

# Development of a Polymeric Nanomedicine to Improve the Bioactivity and Bioavailability of Plant Polyphenols

By

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## Abstract

The purpose of this study was to develop a nanoparticle (NP) formulation to enhance the oral bioavailability of some important plant polyphenols. The nanoprecipitation technique was used to create NPs using biocompatible polymers entrapping the polyphenols morin hydrate (MH), catechin, and naringenin. The optimal NPs were in the form of oil-cored polylactic-co-glycolic acid (PLGA) NPs containing MH, with particles measuring about 200nm and a loading efficiency of ~74%. The NPs showed sustained release of MH over several days. *In vitro* antioxidant assays showed similar activity between free MH and MH NPs. On the other hand, anti-inflammatory assays in lipopolysaccharide-stimulated macrophages revealed a superior anti-inflammatory activity of MH NPs compared to free MH. Finally, oral administration of MH NPs to mice at a single dose of 20mg/kg MH revealed a relative bioavailability which was 5.6-fold greater than free MH and a prolongation of plasma half-life compared to free MH from 0.13 to 0.98h. The results of this study present a promising NP formulation for MH which can enhance its oral bioavailability and bioactivity in inflammation.

**Keywords:** Anti-inflammatory, Antioxidant, Bioavailability, Nanomedicine, Plant Polyphenols.