The effects of prenatal and early postnatal tocotrienol-rich fraction supplementation on cognitive function development in male offspring rats.

ABSTRACT

Background: Recent findings suggest that the intake of specific nutrients during the critical period in early life influence cognitive and behavioural development profoundly. Antioxidants such as vitamin E have been postulated to be pivotal in this process, as vitamin E is able to protect the growing brain from oxidative stress. Currently tocotrienols are gaining much attention due to their potent antioxidant and neuroprotective properties. It is thus compelling to look at the effects of prenatal and early postnatal tocotrienols supplementation, on cognition and behavioural development among offsprings of individual supplemented with tocotrienols. Therefore, this study is aimed to investigate potential prenatal and early postnatal influence of Tocotrienol-Rich Fraction (TRF) supplementation on cognitive function development in male offspring rats. Eight-week-old adult female Sprague Dawley (SD) rats were randomly assigned into five groups of two animals each. The animals were fed either with the base diet as control (CTRL), base diet plus vehicle (VHCL), base diet plus docosahexanoic acid (DHA), base diet plus Tocotrienol-Rich fraction (TRF), and base diet plus both docosahexaenoic acid, and tocotrienol rich fraction (DTRF) diets for 2 weeks prior to mating. The females (F0 generation) were maintained on their respective treatment diets throughout the gestation and lactation periods. Pups (F1 generation) derived from these dams were raised with their dams from birth till four weeks post natal. The male pups were weaned at 8 weeks postnatal, after which they were grouped into five groups of 10 animals each, and fed with the same diets as their dams for another eight weeks. Learning and behavioural experiments were conducted only in male off-spring rats using the Morris water maze.Eight-week-old adult female Sprague Dawley (SD) rats were randomly assigned into five groups of two animals each. The animals were fed either with the base diet as control (CTRL), base diet plus vehicle (VHCL), base diet plus docosahexanoic acid (DHA), base diet plus Tocotrienol-Rich fraction (TRF), and base diet plus both docosahexaenoic acid, and tocotrienol rich fraction (DTRF) diets for 2 weeks prior to mating. The females (F0 generation) were maintained on their respective treatment diets throughout the gestation and lactation periods. Pups (F1 generation) derived from these dams were raised with their dams from birth till four weeks post natal. The male pups were weaned at 8 weeks postnatal, after which they were grouped into five groups of 10 animals each, and fed with the same diets as their dams for another eight weeks. Learning and behavioural experiments were conducted only in male off-spring rats using the Morris water maze.Results: Results showed that prenatal and postnatal TRF supplementation increased the brain (4-6 fold increase) and plasma α-tocotrienol (0.8 fold increase) levels in male off-springs. There is also notably better cognitive performance based on the Morris water maze test among these male off-springs.Conclusion: Based on these results, it is concluded that prenatal and postnatal TRF supplementation improved cognitive function development in male progeny rats.

Keyword: Brain; Cognitive function; Spatial learning; Tocotrienol-rich fraction.