DESIGN AND CHARACTERIZATION OF CARVEDILOL ETHOSOMAS AS TRANSDERMAL DRUG DELIVERY SYSTEM

INTRODUCTION

In recent years, considerable attention has been focused on the development of new drug delivery systems. There are number of reasons for the intense interest in new systems. First recognition of the possibility of repatenting successful drugs by applying the concepts and techniques of controlled release drug delivery systems, coupled with increasing expense in bringing new drug entities to market, has encouraged the development of new drug delivery systems. Second, new systems are needed to deliver the novel, genetically engineered pharmaceuticals to their sites of action without incurring significant immunogenicity or biological inactivation. Third, treating enzyme deficient diseases and cancer therapies can be improved by better targeting. Finally, therapeutic efficacy and safety of drugs, administered by conventional methods, can be improved by more precise spatial and temporal placement within the body, thereby reducing both the size and number of doses. While rate-controlled release drug delivery systems are capable of delivering a drug at some predetermine rate either systemically or locally for a specified period of time, they do so with virtually no controlled over the fate of drug once it enters the body.¹

The conventional drug delivery systems in the form of oral dosage forms (tablets, pills, capsules, powders) or liquids pose many problems even though these are administered easily. Notable among such problems are poor bioavailability due to first pass hepatic metabolism, GIT absorption difficulties due
to pH enzymatic activity and drug interactions with food, drink and other orally administered drugs. Production of rapid blood level concentrations, high and or frequent dosing etc. In the case of parenteral therapy whether by injection or drips it is not only invasive but also painful. Frequent dosing is both cost prohibitive and inconvenient. In order to remove these types of defects of the conventional drug delivery systems there has emerged the advent of novel drug delivery systems which are of various types.

Parenteral route is preferred route of administration for moderate to severe complication, even though patients compliance are rather low for this mode of drug delivery as it is invasive drug delivery technique, requiring frequent pricking with needle. All conventional dosage form except intravenous infusion, follow second order kinetic.\(^2\)

While most drugs are administered orally, these are numerous advantages to the transdermal route. These advantages include the potential for sustained release, controlled input kinetics, improved patient compliance and avoidance of first-pass metabolism in the gastrointestinal tract. However human skin is very effective barrier and severely limits the transdermal delivery of drugs.\(^3\)

Recently a popular approach for improving transdermal drug delivery involves the use of penetration enhancers which penetrate into the skin to reversibly reduce the barrier resistance. Skin penetration enhancement technique have been developed to improve bioavailability and increase the range of drugs for which topical and transdermal delivery is viable option.\(^46\)

There are various approaches in formulating transdermal drug delivery systems of ethosomes such as, hot method, cold method, classic mechanical dispersion method, classic method.\(^79\)
Advantages:

1. Delivery of large molecules is possible (peptides, protein molecule)
2. It contains nontoxic raw material in formulation.
3. Enhanced permeation of drug through skin for transdermal drug delivery.
4. It can be applied widely in pharmaceutical, veterinary, cosmetic fields.
5. High patient compliance. The ethosomal drug is administered in semisolid form hence producing higher patient compliance.
7. It is passive, noninvasive and is available for immediate commercialization.

Disadvantages

1. May not be economical. Poor yield
2. Drugs that require high blood levels cannot be administered – limited only to potent molecules, those requiring a daily dose of 10mg or less.
3. In case if shell locking is ineffective then the ethosomes may coalesce and fall apart on transfer into water.
4. Loss of product during transfer from organic to water media.