WORLD JOURNAL OF PHARMACY AND PHARMACEUTICAL SCIENCES
ISSN 2278 – 4357 Impact Factor 8.025
Volume 14, Issue 12, 338-352 Review Article Coden USA: WJPPAJ

FORMULATION AND EVALUATION OF THE POLYMER-MODIFIED HERBAL CREAM CONTAINING NEEM AND LIQUORICE WITH DUAL ACTIVITY AGAINST HSV AND CANDIDIASIS

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Article Received on 22 October 2025,
Article Revised on 11 Nov. 2025,
Article Published on 01 Dec. 2025,

https://doi.org/10.5281/zenodo.17734893

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How to cite this Article: Prof. Kulkarni A. S.*, Prof. Babar C. V., Acharekar L. D., Banavalikar S. S., Chavan S. G., Dichvalkar D. D., Kolse S. S. (2025). Formulation And Evaluation Of The Polymer-Modified Herbal Cream Containing Neem And Liquorice With Dual Activity Against Hsv And Candidiasis. World Journal of Pharmacy and Pharmaceutical Sciences, 14(12), 338–352.
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ABSTRACT

Viral and fungal infections such as Herpes Simplex Virus (HSV) and Candidiasis remain persistent global health challenges, often leading to discomfort, recurrence and resistance to conventional therapies. The limitations associated with synthetic antiviral and antifungal agents, including acyclovir and azoles such as side effects and reduced efficacy due to resistance have encouraged the exploration of safer, natural alternatives. The present study focuses on the formulation and evaluation of a polymer-modified herbal cream containing neem (Azadirachta indica) and liquorice (Glycyrrhiza glabra) extracts for enhanced antiviral and antifungal activity. Natural polymers, namely xanthan gum and acacia gum were physically modified through blending to improve viscosity, spreadability, stability and drug release characteristics. An oil-in-water cream base selected for its non-greasy texture, easy washability and soothing properties making it suitable for application on sensitive or inflamed skin. The formulate herbal cream was subjected to various physicochemical and stability evaluations, including pH determination, viscosity measurement, spreadability test, homogenesity, washability, irritancy and accelerated stability studies. The results revealed that the developed cream was smooth, uniform, non-irritant and stable under normal storage

conditions with pH compatibility close to that of human skin. The incorporation of modified polymers significantly enhanced the texture, consistency and performance of the cream while maintaining the therapeutic efficacy of the herbal extracts. Overall, this study demonstrates that the polymer-modified herbal formulation offers a safe, effective and eco-friendly topical alternative for the management of herpes simplex virus and candidiasis. Future work may include *in-vitro and in-vivo* testing, clinical evaluations and scale-up studies to validate its therapeutic potential and develop it into a commercially viable product.

KEYWORDS: Herbal Cream, Neem, Liquorice, Xanthan Gum, Acacia, Polymer Modification, Antiviral, Antifungal, HSV, Candidiasis.

INTRODUCTION

Skin infection are among the most widespread health issues affecting individuals globally accounting for a significant proportion of dermatological disorders. Among them viral infections such as herpes simplex virus (HSV) and fungal infections such as candidiasis are of particular concern due to their recurrent nature, transmission potential and impact on patient comfort and quality of life. HSV and DNA virus causes painful and recurrent sores on the skin and mucous membrane while candidiasis mainly due to candida albicans leads to fungal infections of the skin oral cavity genital areas and in some cases may become systemic. HSV causes painful vesicular lesions and inflammation while Candida albicans and related fungal species lead to itching, irritation and skin damage particularly in moist body areas.[1,2,3]

Etiology of Disease

Herpes Simplex Virus (HSV) infection is cause by Herpes Simplex Virus (HSV-1) and type 2 (HSV-2) which are highly contagious DNA viruses transmitted through direct contact with infected saliva, mucosal secretions or skin surfaces. HSV-1 generally causes orofacial lesions while HSV-2 primarily leads to genital infections. After entering through small breaks or abrasions in the skin or mucous membranes the virus replicates within epithelial cells producing vesicular lesions. It then travels via sensory nerves to the dorsal root ganglia where established latency. Reactivation can occur due to triggers such as fever, stress hormonal changes, ultraviolet exposure or immunosuppression leading to recurrent outbreaks at near the initial infection site.[4,5]

