IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 2, January 2026
Impact Factor: 7.67

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

Ban Amol A[1], Dr. Khedkar Samrat A[2], Borade Gayatri S*[3], Chandanshive Pratiksha D*[4]
Associate Professor, Department of Pharmaceutics[1]
Department of Pharmaceutical Chemistry[2]
Students, JBVP'S Vidya Niketan College of Pharmacy, Lakhewadi, Indapur[3,4]

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

I. INTRODUCTION

Topical ocular delivery is still a significant challenge in pharmaceuticals. The eye, especially the areas around it, is protected by strong physical and biological barriers, including tear dilution, blinking, lacrimal drainage, corneal epithelium, and conjunctival blood flow. Traditional eye drops and ointments often have low bioavailability, with less than 5% of the administered dose reaching the target tissues. They also require frequent dosing and can vary in patient compliance. Herbal transdermal eye patches, which are designed for peri-ocular or periorbital application and contain plant-based active ingredients, are a new approach. These patches aim to increase the time the medicine stays in the area, offer controlled release, lower dosing frequency, and enhance patient comfort and adherence.

Herbal ingredients such as aloe Vera, neem, green tea polyphenols, honey, potato extracts, citrus peel flavonoids, and coconut oil are appealing for peri-ocular formulations. Many of these have antiinflammatory, antioxidant, anti-microbial, wound-healing, or moisturizing properties. When chosen and standardized correctly, these botanicals can help with common ocular surface and periocular issues, like dryness, peri-ocular hyperpigmentation, mild

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 6, Issue 2, January 2026 Impact Factor: 7.67

inflammation, and oxidative stress. They also meet consumer preferences for natural or botanical products. However, herbal actives come with specific formulation challenges. These include chemical complexity and variability, possible irritants or allergens, limited solubility in water for some compounds, interactions with preservatives and polymers, and stability issues like oxidation and enzymatic degradation(1).

ADVANTAGES OF HERBAL TRANSDERMAL EYE PATCHES:

1.Sustained and controlled drug release.
2.Avoids frequent use of eye drops.
3.Better patient compliance.
4.Minimized systemic absorption.
5.Improves drug stability.
6.Suitable for heat-sensitive herbal actives.
7.Non-invasive and painless delivery.
8.Reduced chance of blurred vision.

DISADVANTAGES OF HERBAL TRANSDERMAL EYE PATCHES:

1.Limited drug permeation through skin
2.Possibility of skin irritation or sensitization
3.Unsuitability for high-dose drugs
4.Variability in drug absorption
5.Risk of accidental eye exposure
6.Slow onset of action
7.Stability issues of herbal components
8.Adhesion problems.(2)

WHEN WE CAN USE IT (DISEASED CONDITIONS):

1. Under-eye hydration & dryness relief.
2. Reduction of dark circles and puffiness.
3. Soothing tired eyes and cosmetic refreshing effects.
4. Support for myopia prevention.
5. Gives soothing and cooling effect.

Concept of Transdermal Eye Patch:

A herbal transdermal eye patch is a thin polymer film that contains herbal bioactive compounds. It releases the drug slowly to the eye area through:

1.Eyelid skin absorption
2.Conjunctival permeation
3.Controlled release through the polymer matrix

These patches can be applied around the eye or as under-eye patches based on the formulation design.

WHAT TRANSDERMAL ACTUALLY MEANS?

Transdermal refers to delivering drugs or bioactive substances through unbroken skin into the bloodstream or local tissues. This process happens at a controlled and set rate to achieve therapeutic effects.

WHAT IS EYE PATCH?

An eye patch is a small piece of material or film that goes over or around the eye. It protects the area or delivers helpful ingredients to the skin. People use it for skincare, healing, or addressing under-eye issues like dark circles, puffiness, and wrinkles.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 2, January 2026
Impact Factor: 7.67

The above diagram shows the normal or regular image of eye patch.

TYPES OF EYE PATCHES:

1.Cosmetic / Skincare Eye Patches:

Examples: Hydrogel eye patches, sheet eye patches, herbal eye patches.

