# THE PREVENTIVE EFFECT OF VITAMIN E ON THE NEUROLOGICAL TOXICITY OF MONOSODIUM GLUTAMATE

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*SUMMARY: Monosodium glutamate (MSG) has been added to infant formula but, is shown to be toxic to newborn animals. The present study is designed to find out whether vit E has a protective effect on the neurological symptoms against MSG toxicity in animals. One-day old one hundred chicks were divided into five equal groups. The chicks in group A were given MSG (3g/kg) and the chicks in groups B and C were given pyridoxine (7mg/kg) and vitamin E (60 U/kg) respectively 10 minutes before MSG (3 g/kg). The chicks in group D were injected with vitamin E (60 U/kg) 24 hours before MSG (3g/kg). Group E was control and only sterile water (0.5 ml) was injected. In group A, 15 chicks developed neurological sysmptoms, 17 died within 24 hours, and all died within 48 hours. In group B, 14 chicks developed neurologicals systoms, 18 died within 24 hours and 19 died within 48 hours. In group C, 15 chicks developed neurological symptoms, 5 died within 48 hours, 5 more died in 48 hours. No abnormality was noted in groups D and E. In conclusion, this study shows that vitamin E has a protective effect on the neurological symptoms against MSG if it is given 24 hours before MSG.*

*Key Words: Vitamin E, monosodium glutamate toxicity.*

## INTRODUCTION

Monosodium glutamate (MSG) is shown to be toxic to newborn mice and rats (4,7). Newborn mice given 0.5 g/kg doses of MSG caused hypothalamic damage and degenerative changes in the retina (5,8). It has been suggested that MSG provokes some symptoms of "Chinese Restaurant Syndrome" like burning sensations, asthmatic attacks, abdominal cramps and substernal discomfort (6).

Occasionally, the symptoms like burning headaches, chest pressure, pain and diarrhea due to MSG may be misdiagnosed as psychosomatic disease (9). Much concern has also been raised about the use of MSG in infant formula diets. The present study explores whether vitamin E has a protective effect on some of the neurological symptoms against MSG.

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## MATERIALS AND METHODS

One-day-old chicks weighing 30-35 g. were randomly distributed into five equal groups of twenty. The chicks in group A were given MSG (3g/kg) and the chicks in group B and C were given pyridoxine (7mg/kg) and vitamin E ( 60 U/kg) 10 minutes before MSG (3g/kg) respectively. The chicks in group D were injected with vitamin E (60 U/kg) 24 hours before MSG (3g/kg). Group E was control and only sterile water (0.5 ml) was injected.

MSG (Sigma Chemical) and pyridoxine were put into 0.5 ml water. All injections were made intraperitoneally.

The neurological symptoms were evaluated at 90 minutes and 24 and 48 hours following MSG injections.

## RESULTS

Group A: 15 chicks developed paralysis of legs and convulsions, 2 showed tremor in the first 90 minutes, 17 died in the following 24 hours, all died within 48 hours.

Group B: 14 developed paralysis of legs and 18 died in

Table 1: Number of affected chicks in each group.

| Group | Test compound | Number treated | Number affected | | |
|---|---|---|---|---|---|
| | | | Neurological Symptoms | Death | |
| | | | (90 minutes) | 24 hrs | 28 hrs |
| A | MSG | 20 | 15 (5)* | 17(3) | 5(0) |
| B | Pyridoxine and MSG | 20 | 14 (6) | 18(2) | 1(1) |
| C | Vitamin E and MSG | 20 | 15 (5) | 5(15) | 5(10) |
| D | Vitamin E 24 hours before MSG | 20 | 0 (20) | 0 (20) | 0(20) |
| E | Water | 20 | 0 (20) | 0 (20) | 0(20) |

*Number of paranthesis indicates number of the unaffected chicks.

the following 24 hours, all one died in 48 hours.

Group C: 15 developed paralysis of legs and convulsions after 90 minutes. 13 were recovered 5 died after 24 hours and 5 more also died after 48 hours.

Groups D and E : No apperent abnormality was noted (the results are shown in Table 1).

At 90 minutes, 24 hours and 48 hours Fisher exact $x^2$ test was $p<0.05$, $p<0.05$ and $p<0.05$, respectively.

## DISCUSSION

It is important to establish whether oral administration of glutamate could cause central nervous system damage in the infant. Ahmad *et al.* showed that ascorbic acid prevents the toxic effect of MSG in chicks (1). They found that MSG 3 g/kg of body weight had extreme toxic effects. Therefore, we used the same dose in this study.

Several studies, have shown that glutamate is an excellent precursor of gamma amino butiric acid (2,3). Pyridoxine may act as an anticonvulsant by interacting with GABA in the central nervous system. However, in our study, we did not observe this effect with the dose of pyridoxine used. The irreversible damage of MSG on nervous system of chicks was observed in our experiments at the dose used.

Vitamin E has a cytoprotective effect in different tissues. The effect may begin 24 hours after oral administration (10). We have shown the protective effect in the same period. When it was used just before MSG, some animals recovered.

In conclusion, this study shows that vitamin E has a protective effect on several neurological symptoms cell membrane against MSG if it is given 24 hours before MSG.

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