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A Review on Herbal-Based Transdermal Eye Patches for Enhanced Ocular Drug Delivery

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Abstract: *The current research examines how to create and evaluate a herbal transdermal eye patch aimed at the area under the eyes. This patch targets dark circles, puffiness, dehydration, and localized oxidative stress. The chosen herbal ingredients like Aloe Vera, Honey, Neem extract, Green tea extract, potato extract, vitamin c rich herbs like orange peel extract and Coconut oil were selected based on their known benefits for antioxidants, reducing inflammation, moisturizing, anti-aging and repairing skin. A hydrogel-based polymer matrix consisting of Carbopol 934, Polyvinyl Alcohol (PVA), and Gelatin was optimized using a solvent-casting and gel-patch method. Multiple formulations (F1–F6) were developed by changing the ratios of the polymers and the concentrations of the herbal extracts. The patches were tested for sensory properties, pH, weight variation, thickness, folding endurance, moisture content, moisture uptake, adhesion and retention time, swelling index, viscosity, and uniformity of herbal content. The antioxidant activity was measured with the DPPH radical-scavenging test, and in-vitro release studies were conducted using a diffusion cell model to evaluate how well the herbs penetrated through a semi-permeable membrane. Among all the batches, formulation F1 showed the best strength, strong adhesion, suitable skin-friendly pH, good stability in accelerated conditions, and the highest antioxidant potential. This suggests it is the most suitable option for transdermal application around the eye.*
The study concludes that a well-optimized poly herbal transdermal eye patch can be a safe, effective, and convenient method for improving the skin condition under the eyes. It offers moisturizing, skinlightening, and anti-inflammatory advantages. Further clinical tests are suggested to confirm longterm effectiveness and safety in humans.

Keywords*:* Herbal transdermal eye patch, Under-eye patch, Herbal formula, Transdermal drug delivery system (TDDS), Polyherbal extracts, Plant-based actives, Anti-aging formula, Dark circle reduction, Skinlightening agents, Antioxidant properties, Skin hydration, Gelatin or polymer-based patch, Biopolymer matrix, Controlled release system, Physicochemical evaluation, pH analysis, Adhesiveness or peel strength, Stability studies, Skin compatibility test

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