Medical Eye Patches:

Examples: Cloth eye patches, adhesive medical patches, orthopaedic eye patches.

Transdermal Eye Patches:

Examples: Polymer-based patches, herbal transdermal patches.

Cooling / Gel Eye Patches:

Examples: Hydrogel under eye patch, Cucumber gel eye patch.

PARTS OF AN EYE PATCH:

1.Backing layer:

It is an outer protective layer which gives strength and shape to the patch. Usually made of flexible polymer or fabric.

2.Drug or Herbal Reservoir or matrix:

It contains the active ingredients which active pharmaceutical drug or herbal extract. It is responsible for releasing ingredients to the skin.

3.Rate-control membrane:

It controls the release rate of the herbal drug.

4.Adhesive layer:

It helps the patch stick to the skin and it must be safe, non-irritating, and gentle. Sometimes it mixed with the drug.

5.Release Linear:

It is protective layer removed before application. It protects the adhesive and herbal material until use.

6. Herbal active ingredients:

- Aloe Vera
- Honey
- Green tea extract
- Coconut oil
- Neem extract
- Potato extract
- Orange peel extract

7.Permeation enhancer:

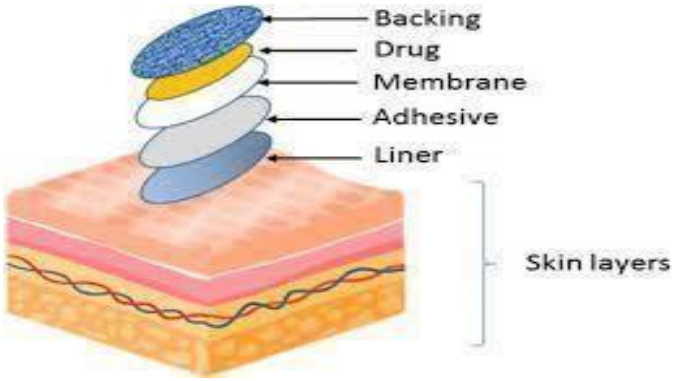
Improve drug absorption through skin.

Ex: glycerin, essential oils

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 2, January 2026
Impact Factor: 7.67

8. Plasticizers or Excipients:
Improve flexibility and comfort.
Ex: glycerol, PEG-400, Propylene glycol.

DIAGRAMATIC REPRESENTATION OF PARTS OF PATCH:



The above diagram shows the skin layer and the parts of patch (3).

METHOD OF PREPARATION:

Selection of herbal ingredients
(Aloe vera, Honey, Orange peel, Neem, Green tea, Coconut oil, Potato)
↓
Cleaning and drying of raw plant materials
↓
Preparation of herbal extracts
(Aqueous extraction / juice extraction)
↓
Filtration of extracts
(Removal of solid residues)
↓
Preparation of hydrogel base
(Gelatin / Carbopol / PVA + Distilled water)
↓
Cooling of gel base (to room temperature)
↓
Incorporation of herbal extracts
(Aloe vera + Honey + Orange peel extract
+ Neem extract + Green tea extract
+ Potato extract + Coconut oil)
↓
Uniform mixing
(Magnetic stirrer / glass rod)
↓
Adjustment of pH
(pH 5.5 – 6.5, suitable for skin)
↓
Pouring into eye-patch shaped molds

DOI: 10.48175/IJARSCT-30896

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 2, January 2026
Impact Factor: 7.67

↓
Setting of patches
(Refrigeration for 2–4 hours)
↓
Removal from molds
↓
Drying (if required)
↓
Packaging and storage
(Airtight container, cool place)(4)

EVALUATION PARAMETERS:

Physical	**Chemical**	**Mechanical and adhesion properties**	**Biocompatibility**
Physical appearance	Surface pH measurement	Peel adhesion	Skin irritation
thickness	Moisture content	Tensile strength	In vivo efficacy studies
Weight uniformity	Water vapour permeability	-	-
Folding endurance	Drug content and content uniformity	-	-

The above table is showing evaluation parameters. (5)

HERBAL INGREDIANTS USED:
1.Aloe Vera
2.Honey
3.Green tea extract
4.Coconut oil
5.Neem extract
6.Potato extract 7.Orange peel extract

1.ALOE VERA :
Aloe Vera is a medicinal plant widely used for its soothing, healing, and moisturizing properties.

