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## Transdermal drug delivery system: a comprehensive review

Vaishali Rajput, Kapil Kumar, Ikram, Amit Kumar Sen, Deepak Teotia

Department of Pharmaceutics, Global Institute of Pharmaceutical Education and Research, Kashipur- 244713, Uttarakhand, India

Article Info :	Abstract
<p><i>Article History</i> Received on: 08-03-2022 Revised on : 18-03-2022 Accepted on : 13-04-2022</p>	<p>In current scenario about 74% drugs are taken orally and are found not to be as desired. Transdermal drug distribution system used to make such characters more efficient. Drug distribution through the skin is known as normally transdermal to check the systemic effect of the drug. Drug distribution and traditional magazine is different from drug distribution. TDDS is in the from of hoofs. Adhesive of transdermal drug distribution system are important for safety, efficacy, and product quality. Occasional praise of the therapeutic agent gives a lot of benefits and drug distribution over traditional oral and intramuscular drugs. Many of the important benefits of transdermal drug distribution are the extent of metabolism near the liver. Increased in bioavailability of stable plasma fixation of drug. Provides or overview of article types Transdermal patch preparation and physicochemical methods are evaluate.</p> <p><b>Keywords:</b> TDDS, Topical drug delivery, Systemic blood circulation.</p>
	

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### \*Corresponding Author

Kapil Kumar

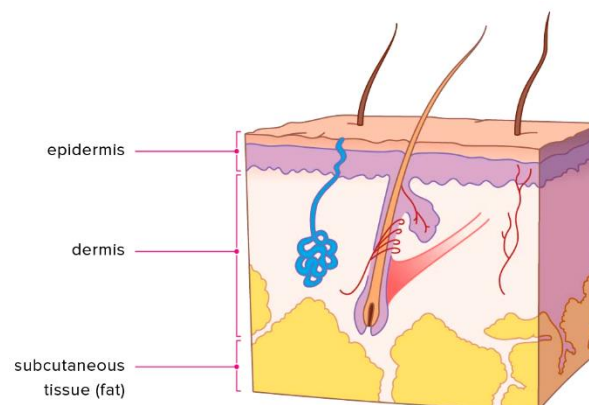
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### Introduction

Medications administered topically as a transdermal drug distribution systems. Patches are a predetermined and controlled rate of delivery of drugs for systemic effects. The can also be a transdermal distribution device active and dysfunctional design is also a device that gives suitable way for administration. These devices give permission for pharmaceuticals and cross the skin barrier. According principle of Transdermal patch works in very easy way. The medicine works at very high levels up to the inside the medicine enters the skin through the blood stream directly. The patch contains low and high concentrations and separates the drug and maintains a constant concentration of the drug in the bloodstream over a long period of time [1, 2, and 3].



**Figure 1: Structure of skin.**

### Advantage

1. The drug approach offers several advantages as compared to conventional delivery which is
  - a) as a substitute for the oral route.
  - b) Enables transdermal drug distribution enzymatic for prevention of gastrointestinal and pH damage isolated inactivity.
  - c) This process also permits to reduce metabolic pathway of medicine dosage transdermal due to shortness route versus gastrointestinal tract.
  - d) Patch also gives permission for daily dosage. Orally administered medicine compared to peaks and valleys in the medicine stage.

e) Ability to terminate with rapid notification of medication in an emergency condition rapid effect through patch removal.<sup>4-9</sup>

**Disadvantage**

a) the medicine that requires a high blood stage can also cause irritation and skin sensitivity.  
 b) The adhesive cannot adhere properly to all types skin is uncomfortable to wear.  
 c) High cost of the product is also necessary deutsche products for its wide spread acceptance. 10

Types of transdermal patches

a) SLD in adhesive:- The system also includes skin & medicine along with chipatents. Adhesive that acts as a single formulations breaking as a foundation decreasing the rate of drug release through diffusion.

b) Multi-layer drug in adhesive

In MLD paste and drug are mixed together. The layers of both layers are separated by a single layer incident released through drug release.

c) Drug reservoir in adhesive

In Corporation of liquid compartment into the reservoir system drug solution between the backing layer suspended suspension.

d) Matrix

Drug matrix in adhesive this system in introduced by the inclusion of chemical.

2. Matrix containing the drug as a suspension or solution directly in the contents of the release liner [11].

3. Matrix-dispersion this types the drug is dispersed homogenously in a hydrophilic or lipophilic polymers matrix. This drug containing a polymer disc is mounted on an occlusive base plate in a compartment constructed from a drug impermeable backing layer [12].

e) Micro reservoir system

Drug stores are manufactured by first suspending the drug in an aqueous solution of a water-soluble polymer and then dispersing the solution homogeneously into a lipophilic polymer to make it thousands of impermeable [13, 14, 15, 16, and 17].

Factor Affecting

The factors affecting the transdermal drug delivery system are differentiate into two categories.

4. **Biological factor**

a. Skin Condition The younger skin permeable than older, children's are more sensitive for skin absorption of toxins.

b. Blood Supply

Changes in peripheral circulation may affect transdermal absorption.

c. Skin Age

Skin age is one of the cause which is affecting penetration of drug in TDDS.

