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Neuroplasticity and anti-neuroinflammatory activity in water extract from leaf of *Withania somnifera*

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Search for herbal medicines that may act as therapeutic agents is an active area of research to combat the diseases such as stroke, head trauma, multiple sclerosis and various neurodegenerative disorders. Ashwagandha (*Withania somnifera*) has a long history of rejuvenating health in Ayurveda, the traditional system of medicine in India. The ongoing study in our lab is aimed to investigate the mechanisms by which *Withania somnifera* leaf water extract (ASH-WEX) may confer protection against LPS induced neuroinflammation. Microglial BV2 cell line was tested for anti-inflammatory and anti-excitotoxic potential of ASH-WEX. Cell viability and the expression of glial and microglial cell differentiation markers was examined in LPS activated cells in the presence and absence of ASH-WEX. We demonstrated that LPS challenged microglia cell line BV2, and glial cell line C6 Glioma when exposed to LPS, undergo activation that was accompanied by change in cellular morphology and specific markers expression such as GFAP, Iba 1, tubulin as well as transcription factors like AP-1, NF-kappaB, c-jun, c-fos, etc. Further the expression of plasticity markers NCAM and PSA-NCAM was evaluated to establish their role in ASH-WEX mediated neuroprotection. The study was further extended to explore the *in vivo* effects and the expression of key inflammatory molecules (NF-κB, Iba1, TNFα, IL-1β, IL-6), glial markers (Iba1, GFAP) were studied in the hippocampus and Piriform Cortex (PC) regions of rat brain exposed to LPS and ASH-WEX treatment. The data suggests that ASH-WEX or its active components may have therapeutic potential for prevention of neuroinflammation and neurodegeneration associated with neuroinfections.

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