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Herbal Nano Particulate Drug Delivery System for Nose to Brain Targeting in the Management of Alzheimer Disease

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Alzheimer's Disease (AD) is the most common form of progressive neurodegenerative disorder and primarily affects the elderly population (50%–60% of the 65-year-old age group). More than 46 million of the global population currently suffers from AD and this is expected to double by 2030. AD is a major medical and social problem for developing societies. The etiology of AD involves cognitive dysfunction, primarily memory loss, and in later stages it causes language deficits, depression, and behavioural problems including agitation, mood disturbances, and psychosis. In the present investigation, Thymoquinone (THQ) encapsulated CS NPs were prepared successfully. A physical evaluation and electron microscope screening supported the suitability for intranasal administration. The scintigraphic study in rats demonstrated that intranasal administration delivers THQ to the brain rapidly and more effectively than previous methods. The accumula¬tion of Thymoquinone nanoparticles (THQ-NP) formulation within interstitial spaces and transport of the drug to the brain may be due the nanometric size range and the stretching of tight junctions within the nasal mucosa. The finding also supported the formulation's Cerebro Spinal Fluid (CSF) penetrating potential. The UPLC/MS/MS bioanalytical method was also used to validate the distribution of THQ in brain and blood after Intranasal (IN) and Intravenous (IV) administration. The brain concentration vs time profiles following different routes of administration were described by non-compartmental pharmacokinetics. Following IV administration, THQ attained a high concentration of 190.91±18.62 ng/ml in blood plasma whereas least concentration (10.94±1.75 ng/ml) was obtained after intranasal administration of THQ solution. The studies suggest intranasal delivery of THQ to be a promising approach for brain target¬ing as well as in reducing the systemic exposure. However, benefit-to-risk ratio and clinical intricacies need to be estab¬lished scientifically for its suitability in clinical practice in the management of Alzheimer symptoms.

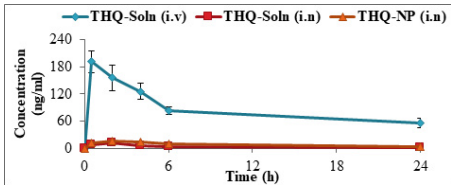

Figure 1: Pharmacokinetic profile of different formulations in Plasma

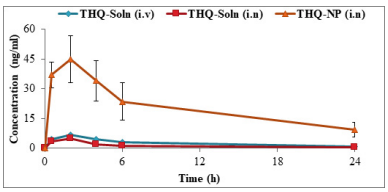

Figure 2: Pharmacokinetic profile of different formulations in Brain

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