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Transdermal drug delivery system & patient compliance

Abstract

In order to kept in mind the patient compliance and interest in producing alternative routes for drug administration Trans-dermal drug delivery system is becoming an area of great interest. Compliance can play a very important role in improving public health. Transdermal drug delivery system use skin as site of administration and it has large number of advantages it reduces the need of frequent dosing as a single patch can be used to deliver the drug for 1 to 7 days so causes no worry to patient if he/she forget to take the medicine. Due to its greater patient compliance the demand of TDS is increasing with time.

Keywords: transdermal drug delivery system, systemic circulation, metabolism

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Husham Ali
Department of Pharmacy, University of Central Punjab, Pakistan

Correspondence: Husham Ali, Department of Pharmacy, University of Central Punjab, Lahore, Pakistan, Email husham_ali@ucp.edu.pk

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Discussion

Due to advancement in technology and the ability to apply the drug to the site of action without causing irritation to the skin membrane, Transdermal route is becoming a widely accepted route of drug administration. Skin is used as site for continuous drug administration into the systemic circulation in TDS and usually a patch containing drug substance is presses on to the skin. It is non invasive, convenient and painless, and avoids gastrointestinal toxicity (e.g. peptic ulcer disease) and the therapeutic first pass metabolism. At present, the most common form of delivery of drugs is the oral route. Beside this route has a large number of advantages , it also has significant drawbacks like poor bioavailability due to hepatic metabolism (first pass) and the tendency to produce rapid blood level spikes (both high and low), leading to a need for high and/or frequent dosing, which can be both costly and inconvenient. As patient compliance is very high in case of TDS so it is becoming an exciting and challenging area .Keeping in mind the few advantages that are discussed below we can easily justify its importance.

a. It avoids the risks and inconveniences of parenteral therapy.
b. Avoid First pass effect.
c. Reduces daily dosing, thus, improving patient compliance.
d. Extends the activity of drugs having short plasma half-life through the reservoir of drug present in the therapeutic delivery system and its controlled release characteristics.
e. Rapid termination of drug effect by removal of drug application from the surface of the skin.
f. Enhance therapeutic efficacy, reduced side effects due to optimization of the blood concentration-time profile and elimination of pulse entry of drugs into the systemic circulation.

Drugs given by this route must be potent with a daily dose of the order of a few mg/day. The half life (t1/2) of the drug should be short. The drug must not induce allergic response. Drugs which degrade in the GI tractor which are inactivated by hepatic first-pass effect are suitable candidates for transdermal delivery.

With the course of time as the technologies are further progressing a number of drugs have been developed that can be given transversally which include small hydrophobic molecules, hydrophilic drugs and macromolecules. Transdermal delivery system is becoming covetable due to large number of advantages in comparison to other route of drug administration. As there is no need of frequent dosing administration, this factor makes it more enticing especially in long term treatment. In case of chronic pain treatment and smoking cessation therapy it allows small quantities to be administered due to elimination of first pass effect. It is also beneficial for those patients who have compromised liver and hence lower side effects in such patients. As trans-dermal patches can be used to deliver the drug from 1 to 7 days so these are inexpensive in comparison to other dosage forms. High patient compliance is responsible for its increasing market.[1] TDS were introduced onto the US market in late 1970's but trans-dermal delivery have been in use over a long period of time.

Mustard plasters to mitigate chest congestion and belladonna plasters as analgesics have also reported to use in the past. Drugs which can be given by TDS's have been classified into different generations. Most of the drugs that are available in the market belong to first generation. It contains drugs that are small, lipophilic and have uncharged molecule and whose therapeutic dose can be delivered only by passive diffusion. But due to advancement in technology a large number of chemical enhancers and also different techniques like iontophoresis and ultrasound have been developed for those drugs that cannot undergo passive diffusion.[2] Mostly drugs of second generation which faces interruption of skin outer layer use additional driving force for delivery of drug. It is also helpful for cancer patient increasing the permeability of skin allows nanoparticles to penetrate and target cancer cells also delivery of lidocaine (a charged molecule), for which an iontophoretic delivery system was developed has been done by this route successfully. A third generation of delivery systems is currently under development in which delivery of macromolecules will be done by micro needles and electroporation. This third generation of systems targets its effect towards the stratum corneum, rather than modification of the drug molecule itself.

Conclusion

The promise of administration methods that allow patients to safely treat themselves is as important as other health care development in

developing countries where doctors, clean syringes and sophisticated treatment are few and far between.

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Conflict of interest

The author declares no conflict of interest.

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