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BACOPA MONNIERA EXTRACT PROTECTS AGAINST OXIDATIVE STRESS AND MITOCHONDRIAL DYSFUNCTIONS INDUCED BY MPP+, ROTENONE AND H_2O_2.

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Parkinson's disease (PD) is one of the most common forms of neurodegenerative diseases affecting millions of people worldwide. Oxidative stress (OS) and mitochondrial dysfunctions play an important role in the pathophysiology and progression of PD. Recently natural antioxidants from fruits, vegetable and herbs have shown neuroprotection both in vitro and in vivo models of PD. Here we present our data on the neuroprotective activity of one of the Indian medicinal plants i.e. *Bacopa monniera* (BM) on SK-N-SH cells. We investigated the neuroprotective effects of BM against 1-methyl-4-phenyl-pyridinium (MPP+), rotenone and hydrogen peroxide (H_2O_2) - induced toxicity. MPP+ and rotenone are widely used toxins *in vitro* and in animal models of PD. Using cell survival assay, XTT test our results demonstrated that the BM extract can protect SK-N-SH cells against H_2O_2 (50 µM), Rotenone (1.0µM) or MPP+ (0.5mM)-induced toxicity. These protections were completed with the toxicity test LDH. MPP+ is known to induce cell toxicity by disrupting the mitochondrial activity. Therefore, we have investigated the effect of BM on the mitochondrial membrane potential (MMP) with the JC1. We found that the BM extract significantly protected against the MPP+-induced loss of MMP. Our results also show that the BM extract could also prevent the opening of mitochondrial permeability pore. BM extract also activated Sirt1, HO-1, p-AKT, pERK1/2 and Nrf2 pathways which are regulated by OS and have been implicated in PD. In conclusion, our data suggest that the BM extract can protect neurons against MPP+, Rotenone and H_2O_2- induced neurotoxicity through different mechanisms, by decreasing OS, preserving mitochondrial functions and by regulating the activities of redox sensitive pathways. Further ongoing studies are likely to elucidate additional mechanisms involved in the neuroprotection and its application in the prevention of PD.