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Formulation and evaluation of polyherbal anti-pollution cream

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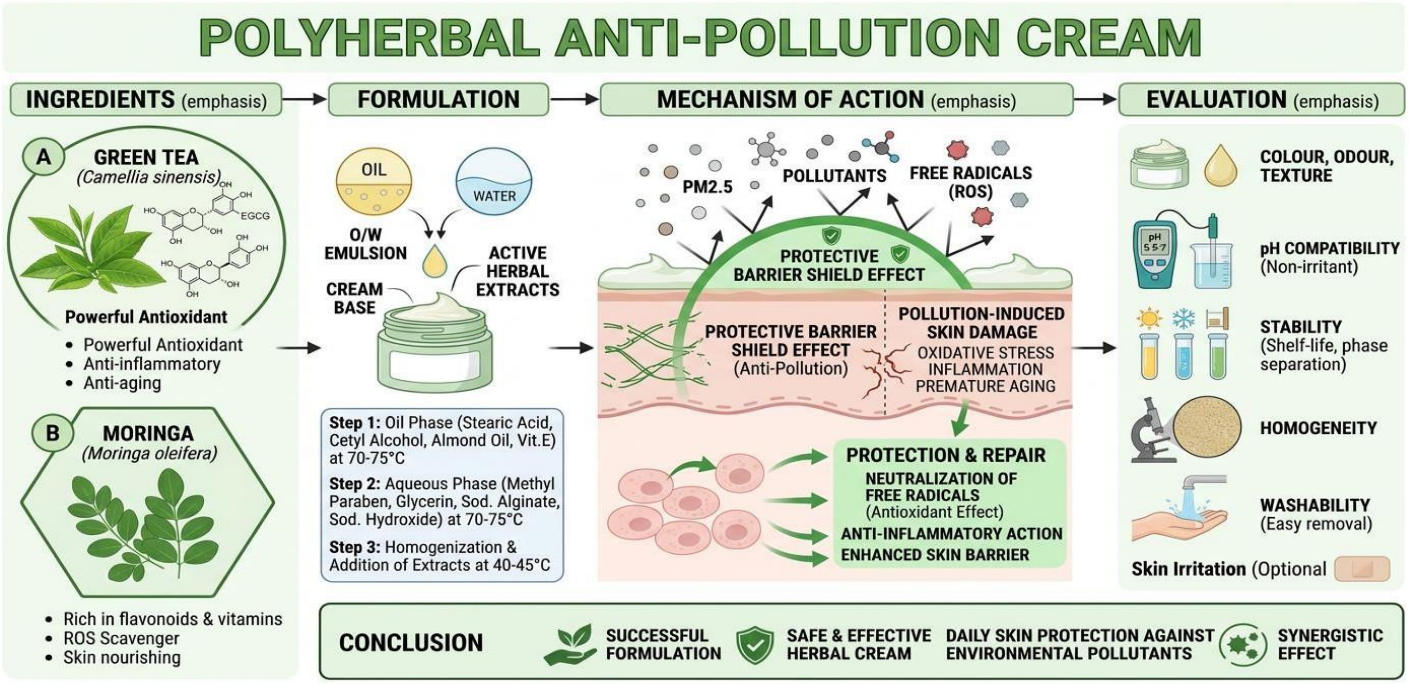
ABSTRACT

As the global cosmetic industry is moving towards sustainable and bioactive alternatives, the need for goods providing therapeutic advantages without the side effects of synthetic chemicals is increasing. Environmental pollution is a primary factor for skin damage, leading to premature aging, pigmentation and inflammation due to the formation of reactive oxygen species (ROS). The present work focuses on the preparation and assessment of anti-pollution herbal cream using extracts of Green tea (Camellia sinensis) and Moringa (Moringa oleifera) which are rich in antioxidants and anti-inflammatory agents. The cream was formulated as an oil-in-water (O/W) emulsion with suitable excipients to give stability, smoothness and ease of application. The prepared formulation was assessed for morphological and physiological characteristics, pH, stability, spreadability and skin irritation. The formulation showed good physical appearance, homogeneity and stability. Bioactive compounds help to counteract free radicals, reduce oxidative stress, and protect the skin barrier. Overall, the developed cream is a safe and effective herbal formulation for protecting skin against pollution-induced damage.