1.Botanical Profile:
Scientific name: Aloe barbadensjis Miller (commonly known as Aloe Vera)
Family: Liliacea, Asphodelaceae
Paorts used:
Aloe gel - clear, slippery material from the inner leaf
Aloe latex - yellow sap beneath the leaf skin (contains anthraquinones)

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 6, Issue 2, January 2026 Impact Factor: 7.67

Chemical Constituents:

- Polysaccharides
- Vitamins
- Minerals
- Enzymes
- Phenolic Compounds
- Amino Acids

Relevance for Herbal Transdermal Eye Patch:

Aloe Vera is suitable because it provides soothing and anti-inflammatory effects on the under-eye area.
Its polysaccharides help in skin repair and hydration.
It supports controlled release when added to polymeric films, like PVA and HPMC.
It is stable in low-temperature formulations, which makes it a good choice for heat-sensitive herbal patches [6].

2. HONEY:

WHAT IS HONEY?

Honey is a natural sweet and thick substance made by honeybees (Apis mellifera) from flower nectar.
Bees change nectar by using enzymes, removing water, and storing it in honeycombs.

1.Botanical Profile:

Scientific name: Apis mellifera
Family: Apidae
Parts used: Honey comb, Propolis [bee glue] Royal jelly, Bees wax

2.Chemical constituents:

Carbohydrates:
Monosaccharides
Disaccharides oligosaccharides Proteins and amino acids
Vitamins and minerals
Organic acids and lipids
Phenolic compounds and flavonoids
Water

Relevance for Herbal Transdermal Eye Patch:

It play important role as wound healing agent that accelerates collagen synthesis, tissue regeneration and repair of damage skin and its beneficial for under eye patches, healing patches and soothing antiinflammatory patches.
1.It act as antioxidant booster this protect from oxidative damage, reduce sign of aging and improve skin elasticity and enhance the anti-aging effect of herbal eye patches.
2.It helps as penetration enhancer increase skin permeability, absorption of herbal actives and bioavailability of nutrients. This improves the therapeutic effect of the patch.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 6, Issue 2, January 2026 Impact Factor: 7.67

3.It Improves ocular surface health that Clinical studies have found that low-concentration honey eye drops improved symptoms of dry eye. They also increased tear film stability, such as tear break-up time. These formulations were well tolerated.

Honey has been shown to speed up epithelial healing and lower inflammatory and angio-genic cytokines in corneal injury in animal models. This suggests it could help with repair and regeneration [7].

3. GREEN TEA EXTRACT:

1. Botanical Profile:

Scientific name: Camellia sinensis (L.) Kuntze

Family: Theaceae **Parts used:**

Young leaves and leaf buds

Sometimes tender systems

2. Chemical constituents:

Polyphenols/ Catechins

EGCG [Epigallocatechin gallate]

ECG [Epicatechin gallate]

ECG [Epigallocatechin]

EC [Epicatechin]

Flavonoids

Tannins

Amino Acids

Vitamin C

Caffeine

Minerals

Relevance for Herbal Transdermal Eye Patch:

Reduces oxidative stress in the skin under the eyes.

Controls dark circles and pigmentation.

Provides anti-inflammatory action, which reduces puffiness.

Tightens the skin due to tannins.

Helps with controlled release in transdermal patches.

Improves skin rejuvenation around the eyes [8].

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 2, January 2026
Impact Factor: 7.67

4.COCONUT OIL:

1.Botanical Profile:

Scientific name: Cocos nucifera L **Family:** Arecaceae [palm family] **Parts used:**

Endosperm (kernel, white flesh) of mature coconut Sometimes coconut milk is also used to make oil.

2.Chemical constituents:

Coconut oil mainly contains medium-chain fatty acids (MCFAs)**:**

Fatty acids:

1.Lauric acids [45-53] - [main antimicrobial fatty acid]

2.myristic acid

3.caprylic acid

4.capric acids

5.palmitic acids

6.oleic acid

7.linoleic acids

Tocopherols

Phytosterols Polyphenols

3. Relevance for Herbal Transdermal Eye Patch:

Works as a natural penetration enhancer.

