Neuroprotective role of 17β-estradiol administration on altered age related neuronal parameters in female rats

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Abstract

Objectives:

During normal aging, brain experiences structural, molecular, and functional alterations. Aging in females and males is considered as the end of natural protection against age-related diseases like osteoporosis, coronary heart disease, diabetes, Alzheimer's disease and Parkinson's disease. Protection from age-related disorders is provided by several factors, including estrogens. These changes increase during menopausal condition in females when the level of estradiol is decreased. The objective of this study was to observe the changes in activities of superoxide dismutase (SOD), glutathione S-transferase (GST), Ca\textsuperscript{2+}ATPase, intracellular calcium levels, DNA degradation and glucose transporter 4 (GLUT4) occurring in brains of female albino Wistar rats of 3 months (young), 12 months (adult) and 24 months (old) age groups, and to see whether these changes are restored to normal levels after exogenous administration of estradiol.

Methods:

The aged rats (12 and 24 months old) (n= 8 for each group) were given subcutaneous injection of 17-β-estradiol (0.1µg/g body weight) daily for one month. Controls animals received an equal volume of vehicle. After 30 days of hormone treatment experimental animals of all the groups were sacrificed and brains were isolated for further study.

Results:

The results obtained in the present work revealed that normal aging was associated with significant decrease in the activities of Na\textsuperscript{+}K\textsuperscript{+} ATPase, SOD, GST, Ca\textsuperscript{2+}ATPase and GLUT4 levels in the brains of aging female rats, and an increase in DNA degradation and intracellular calcium levels. Administration of E2 brought these changes to near normalcy.

Conclusions:

It can therefore be concluded that E2’s beneficial effects seemed to arise from its antioxidant and antilipidperoxidative effects, implying an overall neuroprotective and anti-aging action. The results of this study will be useful for pharmacological modification of the aging process and applying new strategies for control of age related disorders.