2. Physicochemical Factors

a. Partition Coefficient

Drugs with a high 'K' are not prepared to leave the lipid part of the skin, as well as drugs with a low 'K' will not be permeable. The ideal division coefficient (K) is very important for the actual operation.

a. b. Molecular Size And Shape

Smaller particle size has higher permeability than larger particles. Higher molecular weight drugs are less permeable.

c. Diffusion Coefficient:

Content temperature the diffusion coefficient of drug depends on properties of drug.

d. Skin Hydration

The most useful factor is hydration which enhances skin transit hence the use of humectants in transdermal delivery.<sup>18,19</sup>

**Methods for Preparation TDDS**

1. Asymmetric TPX membrane method:- For this a prototype patch can be manufactured, a heat sealable polyester film with 1 cm diameter will be used as the backing membrane.

The specimen membrane is separated and (poly (4-methyl-1-pentenl) asymmetric membrane and sealed by adhesive.<sup>20</sup>

2. Circular Teflon mould method:- Polymer containing solutions are used in many proportions. The unsalted amount of the drug is dissolved half the amount of organic solvent is increased and the other half dissolves at different concentrations. The drug was added to the polymer. The total content is to be stirred for 24 hours. And then put into a circular Teflon mold. To control surface solvent evaporation in the laminar flow hood model with a wind speed of 0.5 m/s, the surface is covered and covered with an inverted funnel. 3. Mercury substrate method:- In this method the sample is dissolved in polymer solution. The above solution along with plasticizer is stirred for 10, 15 minutes to form a flat spread and poured into a flat mercury and covered with it [22].

1. 4. By using IPM Membranes:- In this method water is spread in the mixture and stir in propylene glycol containing carboner 940 polymer and magnetic sanitizer until 120'clock.. The solution is very poor. The gel formed will be incorporated into the IPM membrane. 23  
 5. By using EVAC membranes method:- To prepare transdermal therapeutics 1% carbopol reservoir gel polythelene (PE) ethylene vinyl acetate copolymer (EVAC) membranes can be used as rate control membrane. The drug is not soluble in water. Propylene glycol may be used for the preparation of the gel. The drug is dissolved in propylene. Carbopol resin will be added to the above solution and neutralized

using a 5% w/w sodium hydroxide solution. Will be done [24].

**Evaluation parameters**

a. Interaction studies

Excipients are integral components of almost all pharmaceutical dosages. Other factors depend on the compatibility of the drug with the excipients. When the product is produced the drug and excipients must be mixed with a distance that is constant so it is imperative. Detect any physical or chemical contact may affect the stability of the drug

b. Thickness of the patch

To ensure the thickness of the finished patch determines the mean thickness and standard deviation for the same.

26

c. Weight uniformity

The prepared patch is to be dried at 60 °C for 4 h before testing. Certain areas of the patch should be weighted to different parts of the patch and digital balance.

d. Folding endurance

A strip of specific are is to be cut evenly and repeatedly folded at the same place till it broke. The number of times the first can be kept in one place without folding, broking gave the value.

e. Drug content

The patches are to be dissolved in a suitable solvent of a specific quantity. The solution is then filtered through a filter medium and these techniques are involved in the analysis of the drug with the solution mentioned above.

f. Polari scope examination

Polari scope examination test to examine the drug crystals from patch by Polari scope. Place the piece of architecture on a special surface area on a slide and also inspect it.

g. Thumb tack test

It is a qualitative test applied for dealing with adhesive property determination. The thumb is simply pressed on the adhesive and the property of relatives is traced.

h. rolling ball tack test

In this test the tape is pulled away from the substrate at 90°c at a speed of 12 in/min. The peel force is necessary to prevent the bond between the adhesive and the substrate and to break that bond. Measurement is recorded as a value by which expressed in ounces or grams per inch of width [25].

i. Probe tack test

In this test the tip of a clean test is brought into contact with a paste of roughness along a defined manner. A connection is formed between the adhesive and the probe. The subsequent removal of the probe mechanically breaks [24].

**Marketed preparation for TDDS**

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**Table: 01 Marketed preparation for TDDS**

Brand Name	Drug Name	Manufacturer	Indications
Nicotine II <sup>R</sup>	Nicotine	Novartis	P'cological Smoking cessation
Matrifen <sup>R</sup>	Fentanyl	Nycomed	Pain Relief patch
NuPatch 100	Diclofennac diethylamine	Zydus Cadila	Anti-inflammatory

Alora	Estradiol	TheraTech, Proctol	Postmenstrual syndrome
Nuvelle TS	Estrogen, Progesterone	Ethical holdings	Hormone Replacement
Nitrodis c	Nitroglycerin	Roberts p'ceuticals	Angina Pectoris
Estrader m	Estradiol	Alza/Norvatis	Postmenstrual syndrome

### Conclusion

Useful for topical and local action of TDDS drugs. The prediction shows that TDDS has the potential to be both hydrophobic and hydrophilic. The delivery system to optimize this drug is the mechanism of more social biological interaction of the various and essential polymers. Drugs showing metabolic and unstable status in the first state are suitable candidates for transdermal drug delivery systems. Many new researches are going on at the present time to incorporate new drugs through this system.

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### Declarations

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