Candidiasis is cause predominantly by candida albicans an opportunistic fungal organism that normally residue as a commensal in the oral cavity, gastrointestinal tract and genital mucosa. Under favourable condition such as high humidity, poor hygiene, weakened immunity, diabetes and prolong antibiotic use or hormonal imbalance this yeast converts into it's invasive hypha form resulting in infection. The fungus adheres to epithelial cells and releases enzyme like proteases and lipases that damage tissue causing redness, itching, burning and white patches on the affected area. It can also spread through direct skin contact or contaminated surfaces and in serves cases can enter the bloodstream leading to systemic candidiasis.[6]

Although various synthetic drugs such as acyclovir and fluconazole are commercially available for topical use their long-term application often results in undesirable effects including skin irritation, allergic response and microbial resistance. The increasing prevalence of drug resistant viral and fungal strains highlights the need for the safer more biocompatible alternatives. As a result, herbal based formulation have emerged as a promising approach combining multiple phytoconstituents with synergistic therapeutic potential and minimal adverse effects. Among the wide range of medicinal plants, Neem (Azardirachta indica) and Liquorice (Glycyrrhiza glabra) have been extensively recognized in traditional and modern medicine for their antiviral, antifungal, anti-inflammatory and antioxidant properties. Neem is rich in bioactive constituents such as azadirachtin, nimbidin, nimbin and glabridin which are known to suppress viral replication particularly of HSV-1 and HSV-2 by interfering with viral gene expression and protein synthesis. Glycyrrhizin also provides anti-inflammatory benefits reducing erythema and swelling in infected skin regions. The development of topical herbal cream incorporating these extracts offers several therapeutic advantages. Topical delivery enables direct application at the infection site, enhances drug retention, reduces systemic exposure and ensures rapid onset of action. To further optimize the stability, spreadability and texture of the formulation a polymer modified blend of Xanthan gum and Acacia is incorporated as a natural stabilizer and viscosity enhancer. This polymeric combination provides desirable rheological properties, prevents phase separation and maintains consistency during storage. Additionally, the formulation integrates Shea butter, Glycerin, Propylene glycol, Tween 80 and Light liquid paraffin which collectively function as emollients, humectants, emulsifiers and penetration enhancers. These excipients not only improve the aesthetics appeal of the product but also maintain skin hydration and enhance the transdermal delivery of active phytoconstituents. The present

study aims to formulate and evaluate an herbal cream with dual therapeutic activity providing antiviral protection against herpes simplex virus and antifungal candida albicans. The combination of neem and liquorice extract supported by a natural polymeric base is expected to yield a stable, effective and patient-friendly topical formulation. This study emphasizes the integration of traditional herbal knowledge with modern formulation technology promoting a sustainable, non-toxic and eco-friendly approach to dermatological therapy.[2,3]

Rationale for selection of Cream Dosage Form

The cream dosage form was selected for this formulation due to its superior therapeutic effectiveness, physical stability and patient acceptability compared to other topical systems like ointments, gels or lotions. Creams are semisolid emulsion usually of the oil-in-water (O/W) type providing a smooth non greasy texture and excellent spread ability suitable for both dry and moist skin conditions. In this study, the herbal cream will incorporate Neem (Azadirachta indica) and Liquorice (Glycyrrhiza glabra) extracts to achieve dual antiviral and antifungal activity. The cream base will help in the uniform dispersion of both hydrophilic and lipophilic phytoconstituents ensuring effective localized action against Herpes Simplex Virus (HSV) and Candidiasis Unlike ointments which are greasy for lotions which have poor retention the cream will offer better absorption ease of application and aesthetic appeal. The incorporation of Xanthan gum and acacia as a natural polymers will enhance viscosity, stability and texture of the formulation. Thus, the cream formulation will be designed as a stable, effective and dermatologically safe vehicle for the delivery of Neem and Liquorice extracts in the treatment of viral and fungal skin infections.[7]

