THE EFFECT OF VITAMIN E ON THE HISTAMINE LEVELS IN SKIN, STOMACH AND LUNGS

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SUMMARY : The effect of vitamin E (α - tocopherol) on the histamine levels of the skin, stomach and lungs was studied utilizing the immunologically stimulated Swiss Albino mice. 14 animals were immunized by the intraperitoneal (i.p.) injection of 0.2 ml Complate Freunds Adjuvant and were divided into two groups of the control and the test. 7 mice in the control group were injected with 0.002 ml saline / g body weight / day for a 10 days period. The animals in the test group were injected with 0.3 mg α - tocopherol acetate / g body weight / day under the same conditions. The results showed that Vitamin E lowered the histamine levels in the skin ($p<0.01$) and lungs ($p<0.001$) significantly in agreement with the blood levels ($p<0.01$). However, an insignificant effect ($p>0.05$) was observed in stomach. The protected mast cell degranulation in the skin and lungs may correlate with the high vitamin E uptake of these tissues.

***Key Words :** Histamine, Vitamin E.*

INTRODUCTION

It was shown that the histamine release increases in rapidly growing fetal tissues (12) and in the proliferating epithelial cells of the gastrointestinal mucosa (7). It was also suggested that this amine may have physiological effects. On the other hand, there are some studies showing that the mast cell activity also increases during the fibrous changes which take place after the acute or chronical inflammatory reactions in some tissues (7). The recent findings showed that the triggering mechanism involves the oxygen metabolites. The oxygen radicals produced during the tissue activation stimulate the histamine release by both non-cytotoxic and the cytotoxic mechanisms (11).

Under normal conditions, these oxidants can be buffered by superoxide dismutase (SOD), catalase and glutathione peroxidase or by the chemical elements which are functioning as electron traps (5). Besides that, some compounds, such as vitamins (E,C, K) and ß-carotene, which are present in our food are particularly trapped in some tissues and therein help the reductant defence mechanisms (14). It was shown that vitamin E present in the skin and lungs has a protective effect in some pathological disorders related to superoxide formation including cancer of these tissues (6, 8).

Therefore, vitamin E as being an antioxidant is expected to prevent the degranulation in lungs, stomach and the skin which are rich in mast cell contents. In this study, the effect of vitamin E on tissue histamine levels as a result of its effect in mast cells was observed.

MATERIALS AND METHODS

In this experiment, immunologically stimulated Swiss Albino mice were used. The average weight of the animals was 35.5 ± 5.5 g. They were injected intraperitoneally (i.p.) with 0.2 ml of 10^{-10} basil/ml Complate Freund Adjuvant (6). The animals were divided into two groups of the control and the test. The control group was injected intramuscularly (i.m.) with 0.002 ml saline / g body weight for 10 days. The test group was injected with 0.3 mg α - tocopherol acetate / g body weight under the same conditions (9). The animals in the both group were fed on the standard mouse food and given water ad libitum.

At the end of the 10 days period, they were killed by decaptitation and their blood (13), stomach, lung and the skin (2) histamine levels were measured.

RESULTS

During the 10 days period, there was an insignificant weight gain among the animals both in the control and the test groups. The mean value of the blood histamine levels in the immunologically stimulated control group was 1.678 ± 0.447 µg/ml, whereas in the vitamin E treated group was 0.239 ± 0.055 µg/ml (Table 1). The difference between the two values was significant (p>0.01).

	Control group	α - Tocopherol acetate group (0.3 mg/g body weight)	
Stomach	10.66 ± 1.74 µg / g	7.30 ± 1.36 µg / g	p < 0.05
Skin	37.40 ± 5.31 µg / g	14.47 ± 6.72 µg / g	p > 0.01
Lungs	18.58 ± 1.86 µg / g	8.85 ± 1.53 µg / g	p > 0.001
Blood	1.68 ± 0.45 µg / ml	0.24 ± 0.05 µg / ml	p > 0.01

Table 1 : The effect of vitamin E treatment on tissue histamine levels in swiss albino mice.

Among all the groups, the tissue histamine levels in the vitamin E treated mice were lowered.

In the skin (p<0.01) and lungs (p<0.001), vitamin E lowered the histamine levels significantly. However, its effect in stomach was not statistically significant.

DISCUSSION

During the present work, it was observed that vitamin E significantly lowered the histamine levels in the skin and lungs, as well as the corresponding plasma levels. The result of another study carried out in our laboratory in the mouse mesenterial mast cells supported the histamine-lowering effect of vitamin E quantitatively and morphologically (1). However, the stomach histamine levels were not affected with vitamin E treatment in contrast to the other tissues.

The cytoproptective effect of α - tocopherol was not observed in the lesions due to indomethacine (15) or immobilization stress (3). The unusual observations in stomach may be a result of the low uptake of vitamin E by this tissue. Several studies carried out with different doses and the derivaties of α - tocopherol showed that liver, spleen, lungs (10), kidneys and the subcutaneous adipose tissue (4) concentrate this vitamin. On the other hand, lungs, due to ventilation, and the skin, due to solar UV, are the types of tissues where the oxidative damage is more likely to occur. It was reported that the mast cell activity increases in the diseases such as oedema and plasma extravasation of these organs or in some diseases resulting in fibrotic and even carsinogenetic changes (7). In addition, vitamin E was found to be an active antioxidant to correct these changes (6).

It is well known that the free oxygen radicals play a major role to liberate endogenous histamine (11). During the present study, the endogenous vitamin E acting as an antioxidant prevented the mast cell degranulation in lungs and the skin where the immune responses were stimulated. By this way the organs were protected from the harmful effects of histamine.

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