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EFFECT OF TRANSDERMAL PATCH ON SKIN

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Commentary

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EFFECT OF TRANSDERMAL PATCH ON SKIN

Skin [1 - 3] is a very important site of drug application for each native and general effect. The skin is that the largest organ within the body; it protects against the flow of poisons and also the flow of water and is basically impermeable to the penetration of foreign molecules. Human skin consists of 3 main layers: the stratum, dermis, and layer. The stratum [4, 5], above all the horny layer, acts because the major barrier to drug absorption. The horny layer contains solely 2 hundredth of water and could be an extremely oleophilic membrane; it is 10–20 μm thick depending on its state of association. The thickness of the stratum varies from zero.06 millimeter on eyelids to 0.8 millimeter on the soles of the feet.

An applied drug should traverse these structural layers, encountering many oleophilic and deliquescent domains on the way to the corneum [6 - 10] wherever absorption into the circulation is fast owing due to the large capillary bed. Removing the corneum speeds the diffusion of little soluble molecules into the circulation by up to a thousand times or else, deliquescent compounds will reach the corneum via shunt pathways like hair follicles, sweat glands, nerve endings, and blood and liquid body substance vessels. These routes contribute minimally to steady-state drug flux. The corneum is that the thickest layer of the skin (3–5 mm) [11, 12] and possesses hair follicles, sweat glands, nerve endings, and blood and liquid body substance vessels. It acts as the general absorption web site for medicine.

There are variations between people within the rate at that drugs are absorbed via the skin owing to factors like thickness of the corneum, skin association, underlying skin diseases[13, 14] or injuries, ethnic variations, and vital sign.

The idea of percutaneous drug delivery system (delivering medicine through skin) is recent, because the use of it is reported back in16th century B.C [15 - 17]. Throughout the last years, developments in percutaneous drug delivery are incremented focusing primarily on overcoming issues related to the skin barrier properties [18].

Transdermal drug delivery system [19] is the trendy delivery system to deliver the drug by passing the first pass metabolism drawback. Once the patch is applied, the drug begins flowing through the skin into the blood at a rate regulated by the membrane, pre-programmed to stay the drug at levels that give effectiveness with acceptable adverse effects.

Currently over thirty five TDDS merchandise are approved in us for the wide range of condition like high blood pressure, angina, sickness, severe pain, native pain[20 - 25] etc.

Transdermal drug delivery systems having several advantages and disadvantages it includes:

1. Longer length of action leading to a decrease in dosing frequency [26].
2. Increased convenience to administer medication which might otherwise need frequent dosing.
3. Improved bioavailability [27, 28].
4. More uniform plasma levels [29].
5. Reduced facet effects and improved medical aid attributable to maintenance of plasma levels up to the tip of the dosing interval [30].
6. Flexibility of terminating the drug administration by merely removing the patch from the skin.
7. Improved patient compliance and luxury through non- invasive, painless [31] and easy application.
8. Prevent the first-pass metabolism of drug [32].
9. When drug is not possible to require orally like in continuous unconditioned reflex condition and unconscious patient.
10. Possibility that a neighborhood irritation at the location of application.
11. Erythema, itch [33] and edema [34, 35] may be caused by the drug, the adhesive, or different excipients within the patch formulation.

Transdermal patch [5] consists of 4 layers of skinny, versatile membranes:

1. Impermeable backing membrane: Protects the patch from the setting.
2. Drug reservoir: Drug in direct contact with the discharge liner.
3. Rate-controlling membrane: Controls the discharge of the drug from reservoir and multi-layer patches, and
4. Adhesive: Adheres the elements of the patch along and sticks the patch to the skin.

Several differing types of transcutaneous patches [36 - 38] are presently available:

1. Single-layer drug-in-adhesive patch: The adhesive layer adheres the various layers on and sticks the system to the skin; that is chargeable for the drug unleash.
2. Multi-layer drug-in-adhesive patch: Each adhesive layers are accountable for removing of the drug; one in all the layers is for immediate unharness and also the alternative layer is to manage unharness of the drug from a reservoir.
3. Reservoir patch: It features a separate drug layer as a liquid compartment, containing a drug suspension, between a backing layer and a rate-controlling membrane; this leads to a zero-order rate of unharness. Reservoir patches mustn't be cut.
4. Matrix patch: Features a drug layer of a semi-solid matrix containing a drug answer or suspension spread inside a chemical compound pad in direct contact with the skin. The adhesive layer during this patch surrounds the drug layer part overlaying it.

Various methods for skin enhancement of TDDS:

1. Active/ vehicle interaction
   - Drug/ prodrug
   - Chemical potential
   - Ion pairs
   - Eutectic system
2. Vesicles and particles
   - Liposomes and analogues [39,40]
   - Microemulsions [41]
   - Lipid nanoparticles [42]
   - High velocity particles
3. Strateum corneum bypassed/ removed

- Microneedles [43-46]
- Follicular delivery

4. Electrically assisted methods
   - Iontophoresis [47]
   - Electroporation [48-50]
   - Phonophoresis [51,52]
   - Photomechanical waves [53-55]
   - Magnetophoresis [56]

Factors affecting transdermal drug delivery system:

1. Physicochemical properties of penetrants: pHconditions, partition coefficient, penetrant concentration.
2. Physicochemical properties of drug delivery system: release characteristics, composition of TDDS
3. Physiological and pathological conditions of the skin: skin hydration, skin temperature, lipid film.

CONCLUSION

Transdermal Drug Delivery System (TDDS) is another to traditional delivery by lowering the issues related to the oral and parental administration of medication. TDDS additionally bypasses the first pass metabolism and results in low bioavailability of the drug, to achieving a constant\controlled unharness of drug with minimize facet effects earned by exploitation kind of polymers (applied as a nano-carrier for microspheres, nanoparticles). Another necessary advantage is easy and painless application. The patch can also be used for management of acute and chronic pain.

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