REVIEW OF LITERATURE

Peeush Singhal et al. (2012) have reviewed on the novel technique to enhance the therapeutic efficacy and safety of drugs in transdermal drug delivery system. They suggested that the conventional oral dosage forms has significant drawbacks of low bioavailability due to hepatic first pass metabolism and tendency to produce rapid blood level spikes, leading to a need of frequent dosing, which can be both cost ineffective and inconvenient and to improve such characters transdermal drug delivery system had been emerged.\footnote{10}

Ekapol Limponsa and et al. (2008) prepared the suitable polymeric films for the development of diltiazem hydrochloride transdermal drug delivery systems. Hydroxypropyl methyl cellulose (HPMC) and ethyl cellulose (EC) were used as hydrophilic and hydrophobic film formers, respectively. Effect of HPMC/EC ratios and plasticizers on mechanical properties of free films were studied. Effects of HPMC/EC ratios on moisture uptake, in vitro release and permeation through pig ear skin of diltiazem HCL films were evaluated. The films composed of 8:2 HPMC/EC, 30\% DBP and 10\% IPM, IPP or tween 80 loaded with 25\% diltiazem HCL should be selected for manufacturing transdermal patch by using a suitable adhesive layer and backing membrane. Further in vitro permeation and in vivo performance studies are required.\footnote{11}

K. M. Yerramsetty et al. (2010) have studied the effect of different enhancers on the transdermal permeation of insulin analog. They used chemical penetration enhancers to increase the permeability of transdermal drug delivery for insulin administration. Their result indicated that specific functional groups are not directly responsible for enhanced insulin permeation. Rather, permeation enhancement is produced by molecules that exhibit positive log\textsubscript{ow} values and possess at least one hydrogen donor or acceptor.\footnote{5}

P.R. VERMA et al. (2012) designed and formulated controlled transdermal delivery of propanalol using HPMC matrices and in vitro and in vivo evaluation of patches developed by different grades of HPMC : K4M, K15M and K100M drug release follows higuchi rather than zero order.\footnote{12}
Mohammad Aquil et al (2003) formulated monolithic matrix type transdermal drug delivery system of metaprolol tartrate using polymers like Eudragit RL 100 and poly vinyl pyrrolidone by film casting on a mercury substrate and characterized in vitro by drug release studies, skin permeation studies and drug-excipients interaction analysis.

Narasimha M.S. et al. (1996) comparative release studies of transdermal films of terbutaline sulphate, using polymers such as hydroxy propyl methyl cellulose and sodium carboxy methyl cellulose was studied and reported that the hydroxyl methyl cellulose films showed a greater rate of release compared to that of sodium carboxy methyl cellulose, across all the barriers used.

Y. Indira Muzib et al. (2012) have designed stavudine transdermal patches using hydrophilic and hydrophobic polymers. They investigated physico-chemical characteristics and in-vitro drug release of stavudine from the films of eudragit RS 100 and hydroxyl propyl methyl cellulose using PEG 400 (5% w/w) as plasticizer and D-limonene (8% w/w) as penetration enhancer.

Sadhana P. G. et al. (2005) investigated metaprolol tartarate as a transdermal drug delivery system for controlled release of drug for extended period of time, eudragit RL and hydroxy propyl methyl cellulose were used for the fabrication of the formulation. These systems were characterized for their thickness, tensile strength and drug content. Then it was evaluated in-vitro release kinetics and skin permeation studies and compared its drug plasma profile with metaprolol tartarate.

Shivaraj A et al. (2010) designed transdermal drug delivery of ketotifen fumarate with different ratio of polymers by solvent evaporation technique. Transdermal patches were evaluated for in vitro release of drug.

V.G. Jamakandi et al. (2009) formulated transdermal drug delivery systems of nicorandil using different polymeric grades of hydroxyl propyl methyl cellulose. The patches were characterized for their physicochemical parameters. Further in vitro evaluation studies carried out.
Gajanan Darwhekar et al. (2011) prepared transversal patches of clopidogrel bisulfate using polymers such as hydroxyl propyl methyl cellulose, poly vinyl pyrolidone and ethyl cellulose. Transdermal patches were evaluated for physicochemical studies. Diffusion studies of formulation carried out.\textsuperscript{19}

Anuradha C.M. et al. (2013) prepared matrix type transdermal patches of diclofenac potassium using different ratios of ficus benghalensis fruit mucilage. Transdermal studies carried out.\textsuperscript{20}

