Research Article

# Development, characterization, and performance evaluation of transfersome gel of ibuprofen as a transdermal drug delivery system using nanovesicular carrier

**Fitrianti Darusman*, Rifnie Raisya, Sani Ega Priani**


## ABSTRACT

**Introduction:** Ibuprofen (2-(4-isobutylphenyl) propionate) is a class of nonsteroidal anti-inflammatory drugs (NSAIDs) and is classified in Class II of Biopharmaceutic Classification System. In general, NSAIDs that are used orally cause side effects of gastric ulcers. For this reason, ibuprofen was formulated into transfersome to enhanced transdermal drug delivery using nanovesicular carrier, while avoiding oral side effects. **Aim:** The purpose of this study was to formulate transfersome ibuprofen in gel preparations, then compare its performance to gel containing pure ibuprofen. **Method:** Transferesome was formulated into four formulas with concentration ratio of Phospholipon 90G:span 80 for FI, FII, FIII, and FIV were 90:10, 85:15, 80:20, and 75:25 using direct mixing method, the *in vitro* skin permeation studies were determined using Franz diffusion cell to the two formulas of Viscolam gel that containing 1% of ibuprofen which are ibuprofen transfersome gel and pure ibuprofen gel. **Result and Conclusion:** The result showed that FIV was the best transfersome with entrapment efficiency was 92.95% and had vesicle size of 1.254 µm. Ibuprofen transfersome gel had been shown to increase *in vitro* skin permeation of ibuprofen, cumulative penetration was 1286.64 µg/cm, flux was 214.44 µg/cm/h, and the vesicle size was 0.986 µm, while cumulative penetration, flux, and particle size of gel containing pure ibuprofen were 620.92 µg/cm, 103.49 µg/cm/h, and 0.496 µm, respectively.


**KEY WORDS:** Franz diffusion cell, Ibuprofen, Transdermal drug delivery, Transfersome

## INTRODUCTION

Transdermal drug delivery systems (TDDSs) offer a number of potential advantages over conventional methods such as injectable and oral delivery.[1] However, the major limitation of TDDS is the permeability of the skin; it is permeable to small molecules and lipophilic drugs and highly impermeable to macromolecules and hydrophilic drugs. The main barrier and rate-limiting step for diffusion of drugs across the skin are provided by the outermost layer of the skin, the stratum corneum.[2] Several strategies have been developed to overcome the skin's resistance, including the use of prodrugs, ion pairs, liposomes, microneedles, ultrasound, and iontophoresis.[3-6]


| Access this article online | |
|---|---|
| Website: jprsolutions.info | ISSN: 0975-7619 |


Various types of liposomes exist such as traditional liposomes, niosomes, ethosomes, and transfersomes.[3,7-12] Various liposomes have been extensively investigated for improving skin permeation enhancement. Liposomes are promising carriers for enhancing skin permeation because they have high membrane fluidity. Previous reports indicate that liposomes can deliver a large quantity of hydrophilic drugs, lipophilic drugs proteins, and macromolecules through the skin. Many factors influence the percutaneous penetration behavior of lipopolysaccharides (LPs) including particle size, surface charge, lipid composition, bilayer elasticity, lamellarity, and type of LPs.[6,11] Cevc's group introduced transfersomes, which are the first generation of elastic vesicles. Transfersomes are prepared from phospholipids and edge activators. An edge activator is often a single-chain surfactant with a high radius of curvature that destabilizes the lipid bilayers of the vesicles and increases the

Program Studi Farmasi, Fakultas Matematika dan Ilmu Pengetahuan Alam, Universitas Islam Bandung, Tamansari No. 1 Bandung, West Java, 40116, Indonesia

***Corresponding author:** Fitrianti Darusman, Program Studi Farmasi, Fakultas Matematika dan Ilmu Pengetahuan Alam, Universitas Islam Bandung, Tamansari No. 1 Bandung, West Java, 40116, Indonesia. E-mail: efit.bien@gmail.com

Received on: 27-10-2018; Revised on: 28-11-2018; Accepted on: 16-12-2018