Transdermal delivery of raloxifene HCl via ethosomal system: Formulation, advanced characterizations and pharmacokinetic evaluation

By: Mahmood, S (Mahmood, Syed)[1,2,4]; Mandal, UK (Mandal, Uttam Kumar)[3,4]; Chatterjee, B (Chatterjee, Bappaditya)[4]

INTERNATIONAL JOURNAL OF PHARMACEUTICS
Volume: 542 **Issue:** 1-2 **Pages:** 36-46
DOI: 10.1016/j.ijpharm.2018.02.044
Published: MAY 5 2018
Document Type: Article
View Journal Impact

Abstract

Raloxifene HCl belongs to a class of selective estrogen receptor modulators (SERMs) which is used for the management of breast cancer. The major problem reported with raloxifene is its poor bioavailability which is only up to 2%. The main objective of the present work was to formulate raloxifene loaded ethosomal preparation for transdermal application and compare it with an oral formulation of the drug. Five ethosomal formulations with different concentrations of ethanol and a conventional liposomes formulation were prepared by rotary evaporation method. The prepared systems were characterised by high resolution transmission electron microscopy (HRTEM), force emission electron microscopy (FESEM), atomic force microscopy (AFM), X-ray diffraction (XRD) and P-31 NMR study. All these advanced characterization study established that the ethosome formulation was well defined by its size, shape and its bilayer formation. Transdermal flux of the optimized ethosome formulation was 22.14 +/- 0.83 mu g/ml/cm(2) which was 21 times higher when compared to the conventional liposomes. Confocal microscopy study revealed an enhanced permeation of coumarin-6 dye loaded ethosomes to much deeper layers of skin when compared with conventional liposomes. The gel was found to be pseudoplastic with elastic behaviour. In-vivo studies on rats showed a higher bioavailability of RXL (157% times) for ethosomal formulation when compared with the oral formulation. In conclusion, RXL loaded ethosomal formulation via transdermal route showed superior drug delivery properties as compared to oral formulation.

Keywords

Author Keywords: Ethosomes; Raloxifene HCl; AFM; HRTEM; Pharmacokinetic; Bioavailability

KeyWords Plus: IN-VITRO; POSTMENOPAUSAL WOMEN; SKIN DELIVERY; PRECLINICAL ASSESSMENT; PENETRATION ENHANCERS; LIPID NANOPARTICLES; LOADED ETHOSOMES; HUMAN VOLUNTEERS; VIVO EVALUATION; SURFACE-CHARGE

Author Information

Reprint Address: Mandal, UK (reprint author)

MRSPTU, Dept Pharmaceut Sci & Technol, Bathinda 151001, India.

Addresses:

+ [1] Univ Malaysia Pahang, Fac Engn Technol, Dept Pharmaceut Engn, Gambang 26300, Malaysia

+ [2] Univ Malaysia Pahang, Ctr Excellence Adv Res Fluid Flow CARIFF, Gambang 26300, Malaysia

[3] MRSPTU, Dept Pharmaceut Sci & Technol, Bathinda 151001, India

[4] IIUM, Kulliyyah Pharm, Dept Pharmaceut Technol, Kuantan 25200, Malaysia

E-mail Addresses: uttam@mrsptu.ac.in

Funding

Funding Agency	Grant Number
Ministry of Education (MOE), Malaysia	13-091-0332

View funding text

Publisher

ELSEVIER SCIENCE BV, PO BOX 211, 1000 AE AMSTERDAM, NETHERLANDS

Journal Information

Impact Factor: Journal Citation Reports

Categories / Classification

Research Areas: Pharmacology & Pharmacy

Web of Science Categories: Pharmacology & Pharmacy

See more data fields

Cited References: 57

Showing 30 of 57 **View All in Cited References page** *(from Web of Science Core Collection)*

1. **Nanotransfersomes of carvedilol for intranasal delivery: formulation, characterization and in vivo evaluation** **Times Cited: 8**
By: Aboud, Heba M.; Ali, Adel Ahmed; El-Menshawe, Shahira F.; et al.
DRUG DELIVERY Volume: 23 Issue: 7 Pages: 2471-2481 Published: SEP 2016

2. **Improved Stability and Antidiabetic Potential of Insulin Containing Folic Acid Functionalized Polymer Stabilized Multi layered Liposomes Following Oral Administration** **Times Cited: 56**
By: Agrawal, Ashish Kumar; Harde, Harshad; Thanki, Kaushik; et al.
BIOMACROMOLECULES Volume: 15 Issue: 1 Pages: 350-360 Published: JAN 2014

3. **In vitro and preclinical assessment of factorial design based nanoethosomes transgel formulation of an opioid analgesic** **Times Cited: 4**
By: Ahmed, Shakeeb; Imam, Syed Sarim; Zafar, Ameeduz; et al.
ARTIFICIAL CELLS NANOMEDICINE AND BIOTECHNOLOGY Volume: 44 Issue: 8 Pages: 1793-1802 Published: DEC 2016

4. **Enhanced non invasive trans-tympanic delivery of ciprofloxacin through encapsulation into nano-spanlastic vesicles: Fabrication, in-vitro characterization, and comparative ex-vivo permeation studies** **Times Cited: 4**
By: Al-Mahallawi, Abdulaziz Mohsen; Khowessah, Omneya Mohammed; Shoukri, Raguia Ali
INTERNATIONAL JOURNAL OF PHARMACEUTICS Volume: 522 Issue: 1-2 Pages: 157-164 Published: APR 30 2017

5. **Paramagnetic hydrophilic probes in NMR investigations of membrane systems** **Times Cited: 56**
By: Bergelson, L.
Meth. Membr. Biol. Volume: 9 Pages: 275-335 Published: 1978