



Review Article

- **Niosome - A Versatile Tool in Transdermal Drug Delivery**

Shashikant Chandrakar and Swarnalata Saraf01

ABSTRACT

The stratum corneum plays a crucial role in barrier function for transdermal drug delivery. Despite major research and development efforts in transdermal systems and the advantages of these routes, low stratum corneum permeability limits the usefulness of topical drug delivery. To overcome this, methods have been assessed to increase permeation. One controversial method is the use of vesicular system, such as niosomes, whose effectiveness depends on their physicochemical properties. This review focuses on effect of niosomes on enhancing drug penetration, and defines the effect of composition, size and type of the vesicular system on transdermal delivery.

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- **Iontophoresis: Movement of Medication with Electric Current**

Vivek B Rajendra, Dinesh L Dhamecha, Amit A Rathi, Maria Saifee, Swaroop R Lahoti, Mohd. Hassan G Dehghan05

ABSTRACT

Transdermal delivery of drugs through the skin to the systemic circulation provides a convenient route of administration for a variety of clinical indications. For transdermal delivery of drugs, stratum corneum is the main barrier layer for permeation of drug. This physicochemical constraint severely limits the number of molecules that can be considered as realistic candidates for transdermal delivery. Iontophoresis provides a mechanism to enhance the penetration of hydrophilic and charged molecules across the skin. This technique facilitates movement of ions across a membrane under the influence of an externally applied electric potential difference. The present reviews discuss the basic principle, mechanism, factors affecting and combination strategies of iontophoresis.

KEY WORDS: Transdermal, Iontophoresis, Electroporation, Sonophoresis.

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- **Modeling Techniques – Novel Approach to Skin Permeability Measurement**

ABSTRACT

The stratum corneum, possess a formidable challenge to formulators of drug delivery systems. In this review, various aspects of penetration through the stratum corneum have been highlighted with use of new mathematical models. These models are useful for enhancement strategies of drugs through dermal penetration and are also use in predicting pharmacological and toxicological point of view. These techniques are used to control the penetration rate through stratum corneum.

KEY WORDS: Stratum corneum, mathematical models, pharmacological, toxicological

- **Nanomedicine: An Emerging Area of Nanotechnology**

ABSTRACT

Nanomedicine is emerging as the most important discipline under the umbrella of nanotechnology. It is concerned with the preservation and improvement of human health, using molecular tools and molecular knowledge of the human body. Simply nanomedicine is the application inside nanotechnology to the medicine. The pharmaceutical nanotechnology market is concerned especially with the diagnostic and carrier for drug, which has been rapidly growing over last decade. Some pharmaceutical nanotechnology based products such as nanoparticles polymer, micelles, dendrimer, monoclonal antibody and other modified nanosystems have been approved by US-FDA and have entered in the market. However, some unknown health risk, unpredictable and undefined safety issues and some clinical as well as regulatory issues still pose formidable challenge. Thus, this review justifies the status, scope and importance of nanomedicine inside the field of nanotechnology.

KEY WORDS: Nanotechnology, Nanomaterials, Nanoscale devices, Nanomedicine

Research Article

- **Designing and Evaluation of Floating Microspheres of Verapamil Hydrochloride: Effect of Methocel**

ABSTRACT

The floating microspheres have been utilized to obtain prolonged and uniform release in the stomach for development of a once daily formulation. The major advantage of the preparation technique includes short processing time, the lack of exposure of the ingredients to high temperature and high encapsulation efficiencies. The aim of present investigation was to prepare and evaluate gastroretentive floating microspheres of verapamil hydrochloride that would retain the drug in stomach and continuously release the drug in controlled manner. Floating microspheres were prepared by emulsion solvent evaporation technique. In the present investigation three polymers were used in various concentrations; Methocel K4M, Methocel K15M and Methocel K100M. In vitro performance was evaluated by the usual pharmacopoeial and other tests such as particle size analysis, drug entrapment efficiency, flow properties, in vitro floatability studies, in vivo floatability studies in dog, in vitro drug release studies, stability studies etc. Results showed that the mixing ratio of components in the organic phase affected the size distribution,

yield, drug content, floating time and drug release of microspheres. In vitro drug release studies were performed for all the prepared formulations. Rank order for percentage cumulative drug release was found to be Methocel K4M > Methocel K15M > Methocel K100M. In most cases good in vitro floating behavior was observed and a variety of drug release pattern could be achieved by variation of the drug, polymer and solvent ratio. The developed floating microspheres of Verapamil hydrochloride may be used for prolonged drug release in stomach for more than 8 h.