Keywords: Pollution, Herbal formulation, Cream, Moringa, Green tea.

INTRODUCTION

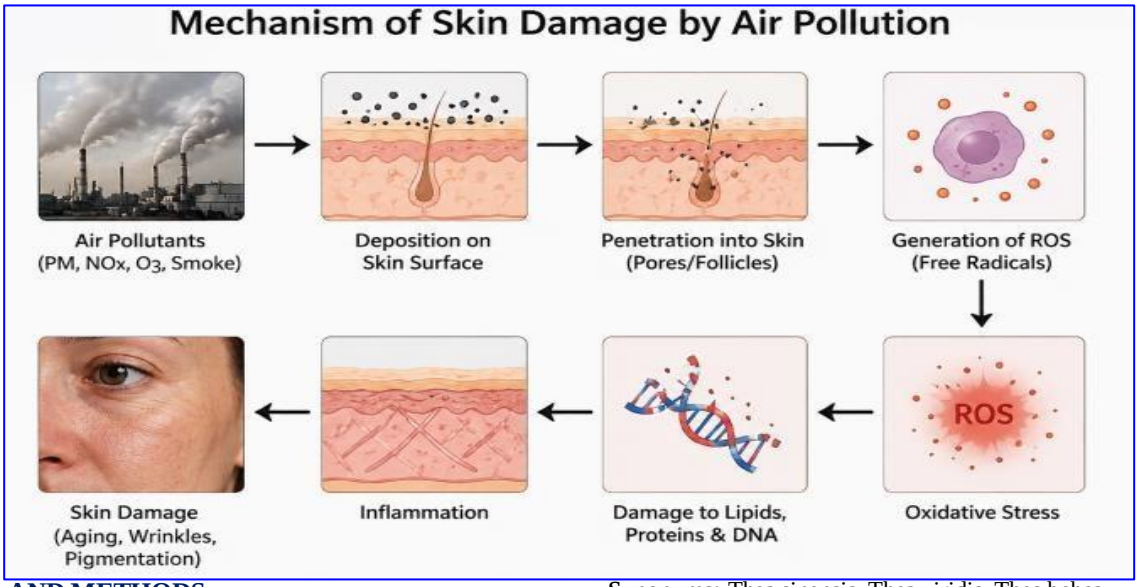
Environmental pollution has emerged as one of the most critical external factors adversely affecting skin health in modern times. Rapid industrialization, urbanization, and increased vehicular emissions have led to higher exposure to pollutants such as particulate matter (PM), polycyclic aromatic hydrocarbons (PAHs), heavy metals, nitrogen oxides, and volatile organic compounds. These pollutants interact with the skin either by direct deposition on the surface or by penetrating through hair follicles and the stratum corneum, leading to the generation of reactive oxygen species (ROS). Excessive ROS results in oxidative stress, which damages cellular components such as lipids, proteins, and DNA, ultimately causing premature aging, hyperpigmentation, inflammation, acne, and weakening of the skin barrier function. In response to these harmful effects, anti-pollution skincare has gained significant importance in cosmetic science. Anti-pollution creams are designed to provide a protective barrier against pollutants while delivering active ingredients that neutralize free radicals and enhance the skin's natural defense mechanisms. Among various formulations, oil-in-water (O/W) creams are widely preferred due to their non-greasy nature, better spreadability, and ease of application. The incorporation of natural antioxidants, particularly herbal extracts, has become a promising approach due to their safety and efficacy. Green tea (*Camellia sinensis*) and moringa (*Moringa oleifera*) are rich in polyphenols, flavonoids, and vitamins, which exhibit strong antioxidant properties. Therefore, the development of an herbal anti-pollution cream offers an effective and natural strategy to protect the skin from environmental damage and maintain overall skin health [1,2].

