

**Abstract 36 – Paper ID: 057****Formulation of Nanocarriers of *Acorus calamus* Essential Oil for Amelioration of Diabetes-Induced Memory Dysfunction in Rats**

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**Abstract**

Memory dysfunction is a common and serious complication of diabetes mellitus, resulting from persistent hyperglycemia-induced oxidative stress and impairment of the cholinergic system. This review explores the potential of *Acorus calamus* essential oil (ACEO) formulated as solid lipid nanoparticles (SLNs) for management of diabetes-induced cognitive deficits. Existing literature on SLN formulation methods, including hot homogenization and ultrasonication, lipid and surfactant selection, and nanoparticle characterization techniques such as dynamic light scattering (DLS) and transmission electron microscopy (TEM), is summarized. Behavioral and biochemical evidence from in vivo studies using streptozotocin (STZ)-induced diabetic models is reviewed, focusing on cognitive assessment through behavioral tests and markers including acetylcholinesterase activity and oxidative stress. The review highlights how nanoencapsulation strategies improve the brain bioavailability and sustained release of ACEO, enhancing its neuroprotective effects. The comprehensive analysis suggests that SLN-based delivery of *Acorus calamus* essential oil holds promise as a novel approach to counteract diabetes-associated memory impairment. This review synthesizes current research on the formulation and therapeutic potential of *Acorus calamus* essential oil-loaded solid lipid nanoparticles for neuroprotection in diabetic cognitive dysfunction. By consolidating formulation techniques and preclinical evidence, it provides critical insights into how nanotechnology can overcome delivery challenges of phytoconstituents to the brain. The information presented offers a scientific foundation for future experimental designs aiming to develop effective nanotherapeutics targeting oxidative stress and cholinergic deficits in diabetes-induced memory decline.

**Keywords:** Diabetes-associated cognitive dysfunction, *Acorus calamus* essential oil, solid lipid nanoparticles, neuroprotection, oxidative stress, cholinergic dysfunction