**ABSTRACT**

Neurodegeneration is a progressive loss of neuronal function in certain parts of brain and spinal cord which lead to many neurodegenerative disorders. Phytocompounds has become a reliable treatment for numerous diseases as they uphold various biological properties within them. The present study had explored the neuroprotective efficacy of spathulenol (component of essential oil) in vitro in SH-SY5Y neuroblastoma cells by inducing neuronal damage through treatment with 6-hydroxydopamine (6-OHDA). To demonstrate the efficacy of spathulenol various assays involving testing its potency on reducing the ROS production, maintaining the mitochondrial integrity, and also its role in neuroprotection was validated through SH-SY5Y cells. The cells were treated with 6-OHDA (100 μM) and spathulenol (1 to 20 μM). Our results depicted that the cells treated with 6-OHDA alone causes membrane [blebbing](https://www.sciencedirect.com/topics/biochemistry-genetics-and-molecular-biology/blebbing" \o "Learn more about blebbing from ScienceDirect's AI-generated Topic Pages) and cell shrinkage while the treatment with both 6-OHDA and spathulenol had ensued recovery of damaged cells in dose dependent way. The study had also highlighted the neuroprotective property of spathulenol amidst 6-OHDA treatment through relieving the cells from [oxidative stress](https://www.sciencedirect.com/topics/biochemistry-genetics-and-molecular-biology/oxidative-stress) and also by maintaining the [mitochondrial membrane](https://www.sciencedirect.com/topics/biochemistry-genetics-and-molecular-biology/mitochondrial-membrane) integrity. These results had evinced the use of spathulenol in restoring the abnormal cellular conditions induced by 6-OHDA in neuronal cells highlighting it as a potential promising therapy for treating neurodegenerative diseases.