

Short Communication

ESSENTIAL OILS ARE ENDORSED FOR HIGHER SOLUBILIZATION OF MANY AQUEOUS INSOLUBLE DRUGS

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ABSTRACT

Objectives: Our study focused on improving or enhancing the solubilization effect of many water insoluble drugs that are under the category BCS Class II-IV.

Methods: The solubility of ten such drugs was checked in clove and cinnamon oils, owing to their higher solubility capacity.

Results: Out of these drugs, carvedilol, followed by, ezetimibe and olmesartan showed good solubilization in both these oils.

Conclusion: These oils could thus be used in the development of drug delivery system for the above-mentioned drugs.

Keywords: Clove oil, Cinnamon oil, Solubility, Drugs.

INTRODUCTION

The importance of essential oil based microemulsion drug delivery system is now the focus of interest in pharmaceutical technology owing to their biocompatibility, higher solubilization of organic compounds in their micellar compartments, enhanced bioavailability, reduced interfacial tension promoting small defined droplets, easier permeation of nano sized drugs through blood capillaries and much more. Hence, we placed our interest in certain essential oils like clove and cinnamon oil owing to their importance as antimicrobial compounds and their role as drug delivery vehicles. It is reported that clove oil has shown improved solubilization potential in drugs with poor aqueous solubility such as ramipril, azithromycin, fluconazole and also showed good activity in baccic acid, quercetin and diopsyrin as well. Similarly, cinnamon oil is also reported to show improved solubility in ramipril, azithromycin and fluconazole as clove oil due to the presence of eugenol content in their composition as explained in our literatures [1-3]. On this point, we worked on about ten other drugs that showed poor solubility to find their solubilization in these essential oils.

The drugs under BCS class II (glyclazide, phenyl propanolamine, diclofenac, olmesartan, ezetimibe, carvedilol) and BCS class III (rosuvastatin, paracetamol, metformin) and penicillin G was chosen

for study. These drugs were obtained as kind gift sample from various sources (Inogent Laboratories Private Limited, Serdia Pharmaceuticals, Aarti Drugs Limited, Sri Krishna Pharmaceuticals, Aurobindo Pharma Limited and Sohan Healthcare Limited) in India. The solubility of these drugs was determined by equilibration method. A known higher quantity of drug was added to about 2 ml of the respective oils and vortexed. This mixture was kept in an orbital shaker for 72 h at room temperature to attain equilibration and centrifuged at 3000 rpm for 15 min. The concentration of drug was determined in the supernatant that was filtered through 0.45 µm membrane filter [4]. The experiment was carried out using a double-beam UV-Visible Spectrophotometer (UV-Vis Systronics 2201; Naroda, Ahmedabad, India) after appropriate dilution with their suitable solvents at their corresponding peaks.

Table 1 represents the solubilization potential of these ten drugs in both clove and cinnamon oil. Only carvedilol, followed by, ezetimibe and olmesartan respectively showed solubilization in both these oils. Of the rest, none showed solubility in these oils. Carvedilol and ezetimibe demonstrated greater solubilization in clove oil than the cinnamon oil. Olmesartan showed better solubility in cinnamon oil as compared to clove oil. The solubility of these three drugs in either oil system further proves that the solubility is due to the presence of phenolic active ingredient, eugenol, in both their compositions.

Table 1: Solubility of Poorly Aqueous Soluble Drugs in Clove and Cinnamon Essential Oils

Solubility (mean ± S.D., n=3) of various drugs in clove and cinnamon oils			
S. No.	Drugs	Clove oil	Cinnamon oil
1	Rosuvastatin	<1 mg/ml	<1 mg/ml
2	Olmesartan	12.31 mg/ml	21.56 mg/ml
3	Metformin	<1 mg/ml	<1 mg/ml
4	Penicillin G	<1 mg/ml	<1 mg/ml
5	Paracetamol	<1 mg/ml	<1 mg/ml
6	Diclofenac	<1 mg/ml	<1 mg/ml
7	Ezetimibe	42.86 mg/ml	39.56 mg/ml
8	Phenylpropanolamine	<1 mg/ml	<1 mg/ml
9	Carvedilol	89.95 mg/ml	70.96 mg/ml
10	Gliclazide	<1 mg/ml	<1 mg/ml

To summarize, carvedilol, olmesartan and ezetimibe are contemporary drugs focusing on different mechanism of action. But, they are classified under the Biopharmaceutics Classification System

Class II. Hence, their solubilization in these both essential oils would help in developing a unique nano-scaled drug delivery system using microemulsion technique from our previous works [5]. The

components involved in developing our system was biologically acceptable and belongs to generally regarded as safe (GRAS) category.

CONFLICT OF INTERESTS

Declared None

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