Research Article
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Green synthesis of antimicrobial nanosuspensions of *Platanus orientalis*

Abstract

Nanosuspensions are non-toxic lipid nano-droplets which are reported safe and approved for human consumption and common food substances that are 'Generally Recognized as Safe' (GRAS) by the FDA. So, in our work, emulsified nanosuspensions were standardized by using leaves of *Platanus orientalis* with coconut oil as herbal surfactant by varying sonication times. The synthesised emulsified herbal nanosuspensions were further characterized for their nanostructure by using dynamic light scattering method (DLS) and their antimicrobial activity was tested on laboratory isolated *E.Coli*. by using Agar well diffusion method followed by agar plating to observe MIC. And, proposed herbal nanosuspensions are found to have submicron sized particles and also have good antimicrobial activity. Hence, they can be further used as potential source of cost effective and safe therapy to treat various bacterial infections.

Keywords: *Platanus orientalis*, Coconut oil, Emulsified nanosupensions, Hebral nanosuspensions

Volume 5 Issue 1 - 2019

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Received: January 29, 2019 | **Published:** February 14, 2019

Introduction

Nanosuspensions are non-toxic lipid nano-droplets and their clinical interest is going to be increased for proposing them as safe nano-biomaterials due to their biocompatibility and their ability to destabilize the lipid membrane of the bacteria which in turn enhance the respective antimicrobial activities. The antimicrobial activity of nanosuspensions is nonspecific, unlike that of antibiotics, thus allowing their respective broad-spectrum activity which don't allow the risk of any type of drug resistance during the treatment.[1–3] Nanoemulsion is a heterogeneous and consist of two immisible phase, one phase is oil phase are formed and other one is aqueous phase. Previously, nanoemulsions have been formulated by using oil such as surfactants, co-surfactants or as an aqueous phase. Nowadays, much focus is raised on oil or lipid based nano-formulations to improve the permeability and bioavailability of poorly water soluble drugs. By keeping this approach, various novel drug delivery systems were proposed in which nanoemulsion and nanodispersions exploited for their vital role in delivering the active pharmaceutical and therapeutic agents for site specific organ targeted delivery. And, nanoemulsions are found to have submicron sized emulsion which previously, have been proposed as drug carriers for improving the delivery of therapeutic agents or delivery vehicles. As well as, nanoemulsion also have good promising future in preparation of cosmetics, therapeutic diagnostics and excellent drug therapeutic approaches.[3–5]

Materials and methods

Emulsified herbal nanosuspensions were standardized and prepared by using homogenized moist leaves of *Platanus orientalis* with coconut oil. Leaves of *Platanus orientalis* was homogenized with 15-16 ml of 0.1M sodium carbonate buffer of pH 9.5 followed by centrifugation at 8000 rpm for 15 minutes. After centrifugation, pellet was discarded and supernatant was collected as herbal extract of *Platanus orientalis*. The prepared leaves extract was sonicated with 0.1 to 0.5ml of coconut oil as herbal emulsifier with varying sonication times.[5,6] The synthesised herbal nanosuspensions were characterized for their structure by using dynamic light scattering method (DLS) and antimicrobial activity was by using Agar well diffusion method followed by agar plating to observe MIC testing.

Results and discussion

Size of prepared herbal nanosuspensions was found in the range of 100 to <1000nm (Figure 1)[7–9] and their antimicrobial activity was found to exhibit excellent which are found to be comparable with previous results of proposed nanosuspensions and nanodispersions (Figure 2).[9,10]

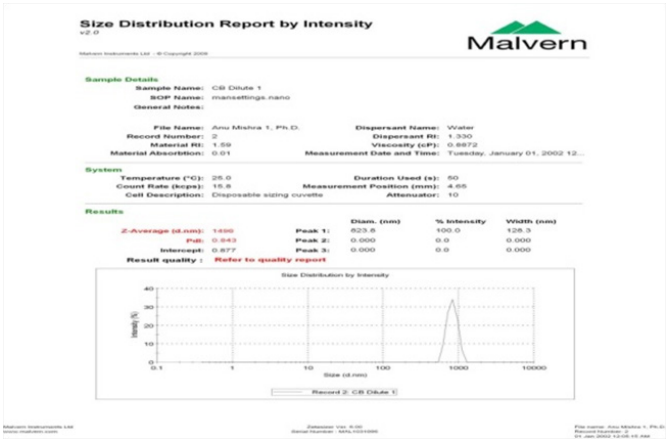
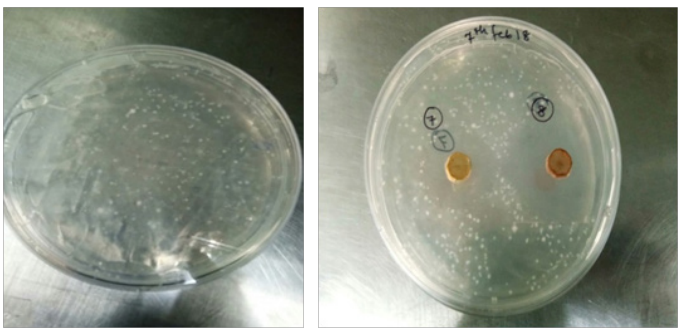


Figure 1 DLS result of prepared herbal nanosuspensions of *Platanus orientalis*.



A: Control B: Test

Figure 2 Antimicrobial test of prepared herbal nanosuspensions *Platanus orientalis*.

Conclusion

Hence, proposed method to prepare *Platanus orientalis* plant leaves based emulsified nanosuspensions are found to be safe and cost effective due to its green synthesis. As well as, the prepared herbal nanosuspensions can be further exploit as potential source of safe broad spectrum herbal therapeutic agent to treat various bacterial infections due to having excellent antimicrobial activity.

Acknowledgments

I would like also to express my cordially appreciation to Amity University Uttar Pradesh, Noida (INDIA).

Conflicts of interest

Author declares that there is no conflict of interest.

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