Beneficial effects of *Ginkgo biloba* Extract on hippocampal oxidative stress and serotonergic system of ovariectomized rats

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Menopause is associated to the development of physical and psychological alterations which arise in consequence to reduction of circulating estrogen levels. In cerebral structures involved in cognition and memory as hippocampus, hypoestrogenism may impair synaptic signaling, contributing to emergence of cognitive disturbances. Furthermore, cognitive impairment is also associated to accumulation of oxidative damages to different cells compounds. *Ginkgo biloba* extract (GbE), a widely used herbal supplement, present many benefits associated with its antioxidant and anti-inflammatory effects. Furthermore, we have previously demonstrated a stimulatory effect of GbE on the hypothalamic serotonergic system of ovariectomized rats. Therefore, the aim of this study was to evaluate GbE action on oxidative stress and 5-HT receptors expression in hippocampus of ovariectomized female rats. 2-month-old female Wistar rats had their ovaries surgically removed (OVX) or not (SHAM) and, sixty days after it was started the treatment with 500mg/Kg of GbE for 14 days. Rats were then euthanized and *hippocampi* were removed. Thereby, protein expression of 5-HT_{1A} and 5-HT_{1B} receptor and 5-HTT transporter quantification were performed, as well as glutathione (GSH), superoxide dismutase (SOD) and catalase (CAT) activities. Although no significant differences 5-HTT levels were observed, both 5-HT_{1A} and 5-HT_{1B} expression were diminished in OVX rats (P=0.0471 an P= 0.004, respectively) in comparison to SHAM rats, while no differences were observed among OVX+GbE and SHAM groups. In addition, OVX rats also presented higher SOD activity (P=0.017) in comparison to SHAM group, while no differences were observed in the OVX+GbE group. However, no differences were observed in GSH and CAT activities. In summary, GbE extract played an antioxidant effect as it reduced SOD activity and also was able to protect against 5-HT_{1A} and 5-HT_{1B} reduction generated in hippocampus of ovariectomized rats. These findings point to a promising therapeutic use of GbE to improve life quality of post-menopausal women, especially in relation to cognition.

Keywords: Serotonin system, ovariectomia, oxidative stress,