Provides a smooth texture and hydrates the skin.

Reduces inflammation around the eyes.

Helps deliver herbal actives.

Improves patch adherence and flexibility.

Prevents dryness or irritation.

Acts as an emollient and protects the skin [9].

5. NEEM EXTRACT:

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 2, January 2026
Impact Factor: 7.67

1.Botanical Profile:
Scientific name: Azadirachta indica
Family: Meliaceae
Parts used: Leaves, Bark, Seeds, Fruits, Flowers
2.Chemical constituents:
Nimbin
Nimbidin
Nimbolide
Gedunin
Quercetin
Salannin
3. Relevance for Herbal Transdermal Eye Patch:
It shows anti-inflammatory action and it helps in under eye swelling and irritation.
It is beneficial for eye patches targeting puffiness, under eye swelling and irritated eye lid skin.
It has antioxidant property which reduces dark circles and protects skin, protect delicate periorbital skin and prevent pigmentation around the eyes.
It shows antimicrobial and antifungal properties which protects eye area by preventing bacterial contamination of the eye patch.
It has wound healing properties and it also act as skin soothing and moisturizing effect and it is also suitable for herbal film forming or patch formulation [10].

6. POTATO EXTRACT:
Potato extract is a natural preparation obtained from the tubers of *Solanum tuberosum* (family *Solanaceae*), rich in starch, enzymes, phenolic compounds, and antioxidants, and is traditionally used for its soothing, anti-inflammatory, skin-cooling, and anti-edema properties.

1.Botanical Profile:
Scientific name: Solanum tuberosum
Family: Solanaceae
Parts used: Tubers (mainly), peels, leaves
2.Chemical constituents:
1.Phenolic compounds: chlorogenic acid, catechol, caffeic acid
2.Flavonoids: quercetin, kaempferol
3.Enzymes: catechol's, polyphenol oxidase
4.Vitamins: Vitamin C, B-complex
5.Minerals: potassium, magnesium

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 6, Issue 2, January 2026 Impact Factor: 7.67

6.Starch: amylose and amylopectin
7.Carotenoids: lutein, zeaxanthin
These compounds show antioxidant, anti-inflammatory, and skin-soothing properties.

3. Relevance for Herbal Transdermal Eye Patch:
A transdermal eye patch can provide sustained release, allowing deeper penetration into the undereye area for better skin lightening effects.
Transdermal patches help maintain longer contact time with the skin, enhancing anti-inflammatory action and reducing puffiness effectively.
Sustained delivery through a patch protects the delicate periocular skin from oxidative damage.
Hydration increases skin elasticity, making the under-eye area appear smoother and firmer when delivered through a patch and eye patches enhance this soothing effect, making them ideal for tired or stressed skin.
Patches keep the extract in contact with the skin for long durations, enhancing the anti-wrinkle benefits and This makes it ideal for herbal formulations where mild, natural ingredients are preferred for delicate areas like eyelids [11].

7. ORANGE PEEL EXTRACT:

1.Botanical Profile:
Scientific name: Citrus sinensis
Family: Rutaceae
Parts used: Orange peel (dried or fresh)
Chemical Constituents:
Flavonoids
Essential Oils
Phenolic Compounds
Vitamins
Relevance for Herbal Transdermal Eye Patch:
it has strong skin-brightening & depigmenting effect and a transdermal patch provides sustained release, improving penetration of brightening compounds into the delicate under-eye skin for better lightening results.
Antioxidants work more effectively when delivered continuously through a patch, protecting the periocular area.
Prolonged contact time from the patch enhances anti-inflammatory action, reducing morning puffiness.
A patch system maintains hydration and enhances collagen-boosting activity for visible antiaging effects.
Transdermal patches improve skin tightening action and create a refreshed, lifted appearance around the eyes and ideal for herbal transdermal systems where gentle action is needed for the delicate eye area [12].