KEY WORDS: Floating microspheres, Verapamil hydrochloride, In vitro release, Methocel..

- **Entric-Coated Pectin Microspheres of Indomethacin for Targeting Inflammation in Lower Gastro-intestinal tract**

A Chandy, Sudish Rai, A Manigauha and Suresh Sahu.....29

ABSTRACT

An objective of the present investigation was to formulate and evaluate targeting of indomethacin (IND) using Methacrylate-coated pectin microspheres. Pectin microspheres were prepared by emulsion dehydration method using different ratios of IND and pectin (1:40 to 1:80), stirring speeds (400-1800 rpm) and emulsifier concentrations (0.75%-1.5% wt/vol). Microspheres prepared by using drug:polymer ratio 1:4, stirring speed 1000 rpm, and 1.25% wt/vol concentration of emulsifying agent were selected as an optimized formulation. Eudragit-coating of pectin microspheres was performed by oil-in-oil solvent evaporation method using coat:core ratio (5:1). Pectin microspheres and Eudragit-coated pectin microspheres were evaluated for surface morphology, particle size and size distribution, swellability, percentage drug entrapment, and in vitro drug release in simulated gastrointestinal fluids (SGF). The in vitro drug release study of optimized formulation was also performed in simulated colonic fluid, where higher release rate was observed than gastric fluid. It is concluded from the present investigation that Eudragit-coated pectin microspheres are promising controlled release carriers for colon-targeted delivery of IND.

KEY WORDS: indomethacin, pectin, Eudragit coating, colorectal tumor

- **Proniosomal Gel as a Carrier for Improved Transdermal Delivery of Griseofulvin: Preparation and In-Vitro Characterization**

Sandeep Gupta, Dheeraj Ahirwar, Neeraj K Sharma, and Deenanath Jhade.....33

ABSTRACT

The present investigation aimed at formulation, and performance evaluation of vesicular drug carrier system proniosomal gel for transdermal delivery of antifungal agent, griseofulvin. Proniosomal gel (PNG) formulations of griseofulvin were prepared, and characterized for vesicles shape, size, entrapment efficiency, and drug permeation across pig ear skin. The effects of different non-ionic surfactants on transdermal permeability profile were assessed. The optimized PNG formulation showed enhanced in vitro skin permeation flux of $3.682 \pm 0.186 \mu\text{g}/\text{cm}^2/\text{hr}$ as compared to $0.028 \pm 0.02 \mu\text{g}/\text{cm}^2/\text{hr}$ for plain drug solution in water. Results indicated that the optimized PNG formulation of griseofulvin had better skin permeation potential than plain drug solution in water.

KEY WORDS:- Transdermal delivery, Griseofulvin (GF), Proniosomal gel (PNG), Non-ionic surfactants

- **A Study of Possible Role of Contact Period on the Efficacy of Antidandruff Shampoo**
Juned Khan, Ajazuddin, SJ Daharwal and Deependra Singh.....38

ABSTRACT

Many people suffer from dandruff problem. The dandruff occurs generally on the hair covered skin, specially the scalp skin. It is known to be controlled by antifungal agents. The present study was carried out to asses the effect of three minutes contact period on the efficacy of antidandruff shampoos. 1% Ketoconazole, 1% Piroctone olamine and 1% Zinc pyrithione were individually formulated in a shampoo base and were used for the study. Three groups of ten patients each with severe dandruff were taken such that each group was treated with only one of the antidandruff agent. Scoring of the dandruff was done on a 0 to 10 scale for each of the three regions of scalp at first and fourteenth day respectively. All the three antidandruff shampoo treated groups improved significantly with a contact period of three minutes rather than no contact period.

- **Development and In Vitro Evaluation of Oral Floating Matrix Tablet Formulation of Ranitidine Hydrochloride**
Dinesh I Dhamecha, Amit A Rathi, Maria Saifee, Swaroop R Lahoti and Mohd. Hassan G Dehghan.....41

ABSTRACT

Recently many drugs are formulated as floating drug delivery systems with an objective to sustain the release of drug in stomach. Ranitidine hydrochloride, which is better absorbed in stomach and whose site of action is gastric area was formulated as floating matrix tablet using gas generating agent (sodium bicarbonate, citric acid) and polymers like HPMC K4M and polaxomer. Formulation was optimized on the basis of in vitro release. All other parameters like physical parameters like thickness and hardness were within range. In vitro buoyancy was found to be in the range of 17 to 89 seconds and water uptake in the range of 125 to 280 %. Floating time was more than 24 hrs. In vitro drug release of the optimized batch was found to be 88% at the end of 8th hr. Hence, it is evident from this investigation that this gas powered floating matrix tablet could be promising delivery system of Ranitidine hydrochloride with sustained release action and improved drug availability at target area.

