Neuroprotective effects of resveratrol against restraint stress

ABSTRACT
Restraint stress induces robust surge in production of reactive oxygen species (ROS) and subsequent oxidative damage in brain bringing about stress-induced neurotoxic effects. These neurotoxic effects ranges from anxiety, depression, behavioural changes, cognitive dysfunction, neuronal loss, and even cause neurodegenerative diseases. The mechanism(s) associated with stress-induced cognitive decline is mediated through hypothalamic-pituitary-adrenocortical (HPA) axis and involvement of neurotransmitters and neurotrophic factors mainly in hippocampus and frontal cortex. But the precise mechanism still remains a matter of debate. The neuroprotective efficacy of resveratrol has been established in various experimental animal studies, trauma models and cell culture studies. We investigated the neuroprotective effects of resveratrol on restraint stress-induced oxidative damage, histomorphological changes in the hippocampus, dentate gyrus and medial prefrontal cortex (MPFC) and memory impairment in rats. The parameters used in the study included micro-anatomical neuronal assay, behavioural tests to assess motor and cognitive functions, antioxidant studies and brain derived neurotrophic factor (BDNF) estimation directly from rat brain homogenate. The restraint stress-induced cognitive dysfunction was found to involve oxidative damage in rat brain, which in turn has affected neuronal population of dentate gyrus (DG), CA3 and CA2 regions of the hippocampus, and medial prefrontal cortex. Resveratrol used as a therapeutic strategy in combating the stress-induced neurotoxic effect was successful in minimizing the oxidative damage in rat brain. Resveratrol also exerted its beneficiary affect against cognitive decline and neuronal loss. Vitamin C used as an alternate strategy has failed in producing beneficiary effects with respect to BDNF expression. This study demonstrates the neuroprotective efficacy of resveratrol against restraint stress-induced neurotoxicity in rat brain.
Research question

- Restraint stress
- Oxidative stress
- Cognitive loss
- Dementia
- Neurodegenerative diseases
- Antioxidant potential
- Can prevent cognitive dysfunction
- Can prevent neuronal loss
- Loss of neurons