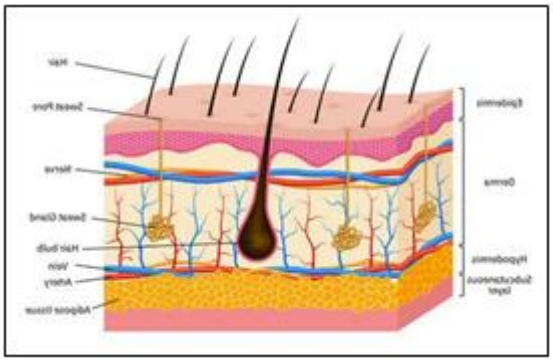


Fig. No.1: Skin Anatomy.[8]

Polymer Modification

Polymer modification refers to the process of altering the physical, chemical or surface characteristics of polymers to improve their functional performance in pharmaceutical

formulations. Natural polymers such as xanthan gum and acacia are widely employed owing to their safety, biodegradability and biocompatibility. However, these polymers often exhibit certain limitations including low viscosity, poor stability and limited bioadhesion. Therefore, modification of such polymers is undertaken to enhance their physicochemical and functional properties, including bioadhesion, mechanical strength and controlled drug release thereby rendering them more suitable for topical delivery systems such as creams and gels.[9] In the present study xanthan gum and acacia gum were selected for physical modification due to their natural origin, biocompatibility and capacity to improve the stability and performance of topical formulations. Physical modification through polymer blending was adopted as a simple, eco-friendly, and cost-effective approach to overcome the inherent limitations of individual polymers while preserving their chemical integrity. This strategy will be helpful to enhance the viscosity, spreadability and give the controlled drug release which are essential for the development of a safe, effective and stable herbal cream exhibiting dual therapeutic activity against Herpes simplex virus (HSV) and Candidiasis.[10]

REVIEW OF INGREDIENTS

1] Neem (Azadirachta Indica)



Fig. No. 2: Azadirachta Indica.[11]

Biological Source: Neem consists of dried leaves, bark, seeds, and oil obtained from *Azadirachta indica A. Juss.*

Synonyms: Margosa tree, Indian Lilac, Nimba, Arishta.

Family: Meliaceae.

Geographical Source: Native to India, Myanmar, Bangladesh, Pakistan; cultivated throughout Southeast Asia, Africa, tropical America.

Category: Bitter tonic, antimicrobial, insecticidal, astringent, anti-diabetic plant drug.[12]

2] Liquorice (Glycyrrhiza glabra L.)



Fig. No.3: Glycyrrhiza Glabra L.[13]

Biological Source: Liquorice consists of dried roots and stolon's of Glycyrrhiza glabra Linn.

Synonyms: Mulethi, Yashtimadhu, Sweet root.

Family: Fabaceae (Leguminosae).

Geographical Source: Native to Southern Europe, Western and Central Asia; cultivated in India (Punjab, Kashmir), Iran, Afghanistan, Spain, Italy.

Category: Demulcent, expectorant, anti-ulcer, anti-inflammation.[14]

Table No. 1: Herbal Agents with Antiviral and Antifungal effect.[15,16]

Herbal Ingredient	Key Bioactive Compounds	Integrated Mechanistic Pathways	Primary Therapeutic Effects
Neem (Azardirachta indica)	Nimbidin, Nimbin, Azadirachtin, Gedunin, Quercetin	-Inhibits viral replication by blocking HSV DNA polymerase and glycoprotein synthesis. -Distrupts fungal cell membrane integrity. -Reduce inflammation through inhibition of prostaglandins and cytokines. -Promotes wound healing and tissue regeneration.	-Exhibits potent antiviral activity against HSV-1 and HSV-2. -Antifungal activity against Candidia species. -Provides anti-inflammatory and healing effects on infected or inflamed skin.
Liquorice (Glycyrrhiza glabra)	Glycyrrhiza, Liquiritin, Glabridin, Flavonoids	-Inhibits HSV viral attachment and replication. -Modulates immune response and reduces inflammation. -Exerts antioxidant and antimicrobial effects. Enhances epithelial healing.	-Possesses antiviral activity against HSV and other viruses. -Shows antifungal and anti-inflammatory effects. -Helps in skin soothing and wound healing.

