

## MODULATION OF BRAIN ANTIOXIDANT ENZYME ACTIVITY AND PROTEIN PEROXIDATION BY TOCOTRIENOL RICH FRACTION (TRF) SUPPLEMENTATION IN AN ANIMAL MODEL

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### Background:

Increased oxidative stress during ageing may result in damages to the brain, leading to debilitating motor and cognitive dysfunctions especially in the advanced stage. Tocotrienol rich fraction (TRF), an antioxidant, was shown to exert neuroprotective effects in *in vitro* studies and improved circulating oxidative status in rats. However, there is no study reported on the effects of long-term TRF supplementation on oxidative status in the brain. Therefore, the present study aimed to determine the effects of short (three months) and long-term (eight months) TRF supplementation on antioxidant enzyme activity and protein peroxidation (an indicator of oxidative damages) in rat brains.

### Materials and Methods:

Twenty four male *Wistar* rats aged three months were divided into supplemented and non-supplemented groups of three or eight months. Rats were sacrificed and brains harvested, weighed and homogenized. Supernatants were analyzed for vitamin E using High Performance Liquid Chromatography (HPLC), catalase (CAT), superoxide dismutase (SOD) and glutathione peroxidase (GSH-Px) activities using spectrophotometric technique and lastly protein carbonyl by ELISA kit.

### Results:

Results showed  $\alpha$ -tocotrienol (ATT) was the major vitamin E isomer in the brain. With increasing age, there was significant decline ( $p < 0.05$ ) of total vitamin E and its isomers:  $\alpha$ -tocotrienol (ATT),  $\gamma$ -tocotrienol (GTT) and  $\gamma$ -tocopherol (GTF). Long-term TRF resulted in significantly higher ( $p < 0.05$ ) level of total vitamin E and isomer ATT and GTT compared to short-term supplementation. GSH-Px activity was also significantly increased ( $p < 0.05$ ) in long-term compared to short-term supplemented group. A significant increase ( $p < 0.05$ ) of GSH-Px activity was observed in ageing as well. Data also showed significantly higher SOD activity ( $p < 0.001$ ), lower protein carbonyl contents ( $p < 0.05$ ) and heavier brain weights ( $p < 0.05$ ) in both supplemented groups but CAT activity remained unchanged with both ageing and TRF supplementation.

### Conclusion:

In conclusion, the study showed continuous long-term TRF supplementation prevented oxidative damages to the brain probably by modulating the antioxidant enzymes activities.

**Keywords:**

aging, antioxidant, brain, oxidative stress, tocotrienol rich fraction (TRF)