

A Painless Drug Delivery System / Transdermal Drug Delivery System

Supekar Rohini K.^{*}, Kawade Kartik D.¹, Mapari Akanksha U.², Bhor Vaishnavi R.³

Sahakar Maharshi Kisanrao Varal Patil College of Pharmacy, Nighoj

Assistant Professor, Sahakar Maharshi Kisanrao Varal Patil College of Pharmacy, Nighoj

Abstract: *Transdermal drug delivery systems (TDDS) represent an innovative and painless approach for administering therapeutic agents through the skin. Unlike conventional oral or injectable routes, transdermal patches bypass first-pass metabolism, provide controlled and sustained drug release, and enhance patient compliance by reducing pain and discomfort. Various designs, including single-layer, multi-layer, reservoir, and matrix patches, have been developed to optimize drug delivery. While TDDS offer advantages such as improved therapeutic outcomes, convenience, and reduced risk of needle-related complications, they also face limitations including restricted drug applicability, variable skin absorption, and possible skin reactions. Emerging technologies such as microneedles and nanoneedles are revolutionizing this field by improving penetration, precision, and multifunctional capabilities, making them suitable for delivering complex molecules, vaccines, and personalized therapies. Overall, transdermal systems hold great promise in advancing painless drug delivery and improving the quality of patient care in the future*

Keywords: Transdermal drug delivery system (TDDS), Painless drug delivery, Skin patches, Microneedles /Nanoneedles, Patient compliance, Matrix patch, Reservoir patch, Drug bioavailability

