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FORMULATION AND EVALUATION OF BLUE LIGHT PROTECTION HERBAL OINTMENT

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ABSTRACT

Concerns have been raised about the harmful effects of blue light (400–500 nm) from digital devices on skin health, including oxidative stress, early aging, inflammation, and hyperpigmentation. The creation and assessment of a herbal ointment intended to guard against skin damage caused by blue light is the main topic of this review. Antioxidant-rich natural plant extracts, especially those from Vitis vinifera (grape), Punica granatum (pomegranate), and Aloe vera, were chosen for their photoprotective properties. These plants are rich in bioactive components such flavonoids, polyphenols, tannins, and anthocyanins, which have potent anti-inflammatory, skin-conditioning, and free radical scavenging qualities. The review focuses on phytochemical profiles, pharmacological actions, and their significance in reducing oxidative stress brought on by exposure to blue light.

KEYWORDS: Blue light, Vitis vinifera, Antioxidant, Punica granatum, Aloe vera, early ageing, hyperpigmentation and inflammation.

INTRODUCTION

Continuous exposure to digital screens, including those on laptops, tablets, mobile phones, and LED light has dramatically grown in recent years. The blue light that these gadgets emits has a wavelength between 400 and 500 nm. By producing reactive oxygen species which cause oxidative stress, early ageing, hyperpigmentation and inflammation. Prolonged

exposure to blue light can have a detrimental effect on skin health. Herbal extracts high in flavonoids, polyphenols and antioxidants can help scavenge free radicals and shield skin from damage caused by blue light. Therefore, creating a herbal ointment with natural preventive ingredients may help avoid skin harm bought on by extended using of digital devices.

PLANT PROFILE

1."VITIS VINIFERA"

BOTANICAL INFORMATION

- **Kingdom :**plantae
- **Order :** vitals
- **Family :** vitaceae
- **Genus :** vitis
- **Species :** vitis vinifera

BOTANICAL DESCRIPTION

VITIS VINIFERA

- Vitis vinifera L. (vine grape, Vitaceae) is one of the best-known fruit crops with wide applications in the food, pharmaceutical and cosmetic industries.[1]
- It possesses antioxidant, antibacterial, anti-inflammatory and anticancer activities.
- V. vinifera is also used as an active ingredient in the cosmetics industry, which is determined mainly by its valuable antioxidant, antibacterial and skin-conditioning properties.

CHEMICAL CONSTITUENTS

Grape seed extract – procyanidine, gallic acid, epicatechin, catechin, quercetin.

White grapes- flavonol glycosides.

Blacks grapes-flavonal glycosides, resveratrol, anthocyanidins.[2]

PHARMACOLOGICAL ACTIVITIES

- Anti-oxidant.
- Anti-inflammatory.
- Anti-bacterial.

2."PUNICA GRANATUM"

BOTANICAL INFORMATION

- **Kingdom :** Plantae
- **Order :** Myrtales
- **Family :** Punacaceae
- **Genus :** Punica
- **Species :** P.granatum

BOTANICAL DESCRIPTION

- It is also known as "seeded apple", commonly called pomegranate, or locally called Anar.
- The bark, leaves, and immature fruits possess therapeutic potential.[4]
- Pomegranate peels are widely used as a traditional remedy.

CHEMICAL CONSTITUENTS

- Flavonoids
- Ellagitannins
- Punicalagin[6]
- Ellagic acid
- Vitamins and minerals

PHARMACOLOGICAL ACTIVITIES

- Antioxidant activity[5]
- Antibacterial activity
- Anticancer activity
- Antiviral activity

3."Aloe vera"

BOTANICAL INFORMATION

- **Kingdom :** Plantae
- **Phylum :** Tracheophyta
- **Class :** Magnoliopsida
- **Order :** Asparagales
- **Family :** Asphodelaceae
- **Genus :** Aloe
- **Species :** Aloe vera

BOTANICAL DESCRIPTION

- Aloe vera derives from "Allaeh" (Arabic word that means "shining bitter substances") and "Vera" (Latin word that means "true").
- It has been recognized for its cosmetic and medicinal applications for a long time.[7]
- Aloe vera has been traditionally used to treat skin injuries (burns, cuts, insect bites, and eczemas) and digestive problems because its anti-inflammatory, antimicrobial, and wound healing properties.