Skin damage by environmental pollution

Environmental pollution causes significant damage to the skin primarily through oxidative stress, inflammation, and disruption of the skin barrier. Pollutants such as particulate matter (PM), ozone, nitrogen oxides, heavy metals, and polycyclic aromatic hydrocarbons (PAHs) settle on the skin surface and can penetrate through hair follicles and the stratum corneum. Once inside, these pollutants stimulate the production of reactive oxygen species (ROS), which are highly unstable molecules that damage cellular components. Excessive ROS leads to oxidative stress, resulting in lipid peroxidation, protein oxidation, and DNA damage. This process weakens the structural integrity of the skin and impairs normal cellular functions. Additionally, pollutants activate inflammatory pathways, releasing cytokines that cause redness, irritation, and chronic inflammation. Over time, oxidative stress also triggers the breakdown of collagen and elastin by activating matrix metalloproteinases (MMPs), leading to premature aging, wrinkles, and loss of skin elasticity.

Furthermore, pollution disrupts the skin barrier by reducing essential lipids, increasing transepidermal water loss (TEWL), and causing dryness and sensitivity. It can also stimulate melanocyte activity, resulting in hyperpigmentation and uneven skin tone. Thus, prolonged exposure to environmental pollutants significantly deteriorates overall skin health [3,4].

Figure 1: Skin damage by environmental pollution



MATERIALS AND METHODS

Herbal ingredients

Green tea (Camellia sinensis)

Biological source

Green tea is biologically referred to as Camellia sinensis.

Family: Theaceae

Synonyms: Thea sinensis, Thea viridis, Thea bohea.

Habitat

It is native to the mountainous, humid regions of Southwest China, but is widely cultivated in Asia (notably in China, Japan, India, and Sri Lanka), as well as in Africa and Latin America.

Active phytoconstituents

The major catechin is epigallocatechin-3-gallate (EGCG), other polyphenolic compounds include flavonoids like Quercetin, Kaempferol, and Myricetin.

Green tea is derived from the leaves of *Camellia sinensis* and is classified as a non-fermented tea, which helps preserve its maximum bioactive constituents. It is rich in polyphenolic compounds, particularly catechins such as epigallocatechin gallate (EGCG), epigallocatechin (EGC), epicatechin gallate (ECG), and epicatechin (EC), with EGCG being the most active component. In addition, green tea contains alkaloids, amino acids, vitamins, and minerals that contribute to its biological activity. Due to its strong antioxidant and anti-inflammatory properties, green tea is widely used in cosmetic and pharmaceutical formulations, especially for protecting the skin against environmental damage and oxidative stress [5, 6].

Role of green tea in formulation

Green tea acts as a key active ingredient in the formulation due to its potent antioxidant activity, which helps in neutralising free radicals generated by environmental pollutants. It reduces oxidative stress and prevents damage to skin components such as lipids, proteins, and DNA. Its anti-inflammatory properties help in soothing skin irritation, redness, and inflammation caused by pollution. Green tea also inhibits collagen degradation, thereby reducing signs of premature aging like wrinkles and fine lines. Additionally, it improves skin hydration and provides a brightening effect, resulting in healthier and more radiant skin. Overall, it enhances the protective and anti-pollution efficacy of the cream [7].

Moringa (*Moringa oleifera*)

Biological source: Moringa oleifera commonly knowns as "drumstick tree" or "horseradish tree" is a versatile topical tree.

Family: Moringaceae.

Synonyms: Anoma moringa, Guilanda moringa, Moringa zeylanica, "Mungana" in Hindi.

Habitat: Originally from northern India, it is now extensively grown in tropical and subtropical areas.

Active phytoconstituents: Niazinin, Niazirin, Glucomoringin, Quercetin, Kaempferol, Cinnamic acid, Syringic acid, Vitexin, Stigmasterol, Caffeic acid, Isothiocyanate.

Moringa oleifera, commonly known as drumstick tree or miracle tree, belongs to the family Moringaceae. Its leaves are rich in flavonoids, phenolic compounds, vitamins (A, C, E), minerals, and essential amino acids. Important constituents such as quercetin, kaempferol, and chlorogenic acid provide strong antioxidant and anti-inflammatory properties [8, 9].

