

## Spirulina microalgae alleviates the stress induced memory impairment in female rats

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**Background:** Chronic exposure to stress, whether it occurs during the pre-pubertal period (juvenile) has an impact on brain structures involved in cognition and mental health. The present study was aimed to examine the effects of Spirulina microalgae (SPM) on learning and memory impairment induced by juvenile stress in adult female rats.

**Methods:** Rats were randomly divided into four groups (Control, SPM(200 mg/kg), Stress, Stress + SPM). The control group received the distilled water (without SPM). In the SPM group animals were orally treated with 200mg/kgSPM for 15 days. Animals in the stress group were restrained 2 h/day (from 10:00 to 12:00) for 10 days in well-ventilated Plexiglass tubes (20 cm length, 6.5 cm diameter) without access to food and water. After the restraint period, the animals in the Stress + Spirulina microalgae group were orally treated with spirulina microalgae 200 mg/kg for 15 days. Inhibitory avoidance (IA) task was performed to evaluate memory consolidation. For habituation, the rat was placed in the illuminated compartment and the guillotine door was raised 5s later. After entering to the dark compartment, animals were transferred into the home cage and the trial was repeated 30 min later. 30 minutes after second session, rats were trained in IA task (one trial, 0.5 mA, 3s foot shock). Memory retention was tested 24 h later during which the latency to re-enter to the dark compartment was recorded. This latency time was considered as the measure of memory retention.

### Results:

The results indicated that juvenile stress impaired avoidance memory. The memory retention deficit induced by juvenile stress was evident in the decreased latency to enter the dark compartment. Memory retention was significantly enhanced in the SPM group compared to control and stress groups. Supplementation of stress rats with SPM significantly reduced memory impairment compared with the control and SPM groups.

### Conclusion:

Our findings indicate that SPM could alleviate the negative effects of stress on memory. Therefore, using the supplementation of Spirulina microalgae as non-pharmacologic treatment to improve stress-related memory defect is recommended.

**Key words:** Female rat, Juvenile Stress, Memory, Spirulina microalgae