Indian Vet. J., October, 2003 ; 80 : 991 - 993

THE ROLE OF VITAMIN E IN SODIUM NITRITE POISONING

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Nitrite and nitrate are present with different levels in nature and in all living beings. Nitrogenous compounds enter the organism different ways. If used excessively for the long period, they are toxic and may lead to the cancer (Hirose *et al.*, 1990). Nitrate and nitrite poisoning in sheep, cattle, pig, rabbit, chickens, and turkey have been reported in several countries (Johnson and Kross, 1990).

Peroxynitrite anion leads to the sulfhydryl oxidation and lipid peroxidation (Allen *et al.*, 1998; Veronica *et al.*, 2000; Yilmaz and Bahcecioglu, 2000).

In this study, changes of the malondialdehyde (MDA), a marker for lipid peroxidation, and reduced glutathion (GSH), an antioxidant, were used to evaluate protective role of vitamin E in nitrite toxicity.

Materials and Methods

Thirty male rabbits were used in this study. All animals were fed commercial rabbit pellets and drinking water *ad libitum.* Rabbits were divided into three groups, each having 10 animals. $NaNO_2$ group: $NaNO_2$ (60 mg/kg) was injected subcutaneously into this group. $NaNO_2$ + α-tocopherol group: $NANO_2$ + (60 mg/kg) was injected in the same way and α-tocopherol(100 mg/kg) was applied intraperitoneally into the second group. Control group: Only physiologic saline was administred to this group.

The animals sacrificed by decapitation after 36 h the administration and their hepatic tissue samples were taken immediately. All the biochemical parameters were determined in the supernatant fraction. The content of GSH was measured using the method of Beutler (1963). MDA levels were estimated by the method of Uchiyama and Mihara (1978). Protein levels of the tissues were determined by Biuret method by commercial kit. The significance of observed differences between groups were evaluated by Student's t-test.

Results and Discussion

GSH and MDA levels in rabbit hepatic tissue are shown in Table. The GSH levels in the $NaNO_2$ group were significantly lower ($P<0.01$) when compared to the control group, however, MDA levels were significantly higher ($P<0.01$). On the other

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Table - Levels of GSH and MDA in the hepatic tissue of $NANO_2$ given rabbits

n:10	Control	$NaNO_2$	$NaNO_2$ + α-tocopherol
GSH nmol/mg protein	22.10±2.63	19.02±2.01*	21.76±2.14
MDA µmol/g tissue	5.54±0.67	6.68±0.79*	5.99±0.53

*:p<0.01

n: Number of animal

hand, GSH and MDA levels in the $NaNO_2$ + α-tocopherol group were determined to be closely similar to those found in the control group.

There have been several studies done on the physiological and pathophysiological functions of the NO in recent years. It forms peroxynitrite anion by reacting with superoxide radical. This turns into the hydroxyl, the most reactive radical, and the nitrate radicals. These free radicals lead to oxidative damage (Naqui and Chance, 1986).

In this study, mean of the GSH levels in $NaNO_2$ group was significantly lower than that of the control group (P<0.01), while the value in the $NaNO_2$ + α-tocopherol group was mainly similar to that of control group. This suggests that NO from $NaNO_2$ creates oxidative damage and vitamin E has a protective role on that. Liu *et al.*(1999), have reported similar results on the liver tissue levels of GSH as compare to our study. The decrease in the GSH may be a substrate for glutation peroxidase to protect increasing formation of ROS (Ulakoglu *et al.*, 1998). However, there are also some studies reported increasing (Aykac *et al.*, 1985; Santra *et al.*, 2000) of the level of GSH in liver.

In the study, mean of the liver MDA levels in the $NaNO_2$ group were significantly higher, comparing with the control group (P<0.01). On the other hand, the levels in the $NaNO_2$ + α-tocopherol group were essentially similar to the those of control group. This indicates that $NaNO_2$ causes lipid peroxidation and vitamin E protects it.

Oxygen derivative toxic products causes lipid peroxidation on the membrane lipids. Lipid peroxidation is a well known mechanism of the liver damage and is a good indicator of the level of the lipid peroxidation since MDA is one of its final products (Mates *et al.*, 1999); Baron *et al.*, (2000) have determined an increasing of the liver MDA levels.

In this study, both GSH and MDA levels in the $NaNO_2$+ α-tocopherol group were found to be similar to those of control group. This might be contributed to the protective role of the vitamin E. Similarly, there are several studies that have showed the protective role of the vitamin E to the oxidative damage. Tocopherol is an important antioxidant that inhibits the lipid peroxidation and free radical chain reactions on the cell membrane (Liu *et al.*, *loc.cit.*; Look *et al.*, 1999).

Summary

Changes in the liver GSH and MDA levels of the sodium nitrite ($NaNO_2$) administrated rabbits and the protective effects of the vitamin E were aimed to be revealed in this study. Thirty male rabbits were used in this study. $NaNO_2$ group was administrated 60 mg/kg $NaNO_2$ subcutaneously. $NaNO_2$ + α-tocopherol group was given same amount of $NaNO_2$ with same way and 100 mg/kg tocopherol intraperitoneally. Control group received physiologic saline. At 36 h. after the administration, liver tissue levels of the GSH and MDA were measured.

Mean GSH levels in the $NaNO_2$ group experimental group, comparing with those of control group, were found to be lower ($P<0.01$); however, mean MDA levels were significantly higher. On the other hand, mean GSH and MDA levels in the $NaNO_2$ + α-tocopherol group were determined to be closely similar to those found in the control group.

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