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PREPARATION AND CHARACTERISATION OF NANOCURCUMIN SUSPENSION

M. Abirami[1], M.J. Raja[1]*, P. Mekala[1] and P. Visha[2]
[1]Department of Veterinary Pharmacology and Toxicology
[2]Department of Veterinary Physiology
Veterinary College and Research Institute (TANUVAS), Namakkal, Tamil Nadu
E-mail: rajamj74@gmail.com (**Corresponding Author*)

Abstract: Curcumin is one of the polyphenols, which has been known for its medicinal use since long time. Curcumin shows poor solubility and low absorption, and therefore, its use as nanoparticles is beneficial due to their greater solubility and absorption. The main aim of the present study was the preparation of nanocurcumin suspension. The synthesized nanocurcumin was assessed for their solubility in water and on comparison nanocurcumin showed better solubility than curcumin. Dynamic light scattering analysis of nanocurcumin particles by particle size analyser showed mean size of 195.3 nm. The results confirm that the prepared nanocurcumin has reduced size, enhanced solubility and unaltered structural similarity with curcumin.
Keywords: Nanocurcumin, Suspension, Particle size and Solubility.

Introduction

Curcumin, an active principle of turmeric (*Curcuma longa* L. is a perennial herb, which belongs to family Zingiberaceae) is a highly promising natural antioxidant compound with wide spectrum of biological functions. It is found mostly in tropical and sub-tropical regions throughout the world. It is commonly cultivated in Asian countries, mostly in India and China and is extensively used in Ayurveda, Unani and Siddha systems of medicine as one of the household therapies to alleviate different diseases (Chattopadhyay *et al*., 2004; Nawaz *et al*., 2011). It has been observed by trials on human and mouse that oral consumption of curcumin had less bioavailability as it undergoes intestinal metabolism (Sharma *et al*., 2005). These obstacles of curcumin can be eliminated by synthesis of curcumin nanoparticles, liposomes, micelles, and phospholipid complexes which can be used for the purpose of longer circulation, permeability and increased resistance to metabolic processes (Nawaz *et al*., 2011; Ravichandran, 2013). To increase the productive use of curcumin, nanotechnology is being considered a potential option. Chemicals modified by nanotechnology have been proven to be highly effective for drug delivery and targeting the required tissue. The main aim of the present study was the preparation of nanocurcumin suspension.

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Materials and Methods

Curcumin nanosuspension was prepared by solvent-antisolvent precipitation (Aditya *et al*., 2017, Devara *et al*., 2015) method. Ethanol was used as a solvent in which curcumin is readily soluble and water was used as antisolvent in which curcumin is sparingly soluble. Curcumin (100mg /ml) was dissolved in ethanol and then distilled water was added to it in the ratio of 1:10 and mixed well. Then it was subjected to ultrasonication (Gopal *et al*., 2016) for 10 minutes to obtain nanocurcumin suspension.

The particle size was analysed by Horiba SZ- 100 (Japan), particle size analyser in the Department of Animal Biotechnology, Madras Veterinary College, Chennai, Tamilnadu. The water solubility of curcumin and nanocurcumin was done and compared.

Results and Discussion

Dynamic light scattering analysis of nanocurcumin particles by particle size analyser showed that the nanoparticles were in the range of 110-300 nm and a mean size of 195.3 nm (Fig.1). The results were generated by the mean of triplicate values of size measurements done by the instrument. The results of particle size of the nanocurcumin synthesized in this study indicates that the particles are considered as nanoparticles as they fall into the nanoscale range of 1–300 nm according to the National Organic Standards Board guidance (NOP, 2010). Moreover, the data indicated that the nanocurcumin particles had narrow range of size distribution, indicating that the protocol could be used to prepare uniform sized nanocurcumin particles. Recently, Gopal *et al*. (2016) prepared nanocurcumin from turmeric by one-step ultrasonication mobilized solvent-free extraction with the same size range.

Figure 1: Dynamic light scattering analysis of nanocurcumin particles by particle size analyzer

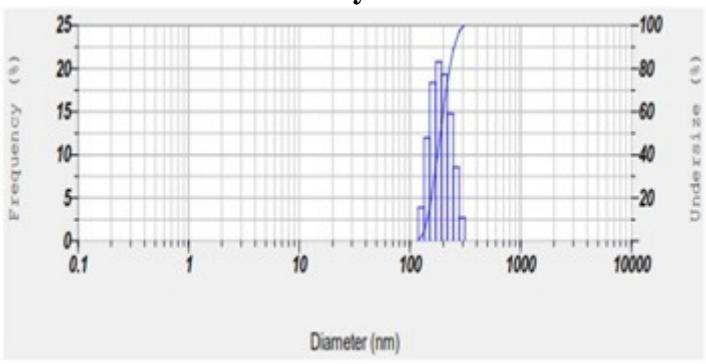

Figure 2: Solubility of curcumin and nanocurcumin in water

Curcumin Nanocurcumin

The solubility of the nanocurcumin was assessed and showed better solubility than curcumin and it is presented in figure 2. The curcumin is less soluble in water but nanocurcumin is highly soluble in water and that property increases the absorption of nanocurcumin. Bhawana *et al.* (2011) reported that unlike curcumin, nanocurcumin was found to be freely dispersible in water in the absence of any surfactants which is similar to our findings. The study of Mohanty and Sahoo (2010) is in accordance with the results of this study.

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