FORMULATION APPROACH AND SCIENTIFIC RATIONALE: The present work is designed to develop an antiviral and antifungal herbal cream formulation utilizing the potent herbal extract of Neem (Azadirachta indica) and Liquorice (Glycyrrhiza glabra) in combination with polymer modified blend of Xanthan gum and Acacia. This formulation aims to provide an effective topical therapeutic approach for the management of Herpes

Simplex Virus (HSV) and Candidiasis. The selection of these herbal ingredients is based on their well-documented antimicrobial, antiviral, antifungal and anti-inflammatory properties which collectively contribute to enhanced healing and skin protection. Neem extract will serve as a key bioactive agent due to its broad-spectrum antimicrobial and antiviral properties will be attribute to compounds such as azadirachtin, nimbin and nimbidin which are known to inhibit viral replication and fungal growth. Liquorice extract will be incorporated for its glycyrrhizin and flavonoid content which exhibit strong antiviral, anti-inflammatory and soothing effects on infected and inflamed skin therapy supporting tissue regeneration and reducing irritation. The combination of these two extracts is expected to produce synergistic therapeutic activity enhancing both antiviral and antifungal potential. The design formulation will be designed as an oil-in-water (O/W) emulsion type cream developed through a controlled emulsification process. Initially separate oil and aqueous phases will be prepared. The oil phase will consist of ingredients such as light liquid paraffin, beeswax, shea butter and Tween 80 which will be accurately weighed and gently melted in a clean beaker at 70 ± 2℃. Simultaneously the aqueous phase will include glycerin, propylene glycol and the polymer blend (Xanthan gum and Acacia gum) dissolved in purified water, maintain at the same temperature. Once both phases reach uniform temperature the aqueous phase will be gradually incorporated into the oil phase with continuous stirring under controlled conditions to ensure stable emulsion formation. The emulsion will then be allowed to cool gradually under gentle stirring to maintain consistency and prevent phase separation. Following temperature reduction below 40℃ the herbal extract of neem and liquorice will be incorporated with continuous gentle mixing to ensure uniform distribution without degradation of active constituents. The formulation will then be adjusted to skin compatible pH (6.0-6.5) and preserved using a suitable agent such as methyl paraben. This formulation is designed to produce a stable, smooth and easily spreadable topical cream capable of delivering herbal actives effectively at the site of infection. The designed herbal cream is expected to serve as a safe, effective and patient friendly alternative to synthetic topical agents, reducing the risk of side effects while enhancing therapeutic outcomes for viral and fungal skin infection.[17]

Table No. 2: Formulation Composition of a Polymeric-Modified Herbal Antiviral and Antifungal Cream using Neem and Liquorice Extracts.[18,19,20]

Sr. no	Ingredient	Amount for 100 gm	Calculated Amount for 30 gm	Concentration (% w/w)	Functions
1.	Neem Extract	5.00	1.50	5.00	API, Antifungal.
2.	Liquorice extract	2.00	0.60	2.00	API, Antiviral, Anti-inflammatory
3.	Shea butter	27.50	8.25	27.50	Stabilizer, Improve texture.
4.	Bees wax	2.50	0.75	2.50	Natural thickener.
5.	Aloe vera	5.00	1.50	5.00	Humectant, Moisturizer.
6.	Propylene glycol	3.33	1.00	3.33	Co-solvent, Penetration enhancer.
7.	Light Liquid paraffin	10.00	3.00	10.00	Emollient, Improve Spreadability.
8.	Tween 80	5.00	1.50	5.00	Emulsifier.
9.	Methyl paraben	0.50	0.1s5	0.50	Preservative.
10.	Modified blend (Xanthan gum + Acacia)	2.00	0.60	2.00	Natural Stabilizer, Improve consistency.
11.	Distilled water	QS	QS	-	Vehicle.