POLYMERS WHICH CAN BE USED:
Polyvinyl Alcohol (PVA)
Hydroxypropyl Methylcellulose (HPMC)
Sodium Alginate
Chitosan

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 2, January 2026
Impact Factor: 7.67

Gelatin
Polyvinyl Pyrrolidone (PVP)
Carbopol (Carbomer)
Ethyl Cellulose [13].

DRUG RELEASE AND SKIN PERMEATION:

The drug release from a herbal transdermal eye patch happens through a controlled diffusion mechanism. The herbal bioactive components are gradually released from the polymer matrix onto the skin. The release rate depends on the type of polymer, thickness of the patch, compatibility between the drug and polymer, and the physical and chemical properties of the herbal extract. Hydrophilic polymers help with swelling and allow for controlled release, while hydrophobic polymers slow down drug movement, which provides sustained delivery. This controlled release profile keeps a steady level of herbal actives for a longer time. It reduces the need for frequent application and improves the therapeutic effect in the eye area.

Skin permeation in a herbal transdermal eye patch involves the passage of herbal active ingredients through the layers of the eyelid skin. This primarily occurs across the stratum corneum, epidermis, and dermis. The skin on the eyelid is thinner and more permeable than in other parts of the body, which improves transdermal absorption. Permeation depends on factors such as molecular weight, lipophilicity, and concentration of herbal ingredients. It also relies on the presence of penetration enhancers like natural oils or surfactants. The close and extended contact of the patch with the skin increases the time it stays in place, allowing effective permeation of herbal actives to local ocular tissues. This method avoids issues linked to eye drops, such as tear dilution and quick drainage. As a result, it improves local drug availability and the therapeutic response [14].

SAFETY OF HERBAL TRANSDERMAL EYE PATCHES:

1.Transdermal eye patches are non-invasive and do not touch the surface of the eye, which lowers the chance of eye injury.
2.Controlled and sustained drug release helps prevent high peak concentrations, which reduces toxicity.
3.Using biocompatible polymers and mild adhesives improves skin compatibility, especially for the sensitive eyelid area.
4.Localized drug delivery lowers systemic exposure and side effects.
5.Proper formulation and packaging improve the microbiological safety of the patch.

FUTURE PERSPECTIVE:

Herbal transdermal eye patches offer an exciting new way to treat eye and surrounding area conditions. In the future, these patches are likely to attract more attention because they are noninvasive, convenient for patients, and provide sustained drug delivery. Improvements in polymer science and nanotechnology will lead to eye patches with better adhesion, controlled release, and greater absorption of herbal compounds. Using biodegradable and smart polymers could allow for drug release that responds to temperature, moisture, or skin ph. This would make therapy more accurate and effective.

Future studies will probably focus on standardizing herbal extracts to ensure consistency, safety, and effectiveness across batches. Using Nano-encapsulated herbal ingredients in transdermal patches could improve their stability and penetration through the skin around the eyes while reducing irritation. Moreover, herbal transdermal eye patches might extend beyond cosmetic uses to help with treating eye disorders such as dry eye syndrome, allergic conjunctivitis, and swelling around the eyes. Clinical trials and gaining regulatory approval will be essential for turning these products from research in the lab into items available for sale.

Overall, herbal transdermal eye patches show great promise as safe, effective, and patient-friendly options compared to traditional eye drops and topical treatments [15].

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 2, January 2026
Impact Factor: 7.67

II. CONCLUSION

Herbal transdermal eye patches have emerged as a new and patient-friendly way to deliver therapeutic agents to the area around the eyes. By combining the benefits of herbal bioactive compounds with controlled transdermal delivery systems, these patches provide sustained and localized drug release through the thin and permeable skin of the eyelids. This delivery method helps address major issues with traditional eye medication forms, like eye drops. These include rapid tear drainage, short residence time in the eye, and the need for frequent applications. The polymer-based matrix of transdermal eye patches improves the stability of sensitive herbal ingredients and allows for controlled release, which increases local availability while reducing overall exposure. Preclinical studies have shown that these patches have acceptable skin compatibility, controlled drug release, and effective permeation of herbal actives. Clinical evaluations indicate they are well tolerated, improve patient compliance, and provide therapeutic benefits for issues like eye strain, inflammation, puffiness, and dryness. Despite these advantages, there are still challenges. These include variability in skin permeability, the long-term stability of herbal ingredients, and a need for thorough clinical validation. However, with the right formulation strategies, safety evaluations, and regulatory compliance, herbal transdermal eye patches have great potential as an alternative way to deliver eye medication. Ongoing research and welldesigned clinical studies are crucial to confirm their effectiveness, safety, and commercial feasibility in modern eye care.