KEY WORDS: Floating matrix tablet, Ranitidine hydrochloride, In vitro release.

- **Sunflower wax as a New Natural Cosmetic Raw Material: Purification and Application in Lipsticks**
A Maru, U Pattamatta and VB Patravale.....45

ABSTRACT

Sunflower Wax is a component of the hull of sunflower (*Helianthus annuus*) oil seeds. The wax is essentially composed of extensively saturated esters of long chain fatty acids (C20-C22) and fatty alcohols (C22-C29). Due to its low economical value, it is often considered as industrial waste. Thus, the focus of the work was to purify the wax and explore its use in cosmetic product, lipstick. The replacement of beeswax with sunflower wax did not alter the properties of the lipstick, thereby providing an economical alternative to beeswax.

- **Formulation and Evaluation of Taste Masked Sustained Release Dosage Form of Metformin Hydrochloride Using Indion Resin**

Bhoyar PK, Biyani DM, Shahare HV, Ikhar PK, Borkar VS.....49

ABSTRACT

Sustained release formulation of metformin hydrochloride (MTHCL) presents significant challenges due to its poor inherent compressibility, high dose and high water solubility. Thus formulating MTHCL into an sustained dosage form would provide slow release. But, it is bitter in taste and taste should be masked to formulate it in a palatable form. So in the work undertaken, an attempt was made to sustained the release as well as to mask the bitter taste by complexation technique using strong cation-exchange resin, Indion 254 and Indion 264 (Polyacrylic hydrogen with carboxylic functionality). The drug loading onto ion-exchange resin was optimized for mixing time, activation, effect of pH, mode of mixing, ratio of drug:resin and temperature. The resinate was evaluated for micromeritic properties, taste masking and characterized by X-Ray diffraction study and IR. Using resinate sustained release tablets were formulated using Hydroxy propyl methyl cellulose (K100M: HPMC) as binder and microcrystalline cellulose (MCC) as diluent. The tablets were evaluated for hardness, thickness, friability, drug content, weight variation and invitro drug release. Tablets thus formulated (Batch B-6) provided sustained release of drug over a period of time 10 hours with First order kinetics. The release of MTHCL from resinate controls the diffusion of drug molecules through the polymeric material into aqueous medium. The results showed that MTHCL was successfully taste masked and formulated into an sustained dosage form as an alternative to conventional tablet.

KEY WORDS: Metformin hydrochloride, Sustained release, Taste masking, Indion (254,264).

- **Formulation and In-Vitro Evaluation of Fast Dissolving / Disintegrating Tablets of Tizanidine Hydrochloride**

Rahul K. Godge, Prakash N. Kendre, Mahendra A. Giri, Syed M. Zama, Syed N. Lateef.....55

ABSTRACT

Tizanidine hydrochloride, the first new oral treatment for muscle spasticity in the U.S. in more than 20 years. Fast dissolving tablets are solid dosage form that contains medicinal substances and that disintegrate and dissolve rapidly without water (within seconds) when placed on the tongue. Fast dissolving tablets of Tizanidine hydrochloride were prepared by direct compression method using Sodium Starch Glycolate, Ac-Di-Sol, and Indion 414 as a super disintegrants, and controlled tablets without any super disintegrant and evaluated for hardness, friability, disintegration time, dissolution time, water absorption ratio and content uniformity. All tablets containing super disintegrants shows release of drug more than 95% within 10 minutes and controlled tablet shows release of drug after 30 minutes. Tablets containing Indion 414 as a super disintegrant shows better result compare to others. Result also shows that as the concentration of superdisintegrant increases percentage release also increases.

KEY WORDS: Fast dissolving tablet, Direct compression, Tizanidine hydrochloride.

ADMINISTRATIVE, EDITORIAL, ADVERTISING AND SUBSCRIPTION OFFICE

**A and V Publication, E-282 'Saikripa' Sector-4, Pt. Deendayal Upadhyay Nagar,
Raipur 492010. (CG) India**

**Phone No. +919406051618. E. mail: editor.rjpdf@gmail.com;
Website: www.anvpublication.org**