Table No. 3: Formulation Approach and Scientific Rationale.[21,22]

Challenge	Description	Formulation Solution
Phase Separation and Instability	Herbal creams may exhibit separation of oil and aqueous phases, affecting stability and consistency.	Incorporation of a *Polymer-modified blend* (Xanthan gum + Acacia) as a natural stabilizer and thickening agent to enhance emulsion stability and maintain uniform consistency.
Poor Spreadability and Absorption	Some herbal actives have limited penetration through the skin barrier.	Use of *light liquid paraffin* and *propylene glycol* to improve spreadability, skin absorption and enhance the delivery of active ingredients.
Microbial contamination Risk	Herbal Formulation are prone to microbial growth due to natural ingredients.	Addition of *methyl paraben* as a safe and effective preservative to prevent microbial contamination and extend product shelf life.
Loss of Active Potency	Bioactive compounds in Neem and Liquorice may degrade upon heating or prolonged storage.	Controlled processing temperature and inclusion of *antioxidant rich Shea butter* and *Aloe vera* to protect actives and improve formulation.
Viscosity and Texture Issues	Inadequate viscosity may lead to poor handling, leakage or reduced skin adherence.	Use of *Modified Polymer blend (Xanthan gum + Acacia)* to provide optimum viscosity, smooth texture and enhanced the feel upon application.
Patients Compliance and sensory	Topical herbal creams may feel greasy or sticky reducing user performance.	Optimized ratio of oil-to-water phase with emollient agents such as *Shea butter* and *light liquid paraffin* to create

Acceptability		a non-greasy, easily absorbable formulation with enhanced patient acceptability.
Skin Irritation Possibility	Some herbal actives may cause mild irritation on sensitive skin.	Incorporation of Aloe vera gel for its soothing, moisturizing and anti-inflammatory properties to ensure skin comfort and tolerance.

Addressing Topical Treatments Challenges in Viral and Fungal Skin Infections in Patients

Viral and fungal skin infection such as *Herpes Simplex Virus* (HSV) *and Candidiasis* are common dermatological conditions causing discomfort, irritation and recurrent outbreaks. HSV spreads mainly through direct contact and remains latent in sensory ganglia, reactivating under stress or low immunity. Candidiasis primarily caused by Candidia albicans result from overgrowth of skin flora due to factors like excessive moisture, antibiotic use, poor hygiene, leading to itching, redness and inflammation in moist areas. Conventional topical drugs like acyclovir and fluconazole provide temporary relief but often cause skin irritation, allergic reactions and microbial resistance upon prolonged use. Ointments are greasy and less appealing while lotions lack retention on infected site. To overcome these issues the present study will focus on developing an herbal cream containing Neem (Azardirachta indica) and Liquorice (Glycyrrhiza glabra) extracts known for their antiviral, antifungal and anti-inflammatory activities. The formulation will include a polymer modified bled of xanthan gum and acacia to enhance stability and texture. Additionally, Shea butter, Glycerin, Propylene glycol, Tween 80 and Light liquid paraffin will act as moisturizing and emulsifying agents improving spreadability and patients' compliance. This proposed herbal cream aims to provide a safe, effective and eco-friendly topical treatment with dual action against HSV and Candida albicans ensuring better stability, absorption and user acceptability compared to compared to conventional formulations.[23,24,25,26]

EVALUATION PARAMETERS: The rigorous evaluation of the designed **Antiviral and Antifungal Herbal Cream formulation** is essential to establish its quality, stability, safety and therapeutic efficacy. A series of standardized physicochemical, microbiological and analytical tests will be conducted in accordance with international pharmacopeial and regulatory guidelines to ensure the formulation's suitability for clinical and topical application.

