Effect of melatonin administration in Rat Model of Alzheimer's Disease

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Introduction: Alzheimer's disease (AD) is an age-associated neurodegenerative disease that is characterized by a progressive loss of cognitive function, extracellular β-amyloid (Aβ) plaques deposition and intracellular neurofibrillary tangles. Melatonin, a tryptophan metabolite, has a number of physiological functions, including circadian rhythms regulator, free radical scavenger, immunity modulator and neuroprotection. Reduced melatonin level in serum and cerebrospinal fluid and the loss of melatonin diurnal rhythm have been demonstrated in Alzheimer's disease (AD) patients. Silent information regulator 1 (SIRT1), a conserved NAD^+-dependent deacetylase, has been suggested to exert various neuroprotective effects. SIRT1 is involved in neural plasticity, cognitive function, protection against neuroinflamation and neurodegeneration. This study aimed to investigate the effect of melatonin on cognitive function and SIRT1 expression in an animal model of AD.

Method: Rats were treated with daily melatonin injection (10mg/Kg body weight; i.p) during 14 consecutive days after intra-hippocampal amyloid beta injection. Memory was assessed by evaluating the alternation behavior in Y-maze. The expression of SIRT1 was detected by Western blot analysis. Neuronal density and morphology assessed by cresyl-violet staining.

Result: The percent of alternation behavior increased in (Aβ)+Melatonin group in compare with (Aβ)+vehicle group which indicate that melatonin administration improved memory. Melatonin administration enhanced cell density and reduced morphologically damaged pyramidal neurons in hippocampal tissue. Moreover

melatonin administration in (Aβ)+Melatonin group increased the level of SIRT1 protein in hippocampal tissue in compare with (Aβ)+vehicle.
Conclusion: The current study presented the neuroprotective effect of melatonin against amyloid beta induced neurodegeneration and memory impairment. We suggest that some part of melatonin beneficial effects may be related to SIRT1 protein.
Keywords: Alzheimer's disease, Melatonin, Memory, Neuroprotection