopathology or after 8 days of surgery.

KEY WORDS : Vitamin E, Carcinoma Breast, TNM stage.

INTRODUCTION

Carcinoma breast is one of the commonest malignancies in females with its increasing incidence (1). Various theories propounded are based on altered hormonal milieu, personal and demographic factors and certain agents such as the radiant energy, oncogenic viruses and chemical carcinogens which induce neoplastic transformation of the cell (2). All carcinogens are highly reactive electrophiles which may attack several electron rich sites on the macromolecules (DNA being the primary site) in the target cells (3).

Vitamin E has been thought to function as an antioxidant and exerts a protective action against carcinogen induced chromosomal breakage. Vitamin E has also been reported to reduce tumorigenesis in carcinoma of the skin and oral mucosa (4,5). Several workers have reported that serum Vitamin E levels are reduced in various types of cancers (1, 6-9). Russell et al (10) however, reported that serum vitamin E levels remain unaltered in malignancy. On the other hand, Gerber et al (11) observed increased concentration of vitamin E in sera of patients with breast cancer. Due to the conflicting reports and paucity of data, the present study was designed to evaluate vitamin E levels in various breast lesions in relation to the TNM stage and histopathology of the disease.

MATERIALS AND METHODS

Vitamin E levels were estimated in 75 patients, in the age group of 20-70 years, each of carcinoma breast and benign breast diseases. Fifty healthy females within the same age group were also studied to serve as controls.

In all the patients, a detailed history was recorded and clinical examination and routine laboratory investigations were done. Diagnosis was confirmed by aspiration cytology and/or tissue histopathology. Staging was done as per TNM classification. Patients were treated according to lesion and stage of the disease. Plasma vitamin E levels were estimated (as α-tocopherol) by spectrofluorometry (12) in all the patients at the time of first presentation and on the 8th day after surgery.

RESULTS

Table 1 shows that mean plasma vitamin E concentration in benign breast diseases (4.24±0.16 µg/ml) was not significantly different (p>0.05) when compared with the controls (4.54±0.17 µg/ml). The mean vitamin E level in breast carcinoma patients (1.70±0.15 µg/ml) was significantly lowered (p<0.001) when compared with the controls as well as with the patients with benign breast diseases.

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Based on TNM staging, patients were divided into 4 groups (Table 2). The mean plasma vitamin E concentration in patients with stage I was found to be significantly lowered when compared with the mean value for the control group (p<0.05). The decrease in plasma Vitamin E concentration was directly related with the increasing stage of cancer.

Table 1. Plasma Vitamin E levels in carcinoma breast.

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Plasma vitamin E (µg/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>50</td>
<td>4.54±0.17</td>
</tr>
<tr>
<td>Benign breast diseases</td>
<td>75</td>
<td>4.24±0.16</td>
</tr>
<tr>
<td>Carcinoma breast</td>
<td>75</td>
<td>1.70±0.15</td>
</tr>
</tbody>
</table>

Values are mean ± SEM, 'n' Number of subjects; * Difference statistically significant when compared with the other two groups (p<0.001).

Table 2. Plasma vitamin E levels in relation to the TNM staging in carcinoma breast.

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Plasma vitamin E (µg/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controls</td>
<td>50</td>
<td>4.54±0.17</td>
</tr>
<tr>
<td>Carcinoma breast:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage I</td>
<td>12</td>
<td>3.43±0.17*</td>
</tr>
<tr>
<td>Stage II</td>
<td>18</td>
<td>2.20±0.24**,**</td>
</tr>
<tr>
<td>Stage III</td>
<td>35</td>
<td>1.68±0.21**,**</td>
</tr>
<tr>
<td>Stage IV</td>
<td>10</td>
<td>0.90±0.23**,**</td>
</tr>
</tbody>
</table>

n - number of subjects; values are mean ± SEM, * Difference statistically significant when compared with the control group (p<0.05), ** (p<0.05) vs stage I.

According to the histopathological type of carcinoma, a majority of the patients (84%) were of infiltrating duct carcinoma (1.90±0.13 µg/ml). There were only 8 patients of lobular carcinoma (1.98±0.29 µg/ml) and 4 of comedo carcinoma (1.83±0.21 µg/ml). The fall in plasma vitamin E, however, was nearly same in all the patients studied.

The mean plasma vitamin E levels were not found to be significantly altered after 8 days of surgery (1.69±0.15 µg/ml) compared with the preoperative value (1.70±0.15 µg/ml).

DISCUSSION

A significant decrease in plasma vitamin E levels in breast carcinoma patients was observed in the present study. Mean level of plasma vitamin E in benign breast disease patients, however, was not significantly different from the controls. The results are in agreement with some of the workers (6-9). On the other hand Russell et al (10) reported that vitamin E levels remain unaltered while Gerber et al (11) observed increased concentration of serum vitamin E in patients with carcinoma breast. Decrease in vitamin E in patients with breast cancer could be due to the possibility that vitamin E reacts very rapidly with molecular oxygen and free radicals, the role of which has been implicated in carcinogenesis (4,5). It is suggested that vitamin E acts as a scavenger protecting polyunsaturated fatty acids from peroxidation reactions in head and neck cancer (9).

Comparing plasma vitamin E levels in patients with breast cancer in relation to the stage of the tumor, a steady decrease in plasma vitamin E was observed from stage I to stage IV. However, the levels were not significantly different with respect to histopathology. Further the preoperative levels remained unchanged after 8 days of surgery. It could be due to the possibility of a short duration of follow up which may not be sufficient to bring the Vitamin E levels back to normal. A more elaborate study is thus required.

REFERENCES