Table No. 4: Evaluation Parameters for the modified polymer blend of xanthan gum and acacia.[9]

Sr. No.	Parameter	Objective	Method/Instrument	Acceptance Criteria
1.	Organoleptic Properties	To assess visual and sensory characteristics such as colour, texture and uniformity	Visual and tactile inspection	Smooth, Uniform, Lump-free blend
2.	Solubility	To determine solubility and dispersion uniformity	Dispersion test in suitable solvent	Should disperse uniformly without clumping
3.	Swelling Index	To evaluate swelling behavior and water absorption capacity	Swelling index determination method	Good swelling
4.	Viscosity	To determine the consistency and flow behavior of the polymer blend	Brookfield viscometer	Moderate viscosity higher than individual polymers
5.	pH	To ensure chemical stability and compatibility	Digital pH meter	pH 5.0-7.0
6.	Stability Study	To ensure physical and chemical stability of the polymer blend	Stability study	Stable, no separation or precipitation

Table No. 5: Evaluation Parameters and Corresponding Acceptance Criteria for Herbal Cream Formulation.[27]

Sr. No.	Parameter	Objective	Method/Instrument	Acceptance Criteria
1.	Organoleptic Characteristics	To asses visual and sensory characteristics such as colour, odour, texture, consistency and appearance	Visual and tactile inspection.	Smooth, uniform texture with characteristics herbal colour and odour.
2.	pH Determination	To ensure chemical stability and compatibility	Digital pH meter(1% W/V dispersion in distilled water at room temperature)	pH between 6.0-6.5 suitable for topical application.
3.	Viscosity Measurement	To determine consistency and spreadability of cream	Brookfield Viscometer	Uniform viscosity ensuring stable 4emulsion system.
4.	Spreadability test	To evaluate ease of application and distribution over the skin surface.	Glass slide method using 1000 gm weight; $S = \frac{m \times L}{T}$	Cream should exhibit good spreadability with minimal time of slide separation.
5.	Moisture content	To evaluate formulation stability and water retention.	Hot air oven at 60°C for 30min; $MC = \frac{w-d}{w} \times 100$	Controlled moisture level indicating formulation stability.
6.	Homogeneity test	To confirm uniform blending of ingredients without lumps.	Physical examination by touch and visual observation.	Smooth and homogenous appearance without phase separation.
7.	Washability Test	To determine ease of removal of skin surface.	Application on skin followed by washing with tap water.	Easily washable without leaving residue.
8.	Accelerated Stability Studies	To evaluate stability under different environmental conditions.	Storage at room temperature parameters. observed	No significant change in pH, colour, odour or phase separation.

			at 20 days intervals for 30 days.	
9.	Irritancy test	To assess skin tolerance and check for erythema and edema.	Patch test on dorsal surface of hand for 24 hours.	No visible signs of irritation or redness observed.
10.	Phase separation study	To determine the stability of emulsion under temperature variations.	Storage between 25℃- 100℃ for 30 days in closed container.	No phase separation observed during study period.
11.	UV Spectrophotometric Analysis	To confirm the presence and stability of active herbal components (Neem and Licorice extract).	UV-Visible Spectrophotometer(200-400)	Characteristic peaks confirming stability and presence of actives
12.	Diffusion Study	To determine the rate and extent of drug release from the formulated herbal cream through skin membrane.	Performed using Franz diffusion cell.	The diffusion profile should control and sustained drug release with consistent and reproducible values among replicates.

Need and Objective

Need

1. Herpes Simplex Virus (HSV) and Candidiasis will continue to be significant infections affecting the skin and mucosal surfaces. The currently available synthetic antiviral and antifungal agents may lead to adverse effects and drug resistance creating a need for safer alternative treatments.
2. Studies have shown that the incidence of HSV and Candidiasis is comparatively higher in women than in men mainly due to physiological and hormonal factors influencing susceptibility.
3. Herbal extracts such as Neem (Azadirachta indica) and Liquorice (Glycyrrhiza glabra) will be explored for their potential antiviral and antifungal properties as they are known to provide results with minimal side effects.
4. The formulation of a topical herbal cream will be developed to provide a non-invasive, targeted and convenient mode of delivery for natural actives directly to the infected sites thereby enhancing localized action and patient compliance.
5. The use of natural polymers such as Xanthan gum and Acacia gum along with their modification, will be incorporated to improve the creams viscosity, spreadability, stability and drug release profile, thus enhancing overall therapeutic performance.
6. Thise study will aim to provide an eco-friendly, safe and effective herbal formulation as a promising alternative to synthetic drugs for managing HSV and Candidiasis.