CHEMICAL CONSTITUENTS

- Chromone and its glycoside derivatives:- Aloesin, Aloeresin A, Isoaloeresin D, Aloeresin E.
- Anthraquinone and its Glycoside Derivatives:- chrysophanol , emodin , physcione , aloe-emodin.[8]
- Flavonoids**:-** flavone , flavonol , and flavan-3-ol.
- Phenylpyrone and Phenol Derivatives:- aloveroside A, feroxidin and vitamin

PHARMACOLOGICAL ACTIVITIES

- Anti-inflammatory activity
- Antioxidant activity
- Anti-microbial activity
- Wound healing activity
- Anti-diabetes activity[9]

MECHANISM OF BLUE LIGHT-INDUCED SKIN DAMAGE

Blue light (400–500 nm) penetrates deeper into the skin compared to UVB and can reach the dermis. It induces damage primarily through.

- Generation of reactive oxygen species (ROS) → oxidative stress.[10]
- Mitochondrial dysfunction → reduced cellular energy
- Activation of matrix metalloproteinases (MMPs) → collagen degradation
- Stimulation of melanogenesis → hyperpigmentation

Keratinocytes and fibroblasts are particularly affected, leading to premature aging and inflammation.

ROLE OF ANTIOXIDANTS IN PHOTOPROTECTION

Herbal antioxidants play a central role in mitigating blue light damage.

- Flavonoids: Neutralize free radicals and inhibit lipid peroxidation.[11]
- Polyphenols: Protect DNA and cellular proteins.[14]
- Anthocyanins: Absorb light and reduce oxidative stress.[12]
- Tannins: Provide astringent and protective effects on skin

These compounds act synergistically to enhance skin defense mechanisms

FORMULATION CONSIDERATIONS FOR HERBAL OINTMENT

Important parameters while developing the ointment.

a. Base Selection

- Oleaginous bases (e.g., petroleum jelly) → good occlusion.
- Absorption bases → better incorporation of aqueous extracts.
- Water-removable bases → easy washability.

b. Compatibility

- Check interaction between herbal extracts and excipients.
- Maintain pH close to skin (5.5–7).

c. Stability

- Protect from light and oxidation.
- Use natural stabilizers or antioxidants (e.g., vitamin E).

EVALUATION PARAMETERS OF HERBAL OINTMENT

Physical Evaluation: Color, odor, texture, consistency.

Physicochemical Tests: pH determination**,** Spreadability**,** Viscosity**,** Extrudability**.**

Stability Studies

- Conduct at different temperatures (e.g., 25°C, 40°C).
- Observe phase separation, color change.

Biological Evaluation

- Antioxidant activity (DPPH assay)[13]
- Anti-inflammatory studies[15]
- Skin irritation test (patch test).

ADVANTAGES OF HERBAL FORMULATIONS

- Safer with minimal side effects
- Biodegradable and eco-friendly
- Suitable for long-term use
- Cost-effective compared to synthetic formulations.[16]

LIMITATIONS

- Variability in phytochemical content
- Stability issues due to natural compounds
- Need for standardizatio
- Limited clinical data

FUTURE PERSPECTIVES

- Development of nanocarrier-based herbal formulations (liposomes, nanoparticles) for enhanced penetration.[17]
- Incorporation of synergistic plant combinations.
- Clinical trials for efficacy validation.
- Use of AI in formulation optimization.