Shrikant A. et al. (2005) prepared transdermal patches of antihypertensive agents. Transdermal patches were evaluated for physicochemical properties. In vitro permeation studied in this.\textsuperscript{21}

Verma M. et al (2007) developed transdermal patches of herbal component using ethyl cellulose and polyethylene glycol. These patches further studied for physicochemical parameters. Further in vitro diffusion study carried out.\textsuperscript{22}

Panchaxari D.M. et al. (2013) prepared transdermal drug delivery system of diclofenac diethylamine. Solvent evaporation technique used for formulation. The effect of permeation enhancement on the drug permeation were studied using pig ear skin.\textsuperscript{23}

Nantiyal et al. (2013) studied transdermal drug delivery system using different polymers such as ethyl cellulose, cellulose acetate, polyvinyl pyrolidone and hydroxyl propyl methyl cellulose with plastisizer propylene glycol.\textsuperscript{24}

Kanikkannan N. et al. (2004) formulated drug in adhesive type transdermal patches of melatonin with penetration enhancers such as fatty alcohols, fatty acid and terpenes. Effect of penetration enhancers studied in this.\textsuperscript{25}

Patel N.A. et al. (2009). Studied matrix type transdermal drug delivery system containing curcumin with different ratios of hydrophilic and hydrophobic polymers. Patches prepared by solvent evaporation technique. Further in vitro permeation study and stability study carried out.\textsuperscript{26}
Shinde A.J. et al. (2008) prepared transdermal patches of tramadol hydrochloride using hydroxyl propyl methyl cellulose, eudragit RL-100, hydroxyl propyl methyl cellulose and eudragit RS-100 with triethyl citrate as a plasticizer and DMSO as penetration enhancer. Effect of concentration of polymer studied by in vitro diffusion method.  

Kear C.L. et al. (2008) studied mechanism by which hydroxyl propyl beta-cyclodextrin increases permeation of transdermal drug delivery.  

Lewis S. et al. (2006) formulated cost effective transdermal patches of nicotine. They formulated monolayered patches with rate controlling membrane and bilayered matrix patches. Release study of transdermal patches showed a biphasic release pattern.  

Murthy T E G. K. et al. (2007) studied cellulose acetate and ethyl cellulose transdermal patches. These were prepared using solutions of polymers in different solvents to evaluate permeability properties of patches. This study showed effect of solvent and polymers on release of drug.  

Prasad Verma P. et al. (2009) prepared pentazocine transdermal drug delivery with hydroxy propyl methyl cellulose. In this drug release pattern studied. In vitro dissolution rate constant, dissolution half life and pharmacokinetic parameters statistically evaluated by ANOVA.  

Padula C. et al. (2007) explained latest drug delivery system based on water and vapour permeability. In this release of drug in rabbit ear skin studied. Effect of adhesive and plasticizer on lidocain release in skin evaluated. In this formation of ion pair effects on permeation of drug studied.  

Amar H. O. et al. (2006) prepared drug delivery system of Aspirin. Oral Aspirin showed side effects and require repeate dose, for this transdermal patches formulated. In vitro permeation study showed drug permeation higher by hydrocarbon gel. Propylene glycol and alcohol gives better enhancement.
Suedee R. et al. (2008) in this formulation of transdermal patch with active s-enantiomer from racemic propanalol. Further study include evaluation by using in vitro using wistar rats. In this investigation by effect of gel reservoir on enantioselective delivery.\(^{34}\)

Garcia M.T.J. et al. (2006) studied ketoprofen transdermal patches. Effect of dioleylphosphatidyl choline on skin permeation observed. Skin irritation and hypersensitivity reactions of formulation further studied.\(^{35}\)

MC Daid D. M. et al. (1996) designed and formulated transdermal patches of amlodipine base. Drug permeation of hydrophilic and hydrophobic bases on mouse skin was studied and effect of permeation enhancers sodium lauryl sulphate and propylene glycol in sodium carboxymethyl cellulose gel base studied.\(^{36}\)

Mayorga P. et al. (1996) prepared transdermal patch of antimalarial drug primaquine. Absorption of drug through rat skin was studied. Drug release studied by different matrix patches. Primaquin free base suitable for patches.\(^{37}\)

Jain G. K. et al. (1996) designed controlled patches of Verapamil hydrochloride. In this polyvinyl alcohol and polyvinyl pyrolidone polymers were use with varied concentration of enhancer. By diffusion cell in vitro permeation through guinea pig dorsal and human cadaver skin studied.\(^{38}\)