Objectives

1. To formulate a stable herbal cream using liquorice and neem extracts.
2. To support dual antiviral and antifungal activity through literature evidence.
3. To propose safe, effective and stable formulation.
4. To select suitable herbal extracts with reported antiviral and antifungal properties.
5. To modify natural polymers through physical blending to enhance the cream's viscosity, spreadability and stability.
6. To evaluate the physicochemical properties of the formulated cream (appearance, pH, spreadability, viscosity, etc.).
7. To evaluate the safety, efficacy and stability of the cream under storage conditions.

CONCLUSION

This study focuses on the formulation and design of a polymer modified herbal cream containing Neem (Azadirachta indica) and Liquorice (Glycyrrhiza glabra) extracts integrated with a modified polymer blend (Xanthan gum + Acacia gum) to enhance the formulation's stability, spreadability and therapeutic efficiency. The designed formulation aims to provide broad spectrum antiviral and antifungal activity along with anti-inflammatory and skin soothing properties suitable for the topical application. Neem contributes its well documented antimicrobial and wound healing potential while liquorice enhances skin protection, reduces oxidative stress and supports antiviral defence. The modified polymer blend further stabilizes the formulation, improves viscosity and promotes sustained release of active compounds ensuring uniform skin absorption and enhanced effectiveness. This herbal cream is envisioned to serve as a safe, natural and effective alternative to conventional topical treatments offering dual therapeutic and cosmetic benefit. Future studies will focus on *in-vitro and in-vivo* evaluations to confirm its efficacy, stability and safety for potential clinical and commercial application.

ACKNOWLEDMENTS

We convey my heartiest thanks to Prof. Amar Shripati Kulkarni for his most valuable suggestion, constant encouragement and Affectionate guidance during the period of project work experimentation. It will also help us to improve our knowledge.

CONFLICT OF INTEREST: None.

FINACIAL SUPPORT: None.

ETHICS STATEMENT: None.

REFERENCES

1. Tiwari V, Darmani NA, Yue BYJT, Shukla D. In vitro antiviral activity of neem (Azadirachta indica L.) bark extract against herpes simplex virus type-1 infection. Phytotherapy Research, 2010; 24(8): 1132-1140.
2. Xu L, Zhong XL, Xi ZC, Li Y, Xu H. Medicinal plants and natural compounds against acyclovir-resistant HSV infections. Frontiers in Microbiology, 2022; 13: 1025-1032.
3. James C, Harfouche M, Welton NJ, Turner KM, Abu-Raddad LJ, Gottlieb SL, et al. Global and regional estimates of the prevalence and incidence of herpes simplex virus type 1 and type 2 infection: a systematic review and modelling study. Lancet Global Health, 2020; 8(8): 1162–1171.
4. Zhu S, Weng C, Liang H, Wen Z, Zhang X, Li F. Pathogenesis and virulence of herpes simplex virus. Virulence. Taylor and Francis, 2021; 13(2): 241-245.
5. Parambath S, et al. Candida albicans - A systematic review to inform the World Health Organization fungal priority pathogens list. Frontiers in Microbiology / PMC, 2024; 230-235.
6. Talapko J, Jadan D, Salkic N, Kapitanovic S, Mrsic V. Candida albicans- Virulence factors and clinical manifestations. Journal of Fungi., 2021; 7(6): 316-323.
7. Chauhan L, Gupta S. Creams: A review on classification, preparation methods, evaluation and its applications. Journal Drug Delivery, 2020; 10: 281-289.
8. The image of skin anatomy was taken from internet source https://share.google/images/9q7WGud7TU6Knm7gJ
9. Aswathy KS, Kannan RR, Shinde A, Tiwari RR. Advances in xanthan gum-based systems for the delivery of therapeutic agents. Indian Journal of Pharmaceutics, 2023; 15(2): 402-412.
10. Shit SC, Shah PM, Majumder M, Bandyopadhyay A, Ray S. The use of natural gums to produce nano-based hydrogels and films for topical application. International Journal of Pharmaceutics, 2022; 625: 122048-122058.
11. The image of neem was taken from internet source https://share.google/images/uOYF9PKoNvAIzMDo7
12. Subapriya R, Nagini S. Medicinal properties of neem leaves: a review. Current medicinal Chemistry Anticancer Agents. Bentham Science Publishers, 2005; 5(2): 149-156.
13. The image of liquorice was taken from internet source https://share.google/images/Z4qPUAe32mDnYUql1

