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FORMULATION AND EVALUATION OF *CARICA PAPAYA* NANOEMULSION FOR TREATMENT OF DENGUE AND THROMBOCYTOPENIA

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ABSTRACT

Aim of the current research work was to enhance availability of Carica papaya to through the oral route using nanoemulsion approach. The attempt was made to develop a nanoemulsion formulation of Carica papaya and its evaluation in the treatment of dengue as well as thrombocytopenia. Nanoemulsion is clear, heterogeneous emulsion (of droplet size 50-200 nm) consists of surfactant/co-surfactant (Smix), oil, water and drug. Different components were selected on the basis of solubility of Carica papaya in different oils. Tween 20 and polyethylene glycol (PEG-400) was selected as surfactant/co-surfactant, while oleic acid used as an oil phase in nanoemulsion. Nanoemulsion formulations are physically identified on the basis of phase diagram. These are characterized on the basis of viscosity, conductivity, refractive index morphological and stability evaluation etc. This combination of Smix and oil ratio had sufficient capacity to load Carica papaya leaf powder (drug) which yielded nano emulsification in aqueous media and produced nanoemulsion with droplet size (63.37nm).According to all evaluation parameters, formulation number-4 (F4) showed the promising prospective on the basis of particle size range

Keywords: *Carica papaya* nanoemulsion, dengue, thrombocytopenia

INTRODUCTION

Nanoemulsions are oil-in-water dispersions, having consists of oil, water, and S_{mix} (surfactant and co-surfactant mixture) of dispersion with size range of 20 to 200 nm. These are biphasic system in which one phase is disperse in the other phase, in the form in minute droplets Chime S.A. *et al.* [2014]. Nanoemulsion is biphasic dispersion, consists of oil phase, aqueous and higher proportion of surfactant and co-surfactant mixture of which yield size of nanoemulsion in the range of 50 to 200 nm. These systems possess intimately dispersed phase into another phase. These are two types of nanoemulsion such as oil/water (o/w) or water/oil (w/o) and bicontinous Mason T.G. *et al.* [2006]. The dispersed phase is also known as internal phase or discontinuous phase, while the outer phase is called external phase or continuous phase. These are two types of nanoemulsion such as oil in water type (o/w) or water in oil type (w/o) and bicontinous. It they appear transparent due to low size range Mishra R.K. *et al*. [2014]. It can also be defined as that nanoemulsions are thermodynamically stable, isotropically clear dispersion and stabilized by an interfacial film called as surfactant molecule. Also, it is known as miniemulsions, submicron emulsions and ultrafine emulsions Halnor V.V. *et al*. [2018]. Nanoemulsions are stable and appeared as transparent and translucent due to small size droplet range Bhatt P. *et al.* [2011]. Nanoemulsion has been widely used in drug delivery, cosmetics Junyaprasert V.B. *et al.* [2009]. and because of its small droplet size, long term stability and better solubilization capabilities. Ghosh PK. *et al*. [2006]. There is major difference between emulsion and nanoemulsion, emulsion is kinetically stable but thermodynamically unstable. nanoemulsion is very clear in physical appearance but emulsions are cloudy Halnor V.V. *et al* [2018].

Advantages of nanoemulsion

1. It gives site specific delivery of drugs Mangale M.R. *et al*. [2015].
2. It improves the bioavailability of drug.
3. It has improved physical stability of drug.
4. It facilitates drug to solubilize in its lipophilic vehicle Hussan R. *et al*. [2011].
5. It protects drugs from degradation with long term stability which leads to making an ideal drug delivery system Patil P.A. *et al.* [2016].
6. It is non-irritant and non-toxic.
7. It provides greater absorption because have smaller the droplet size droplets which having greater surface areaJaiswal M. *et al* [2015].

Disadvantages of nanoemulsion

1. Partial hydrolysis/ digestion of surfactant molecules by GIT lipase.
2. Over exaggerated use of large amount of surfactant and co-surfactant retarded its functionality Sharma N. *et al*. [2013].

Oral Administration of drug loaded nanoemulsion

Oral route is the easiest, most convenient and cost-effective way, for non-invasive drug administration Pinto J.F. *et al*. [2010]. This route is easy to achieving therapeutic targets due to increasing patient compliance for personalized