Moringa is widely used in cosmetic and pharmaceutical formulations due to its antioxidant, antimicrobial, anti-ageing, and skin-protective effects. It helps neutralize reactive oxygen species (ROS), reduce inflammation, protect the skin from pollution-induced damage, and improve overall skin health. Therefore, Moringa is considered an effective natural ingredient in anti-pollution herbal creams [10].

Role of moringa in formulation

Acts as a strong antioxidant and neutralizes free radicals (ROS).

Protects the skin from pollution-induced oxidative damage.

Reduces skin inflammation, redness, and irritation.

Provides antimicrobial activity against microorganisms.

Nourishes the skin due to the presence of vitamins and minerals.

Improves skin hydration and maintains moisture.

Prevents collagen degradation and reduces premature aging.

Enhances skin repair and improves overall skin health.

Excipients profile

Stearic acid

Stearic acid is a long-chain saturated fatty acid widely used in topical formulations as an emulsifying and thickening agent. It helps in the formation and stabilization of oil-in-water (O/W) creams and improves the consistency and texture of the formulation.

Cetyl alcohol

Cetyl alcohol is a fatty alcohol commonly used as a co-emulsifier and viscosity-enhancing agent in creams. It improves the stability, smoothness, spreadability, and emollient properties of the formulation.

Glycerin

Glycerin is a hygroscopic compound widely used as a humectant in cosmetic formulations. It attracts and retains moisture, thereby improving skin hydration, softness, and elasticity.

Sodium alginate

Sodium alginate is a natural polymer obtained from alginic acid and is used as a film-forming and thickening agent. It increases viscosity, stabilizes the emulsion, and forms a protective layer on the skin.

Sodium hydroxide

Sodium hydroxide is used as a neutralizing agent in cream formulations. It reacts with stearic acid to form sodium stearate, which acts as an emulsifying agent and helps in the formation of stable oil-in-water emulsions.

Vitamin-E

It is a strong antioxidant widely used in skincare formulations. It protects skin lipids from oxidative damage, reduces free radical activity, and provides anti-ageing and skin-protective effects.

Methyl paraben

Methyl paraben is a preservative used in pharmaceutical and cosmetic formulations to prevent microbial growth. It enhances the shelf life and stability of the cream by protecting it from bacterial and fungal contamination.

Distilled water

Distilled water acts as the continuous phase or vehicle in oil-in-water emulsions. It helps dissolve hydrophilic ingredients and ensures uniform distribution of active constituents within the formulation [11,12].

Table 1: Plant profile

Description	Green Tea	Moringa
Synonyms	Camellia sinensis, green tea	Moringa oleifera, Drumstick tree
Biological Source	Leaves of Camellia sinensis	Leaves of Moringa oleifera
Family	Theaceae	Moringaceae
Chemical Constituents	Catechins, EGCG, flavonoids, caffeine, vitamins	Quercetin, Kaempferol, vitamins A, C, E
Function	Antioxidant, anti-inflammatory, anti-ageing	Antioxidant, antimicrobial, skin-nourishing
Part Used	Leaves	Leaves
Nature	Rich in polyphenols	Rich in flavonoids and nutrients
Role in Formulation	Protects skin from oxidative stress	Provides hydration and anti-pollution effect

Table 2: Formulation table

Ingredient	Quantity %	Quantity (100 g)
Green Tea Extract	2%	2 g
Moringa Extract	2%	2 g
Stearic Acid	4%	4 g
Cetyl Alcohol	2%	2 g
Almond Oil	5%	5 g
Glycerin	4%	4 g
Sodium alginate	0.50%	0.5 g
Sodium hydroxide	1%	1 g
Vitamin E	0.50%	0.5 g
Methyl paraben	0.80%	0.8 g
Distilled Water	q.s.	~78.2 g
Fragrance	q.s.	Few drops

Method of extraction

Fresh leaves of selected plants were collected and washed properly with distilled water to remove dirt and impurities. The leaves were then shade-dried and crushed or ground into small pieces. A suitable solvent, methanol, was added to the crushed leaves to prepare a slurry. The mixture was stirred continuously and heated at 40–50°C for about 2–4 hours to allow proper extraction of active constituents. After extraction, the mixture was filtered first through muslin cloth and then through filter paper to obtain a clear filtrate. The filtrate was concentrated using a water bath to remove excess solvent and obtain the liquid extract. Finally, the prepared extract was stored in an airtight container at room temperature for further use in the formulation [13].