14. Pastorino G, Cornara L, Soares S, Rodrigues F, Oliveria MBPP. Licorice (Glycyrrhiza glabra): a phytochemical and pharmacological review. Phytotherapy Research, 2018; 32(12): 2323-2339.
15. Mahmoud DA, Hassanein NM, Youssef KA, Abou Zeid MA. Antifungal activity of different neem (Azadirachta indica) leaf extracts and the effect on Candida species. Brazilian Journal Microbiology, 2011; 42(3): 1007–1015.
16. Ghannad MS, Mohammadi A, Safiallahy S, Faradmal J, Azizi M, Mohammadi A. The effect of aqueous extract of Glycyrrhiza glabra on Herpes Simplex Virus Indian Journal Microbiology, 2014; 7(7): 1161-1166.
17. Patel V, Jain A, Tiwari M. Formulation and evaluation of herbal cream. International Journal Pharmaceutical Science Research, 2023; 83(2): 64–69.
18. Desplanques S, Renou F, Grisel M, Malhiac C. Impact of chemical composition of xanthan and acacia gums on the emulsification and stability of oil-in-water emulsions. Carbohydrate Polymer. Food Hydrocolloids, 2012; 87(1): 676–686.
19. Megnanou RM, Belleville M-P, Kapseu C, et al. Improving the optimized shea butter quality: a great potential for its application in cosmetics. Food and Nutrition Sciences, 2015; 6: 1088-1103.
20. Torfs E, Hectors TL, Vanparys P, et al. A perspective on the safety of parabens as preservatives in cosmetics. Regulatory Toxicology and Pharmacology, 2020; 114: 1046-1058.
21. Darbre PD, Harvey PW. Parabens can enable hallmarks and characteristics of cancer in human breast epithelial cells: a review of the literature with reference to new exposure data and regulatory status. Journal of Applied Toxicology, 2023; 43(7): 1121-1137.
22. Elderwy Y, Abdel-Ghaffar A, El-Banna H, El-Khatib A. Influence of Guar Gum and Xanthan Gum on the Rheology and Stability of Emulsion Systems. Processes, 2025; 13: 3301-3315.
23. Shentu CY, Huang Y, Li X, Zhang L. Progress and challenges of topical delivery technologies for skin diseases: from classical formulations to advanced nanosystems. International journal of nanomedicine, Pharmaceutics, 2024; 16(3): 1072-1078.
24. Pai V, Shukla S, Nair P. Antifungal resistance in dermatology: mechanisms, clinical impact and strategies to overcome resistance. Indian Dermatology Online Journal, 2018; 9(5): 349–356.

25. Costa-de-Oliveira S, Rodrigues AG, Henriques M. Candida albicans Antifungal resistance and tolerance: mechanisms and clinical implications. Journal of Fungi (Basel)., 2020; 6(4): 176-180.
26. Cheng T, Li X, Wang Z, et al. Advances and challenges in topical/transdermal treatment of skin diseases: formulation, penetration and clinical translation. Indian Journal of Pharmaceutics, 2023; 15(8): 2165-2170.
27. Shweta A. Bandgar Formulation of antifungal herbal cream International Research Journal if Modernization in Engineering Technology and Science, 2024: 5(6): 1712-1713.