

Nanoparticulate Hydrogel Incorporated with *Mimosa pudica* Extract: Formulation and Characterization

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Abstract: Present study is designed at the preparation of *Mimosa pudica* extract and formulating into nanoparticulate hydrogel. The active ingredients were extracted by cold maceration of the *M. pudica* leaves in ethanol. These were then developed into polymeric nanoparticles by nanoprecipitation method using PLGA as polymer, and incorporated into gel matrix, using HPMC K4M as base. Reports showed that polymeric nanoparticles are closely spherical shape with z-average 95.7-185.2 nm, PDI in the range of 0.236- 0.298 and zeta potential is -2.07 mV to -3.5 mV, with sufficient drug entrapment of 69%. Nanoparticulate hydrogel formulations exhibited high viscosity, neutral pH with good spreadability which is appropriate for transdermal application. In vitro drug release showed initial burst release of 28.56 ± 0.93 % with prolonged drug release of 90.06 ± 0.93 % from optimized formulation up to 24 h. Thus, the prepared nanoparticulate hydrogel can be utilized as a carrier for transdermal delivery of extract of *M. pudica*.

Keywords: *Mimosa pudica*, Nanoparticle, hydrogel

1. Introduction

Natural products are being used in the treatment of diseases since ancient times. The natural plant preparations have numerous constituents which work instantaneously all together against the diseases [1].

A scientific approach is needed for the phytochemists to carry the active constituents in a sustained fashion. This can be achieved by scheming novel drug delivery systems (NDDSs) for plant components. They have the benefit of mitigating the toxicity, enhancing the solubility, bioavailability and activity [2]. Therefore, in order to battle many diseases such as asthma, cancer, diabetes, and all the skin related diseases, loading of the nanocarriers as a NDDS is more important.

Polymeric nanoparticles are favourable formulation used for controlled drug delivery systems, and are made from biodegradable and biocompatible polymers, whereas hydrogels are polymeric networks with three-dimensional configuration capable of imbibing high amounts of water or biological fluids [3,4]. Due to their unique nature, hydrogel nanoparticles have attained substantial attention in the current period as one of the most potential nanoparticulate drug delivery systems.

Mimosa pudica (Family: Fabaceae / Mimosaceae) also called shy plant or sensitive plant, is a valued medicinal plant, which is simply existing throughout India. Its roots contain tannin, ash, calcium oxalate crystals and alkaloid mimosine, and therefore suggested for the treatment of diarrhoea, amoebic dysentery, high blood pressure and gynaecological disorders, skin diseases etc [5,6]. To make the extract into efficient candidate for topical application, study was conducted to develop nanoparticulate hydrogel formulation containing *M. pudica* extract which is expected to have sustained release as well as improved permeation characteristics due to nano size and hydrophilic nature.