Antioxidant activity

DPPH free radical scavenging activity

Principle

Antioxidant activity of antioxidant substances was assessed by measuring their ability to scavenge radicals or donate hydrogen, using the stable radical DPPH.

DPPH (2,2-diphenyl-1-picrylhydrazyl): An antioxidant test known as the "free radical method" uses electron transfer to create a violet solution in ethanol. In the presence of an antioxidant molecule, stable free radical at room temperature is diminished, resulting in the formation of a colourless solution of ethanol. Antioxidants undergo a reaction with the stable free radical DPPH, resulting in the formation of pairs when a hydrogen donor is present. This reaction leads to the reduction of DPPH to DPPHH, causing a drop in absorbance from DPPH. When neutralised, radical DPPH turns pale yellow or colourless. Radical DPPH is deep violet in solution and is a radical to DPPH-H (2, 2-diphenyl-1 picrylhydrazine hydrate) in terms of the number of electrons collected.

The greater the degree of discolouration, the higher the reduction capacity, and this characteristic enables the observation of the reaction. The property and the number of starting radicals can be determined by analysing the shift in the optical strong absorption band, which is centred at 520 nm.

Preparation of solution and material required

Dissolve 1mg of powdered extracted material in 25 ml of methanol in a conical flask. Centrifuge the sample at a speed of 6000-8000 rpm for 15 minutes. After the centrifugation process, retrieve the tubes and pass the liquid portion (supernatant) through a filter paper. Dehydrate and conserve the specimen.

Preparation of sample stock solution

The extracted solution is dissolved in 10ml of methanol to prepare 400 mcg/ml solutions, and then serial dilutions are prepared for a required concentrated solution.

Preparation of DPPH solution (0.004% w/v)

1M DPPH preparation- weighs 4 mg of DPPH on a watch glass and dissolves in 100 ml methanol.

Preparation of standard ascorbic acid

2.5 ml of distilled H_2O was mixed with 2 mg of ascorbic acid to make a solution with a conc. of 800 mcg. We refer to this as the stock solution. Then the serial dilution was prepared as different concentrated solutions (12.50, 25, 50, 100, 200, and 400 mcg).

Preparation of control

3ml DPPH solution was utilised as a negative control; the blank for this solution is ethanol.

Procedure

From the standard ascorbic acid stock solution, prepare serial dilutions with methanol as different concentrated solutions as 1, 2, 3, 4, 5 and 6 ml of six test tubes, each containing ascorbic acid of

12.5, 25, 50, 100, 150, and 200 mcg, respectively in test tubes. Dispense 4 millilitres of DPPH solution into each test tube and well blend. Allow to incubate at ambient temperature for a duration of 30 minutes in a location devoid of light. The colour varies from dark violet to various shades of discolouration, depending on the strength of the antioxidant. Then the absorbance of the solution is measured at 520nm.

Percentage radical scavenging activity was calculated utilising the below-mentioned formula:

DPPH free radical scavenging activity = $[(A_0-A_1)/A_0 \times 100]$

Here,

A_0=Absorbance of control reaction

A1 = Absorbance in the presence of all extract sample and standard.

Prepare sample extract stock solution serial dilution with methanol of 1ml, 2ml, 3ml, 4ml, 5ml, and 6ml solution of 12.50mcg, 25mcg, 50mcg, 100mcg, 200mcg, and 400mcg in six test tubes. Dispense 4 millilitres of DPPH solution into each test tube and well blend. Allow to incubate at ambient temperature for a duration of 30 minutes in a location devoid of light. The color varies from dark violet to varying shades of discolouration, depending on the strength of the antioxidant. Then the absorbance of the solution is measured at 520nm. [92]

Percentage radical scavenging activity was calculated utilising the formula given below:

DPPH free radical scavenging activity = $[(A_0-A_1)/A_0 \times 100]$

Here,

A_0=Absorbance of control reaction

A1 = Absorbance in the presence of the extract sample and standard.