CONCLUSION

In conclusion, exposure to blue light from contemporary digital gadgets poses a serious risk to skin health due to oxidative stress and associated damage. Because of their abundant antioxidant and anti-inflammatory components, herbal ointments made with natural extracts including Vitis vinifera, Punica granatum, and Aloe vera offer potential protective effects. These phytochemicals promote skin regeneration processes and successfully counteract free radicals. In comparison to synthetic alternatives, the reviewed evidence shows that these formulations are safe, economical, and appropriate for long-term usage. Their effectiveness and stability are further guaranteed by proper formulation and assessment. In order to avoid screen-induced skin damage, herbal-based blue light protection ointments are a useful and sustainable method in dermatological care.

REFERENCES

1. Coats, Jahnna G., et al. "Blue light protection, part II—Ingredients and performance testing methods." *Journal of Cosmetic Dermatology*, 2021; 20.3: 718-723.
2. Hussain, Syed Zameer, et al. "Grapes (Vitis vinifera)—morphology, taxonomy, composition and health benefits." *Fruits Grown in Highland Regions of the Himalayas: Nutritional and Health Benefits*. Cham: Springer International Publishing, 2021; 103-115.
3. Insanu, Muhamad, et al. "Phytochemical compounds and pharmacological activities of Vitis vinifera L.: An updated review." *Biointerface Res. Appl. Chem,* 2021; 11.13829: 10-33263.

4. Shaygannia, Erfaneh, et al. "A review study on Punica granatum L." *Journal of evidence-based complementary & alternative medicine*, 2016; 21.3: 221-227.
5. Miguel, Maria Graça, Maria A. Neves, and Maria Dulce Antunes. "Pomegranate (Punica granatum L.): A medicinal plant with myriad biological properties-A short review." 2010.
6. Coronado-Reyes, Jesús Alberto, Consuelo de Jesus Cortes-penagos, and Juan Carlos González-Hernández. "Chemical composition and great applications to the fruit of the pomegranate (Punica granatum): a review." *Food Science and Technology*, 2021; 42: e29420.
7. Shelton, Ronald M. "Aloe vera: its chemical and therapeutic properties." *International journal of dermatology*, 1991; 30.10.
8. Boudreau, Mary D., and Frederick A. Beland. "An evaluation of the biological and toxicological properties of Aloe barbadensis (miller), Aloe vera." *Journal of Environmental Science and Health Part C.*, 2006; 24.1: 103-154.
9. Hekmatpou, Davood, et al. "The effect of aloe vera clinical trials on prevention and healing of skin wound: a systematic review." *Iranian journal of medical sciences*, 2019; 44.1: 1.
10. Werner A, Erkiert-Polguj A, Budzisz E.The two faces of blue light: From treating inflammation to causing oxidative stress in the skin. Biomed Pharmacother, 2025; 191: 118442.
11. Wortzman M, Nelson DB.A comprehensive topical antioxidant inhibits oxidative stress induced by blue light exposure. J Cosmet Dermatol, 2021; 20(4): 1160–1165.
12. Chen J, Liu Y, Zhao Z, Qiu J.Oxidative stress in the skin: Impact and related protection. Int J Cosmet Sci, 2021; 43(5): 495–509.
13. Petruk G, Del Giudice R, Rigano MM, Monti DM.Antioxidants from plants protect against skin photoaging. Oxid Med Cell Longev, 2018; 2018: 1454936.
14. Nichols JA, Katiyar SK. Skin photoprotection by natural polyphenols. Arch Dermatol Res, 2010; 302(2): 71–83.
15. Pandey P, Sinha S, Akhade KS.Effects of visible light and role of antioxidants in skin health. Int J Res Med Sci, 2023.
16. Li Y et al. Therapeutic potential of flavonoids in oxidative stress-related dermatoses. Front Pharmacol, 2021.
17. Rodríguez-Concepción M et al. Effects of carotenoids and flavonoids on UV-induced skin damage. Nutrients, 2022; 14: review.