

REVIEW ARTICLE

**A Review: Development of Transdermal Drug Delivery System By Using Different Modified Chitosan**

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**ABSTRACT**

Today about 74% of drugs are taken orally and are found not to be as effective as desired hence, the transdermal drug delivery system has numerous advantages over the more traditional drug delivery route. This includes high bioavailability, absence of first pass hepatic metabolism effect, steady drug plasma concentration, and the fact that therapy is non-invasive. A Transdermal Patch is an adhesive patch that has a coating of medicine (drug) that is placed on the skin to deliver specific dose of the medicine (drug) into the bloodstream over a period of time. This review will give an introduction about the transdermal drug delivery by using modified Chitosan. Chitosan is deacetylated product formed by treatment of chitin with concentrated (50%) caustic alkali. Modified chitosan used as a permeation polymers for biomedical and pharmaceutical application. A thorough understanding of skin physiology and the basics behind the new technologies would be useful for understanding these exciting new drug delivery systems.

**Key words:** Transdermal drug delivery system, Basic Components, Kinetics, modification of chitosan.

**INTRODUCTION**

Transdermal drug delivery system has been in existence for a long time. In the past, the most commonly applied systems were topically applied creams and ointments for dermatological disorders. The occurrence of systemic side-effects with some of these formulations is indicative of absorption through the skin. A number of drugs have been applied to the skin for systemic treatment. In a broad sense, the term transdermal delivery system includes all topically administered drug formulations intended to deliver the active ingredient into the general circulation. Transdermal therapeutic systems have been designed to provide controlled continuous delivery of drugs via the skin to the systemic circulation. Moreover, it over comes various side effects like painful delivery of the drugs and the first pass metabolism of the drug occurred by other means of drug delivery systems. So, this transdermal drug delivery system has been a great field of interest in the recent time. Many drugs which can be injected directly into the blood

stream via skin have been formulated. The main advantages of this system are that there is controlled release of the drug and the medication is painless. The drug is mainly delivered to the skin with the help of a transdermal patch which adheres to the skin.

Transdermal Patch has several components like liners, adherents, drug reservoirs, drug release membrane etc. which play a vital role in the release of the drug via skin. Transdermal drug delivery device, which may be of an active or a passive

design, is a device which provides an alternative route for administering medication. These devices allow for pharmaceuticals to be delivered across the skin barrier. Through a diffusion process, the drug enters in the blood stream directly through the skin. Since there is high concentration on the patch and low concentration in the blood, the drug will keep diffusing into the blood for a long period of time, maintaining the constant concentration of drug in the blood flow. A **transdermal patch** or **skin**

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**patch** is a medicated adhesive patch that is placed on the skin to deliver a specific dose of medication through the skin and into the bloodstream.

This approach to drug delivery offers many advantages over traditional methods. As a substitute for the oral route, transdermal drug delivery enables the avoidance of gastrointestinal absorption, with its associated pitfalls of enzymatic and pH associated deactivation. This method also allows for reduced pharmacological dosaging due to the shortened metabolization pathway of the transdermal route versus the gastrointestinal pathway. Multi-day therapy with a single application, rapid notification of medication in the event of emergency, as well as the capacity to terminate drug effects rapidly via patch removal, are all further advantages of this route. One of the solutions developed is transdermal drug delivery systems which can deliver medicines via the skin portal to circulation at a predetermined rate and maintain clinically effective concentration over a prolong period of time.

This route of drug administration avoids the hazards and discomfort associated with parenteral therapy and improves patient compliance, as it is easy to apply a patch.

### **Modified Chitosan:**

Chitosan a polysaccharide of animal origin is obtained from waste material of sea food industries. It occurs in the skeletal material of crustaceans such as crabs, lobsters, shrimps, prawns and crayfish. Crustacean shells are the usual raw material of chitin.

Chitosan is deacetylated product formed by treatment of chitin with concentrated (50%) caustic alkali.

Chitosan in India is being manufactured by marine chemicals at Cochin.

Chitosan a bio poly- amino- polysaccharide is a copolymer of Glucosamine and N-acetylglucosamine.

It is derived by alkaline deacetylation of chitin, which is isolated from hard shells of marine living animals (fishes, crustal) or synthesized by natural organism (fungi like yeast).

Chitosan is insoluble in neutral and alkaline pH, but dissolves in organic and inorganic acid-

e.g. acetic acid, formic acid, Glutamic acid, lactic acid, Hydrochloric acid.

Chitosan salt is soluble in water and their Solubility depends on the degree of deacetylation and pH.

Viscosity of chitosan Solution increase with increasing degree of deacetylation.

At low degree of deacetylation chitosan molecule adopts a more rod like shape or coiled shape to lower charge.

Molecular weight of chitosan Aries from 50KDa to 2000 KDa.

### **Application of chitosan :**

Cosmetic, food, biotechnological preparation and pharmaceutical preparation. It is a proposed as a drug carrier for mucosal administration in the ocular, buccal, nasal, gastrointestinal and vaginal, uterine therapy.

### **Method for modification of chitosan:**

#### **Preparation of polymer A:**

Chemical modification of chitosan in which the chitosan solution is preparing by dissolves the polymer in 1% acetic acid solution (1% acetic acid solution preparing in 99 ml of water). The solution string with acetaldehyde. Stirring continuously for 3 hour at 60<sup>0</sup>c .after the acetone adds to above polymer solution to precipitate the chemically modified chitosan A.

#### **Preparation of polymer B:**

Chemical modification of chitosan in which the chitosan solution is preparing by dissolves the polymer in 1% acetic acid solution (1% acetic acid solution preparing in 99 ml of water). The solution string with propionaldehyde. Stirring continuously for 3 hour at 60<sup>0</sup>c .after that acetone add to above polymer solution to precipitate the chemically modified chitosan

### **Conclusions**

Successful transdermal drug delivery requires numerous considerations owing to the nature and function of the site of application. This article provide an valuable information regarding the transdermal drug delivery systems with modified chitosan and its evaluation process details as a ready reference for the research scientist who are involved in TDDS. Modified chitosan used as permeation polymers for biomedical and pharmaceutical application. The foregoing shows that TDDS have great potentials, being able to use for both hydrophobic and hydrophilic active substance into promising deliverable drugs. It should always be kept in mind, that the basic functions of the skin are protection and

containment. As per these rulings, it would seem exceptionally difficult to cross the skin for systemic absorption. However, with continuous exploration of the structure, function and physicochemical properties of the skin, more and more new drug products are being developed for transdermal delivery. To optimize this drug delivery system, greater understanding of the different mechanisms of biological interactions, and polymer are required. TDDS a realistic practical application as the next generation of drug delivery system.

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