REFERENCES

[1]. Sudhakar, Y. S., Patel, C. N., Mandal, A. K., Singh, A., & Hussain, M. D. (2018). Ocular drug delivery barriers—Role of nanocarriers in the treatment of anterior segment ocular diseases. Pharmaceutics, 10(4), 221.
DOI: 10.3390/pharmaceutics10040221 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5874841.

[2]. Prabhakar D, Sreekanth J, Jayaveera KN. Transdermal drug delivery patches: A review. J Drug Delivery Ther. 2013;3(4):231-2.
DOI: https://doi.org/10.22270/jddt.v3i4.590.

[3]. Recent Advancement of Medical Patch for Transdermal Drug Delivery https://share.google/images/FlZZQ2CxIerZaXyQo

[4]. World Journal of Pharmaceutical Research.Formulation and Ev laaluation of Polyherbal Under Eye Patches.WJPR, 2022–2024.

[5]. Evaluation of transdermal patch parameters including thickness, weight variation, surface pH, folding endurance, and moisture content.

[6]. Eshun, K., & He, Q. (2004). Aloe vera: A valuable ingredient for the food, pharmaceutical and cosmetic industries. Critical Reviews in Food Science and Nutrition, 44(2), 91–96.
https://doi.org/10.1080/10408690490424694

[7]. Bogdanov, S., Jurendic, T., Sieber, R., & Gallmann, P. (2008). Honey for nutrition and health: A review. Journal of the American College of Nutrition, 27(6), 677–689. https://doi.org/10.1080/07315724.2008.10719745.

[8]. Cabrera, C., Artacho, R., & Giménez, R. (2006). Beneficial effects of green tea—A review. Journal of the American College of Nutrition, 25(2), 79–99. https://doi.org/10.1080/07315724.2006.10719518.

[9]. DebMandal, M., & Mandal, S. (2011). Coconut (Cocos nucifera L.: Arecaceae): In health promotion and disease prevention. Asian Pacific Journal of Tropical Medicine, 4(3), 241–247. https://doi.org/10.1016/S1995-7645(11)60078-3.

[10]. Subapriya, R., & Nagini, S. (2005). Medicinal properties of neem leaves: A review. Current Medicinal Chemistry – Anti-Cancer Agents, 5(2), 149–156.
https://doi.org/10.2174/1568011053174828.

[11]. Ezekiel, R., Singh, N., Sharma, S., & Kaur, A. (2013). Beneficial phytochemicals in potato: A review. Food Research International, 50(2), 487–496. https://doi.org/10.1016/j.foodres.2011.04.025.

[12]. Manthey, J. A., & Grohmann, K. (2001). Phenols in citrus peel byproducts. Journal of Agricultural and Food Chemistry, 49(7), 3268–3273. https://doi.org/10.1021/jf001360z.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 2, January 2026
Impact Factor: 7.67

[13]. Dash, M., Chiellini, F., Ottenbrite, R. M., & Chiellini, E. (2011). Chitosan—A versatile semisynthetic polymer. Progress in Polymer Science, 36(8), 981–1014. https://doi.org/10.1016/j.progpolymsci.2011.02.001.

[14]. Bakhrushina et al. (2025) explain that effective transdermal drug delivery requires penetration across the stratum corneum, epidermis, and dermis, which is essential for skin permeation. DOI / Link: https://www.mdpi.com/1999-4923/17/7/936.

[15]. Novikova, D. B., et al. (2021). Stimuli-responsive polymers for transdermal, transmucosal and ocular drug delivery: prospects and future directions. Pharmaceutics, 13(12), 2050. https://doi.org/10.3390/pharmaceutics13122050.