Method of preparation of cream

The anti-pollution herbal cream was prepared by the fusion method followed by emulsification technique for the preparation of an oil-in-water (O/W) cream. All the ingredients were accurately weighed according to the required formulation. The formulation was divided into two phases: oil phase and aqueous phase.

The oil phase consisted of stearic acid, cetyl alcohol, almond oil, and vitamin E. These ingredients were taken in a clean beaker and heated on a water bath at 70–75°C until completely melted and a clear homogeneous mixture was obtained.

In another beaker, the aqueous phase was prepared by dissolving methyl paraben in warm distilled water. Glycerin and the remaining distilled water were added, followed by sodium hydroxide with continuous stirring. Sodium alginate was then slowly added to avoid lump formation. The aqueous phase was also heated to 70–75°C.

After maintaining both phases at the same temperature, the aqueous phase was slowly added to the oil phase with continuous stirring using a mechanical stirrer to form a stable emulsion. During this process, stearic acid reacted with sodium hydroxide to form sodium stearate, which acted as an emulsifying agent.

The emulsion was homogenised to improve texture and stability, and then cooled gradually with gentle stirring. When the temperature reached 40–45°C, Green tea extract and Moringa extract were added to prevent degradation of active constituents. Finally, the cream was stirred until a smooth homogeneous consistency was obtained and then transferred into suitable containers for storage and evaluation.

Evaluation tests of anti-pollution herbal cream

Physical evaluation test

Physical evaluation was carried out to examine the appearance, color, odor, state, and consistency of the cream. The prepared cream showed a creamish color, pleasant odor, semi-solid nature, and smooth consistency suitable for topical application.

pH determination test

The pH test was performed to determine the compatibility of the cream with skin. About 1 g of cream was dispersed in 10 mL of distilled water and the pH was measured using a digital pH meter. The pH of the formulation was found to be in the range of 5.5–7, indicating that the cream is non-irritant and suitable for skin application.

Emulsion type test

This test was performed to identify whether the cream was oil-in-water (O/W) or water-in-oil (W/O). A small amount of cream was mixed with water on a glass slide. The cream mixed easily with water and showed a non-greasy nature, confirming that it was an oil-in-water (O/W) emulsion.

Washability test

The washability test was carried out to evaluate the ease of removal of the cream from the skin. A small quantity of cream was applied on the skin and then washed with water. The cream was easily removed without using soap, indicating good washability.

Homogeneity test

Homogeneity test was performed to check the uniformity and smoothness of the formulation. A small quantity of cream was observed visually and rubbed between fingers. The formulation was found to be smooth, uniform, and free from lumps or grittiness.

Stability test

Stability testing was carried out to evaluate the physical and chemical stability of the cream under different storage conditions such as room temperature, refrigerated condition, and elevated temperature. The formulation was observed for changes in color, odor, pH, consistency, and phase separation [14].

RESULT AND DISCUSSION

Antioxidant activity

Free radical scavenging activity

Antioxidant activity of extracts and standard ascorbic acid were computed. Antioxidant activity of plant extract is quantified by

its IC50 value, which represents its ability to scavenge free radicals. IC50 refers to concentration of a sample that is needed to remove 50% of free radicals in a given system. Based on the graph and calculations, it was determined that the plant extract's ability to scavenge free radicals was nearly equivalent to that of conventional Ascorbic Acid (A.A).

Table 3: Absorbance and % scavenging activity of the plant extracts Green Tea (G.T) and Moringa Oleifera (M.O)

Std.A.A (ml)	Extract sol. (ml)	Conc. (mcg)	Abs. at 520 nm of A.A	Abs. at 520 nm of G.T	Abs. at 520 nm of M.O	% SCV A.A	% SCV G.T	% SCV M.O
1	1	12.5	0.958	0.456	0.495	11.29	22.58	10.64
2	2	25.0	0.905	0.401	0.464	16.20	31.91	16.24
3	3	50.0	0.808	0.340	0.393	25.18	42.27	29.06
4	4	100.0	0.495	0.274	0.252	54.16	53.48	54.51
5	5	200.0	0.324	0.109	0.171	70.00	81.49	69.13
6	6	400.0	0.251	0.079	0.081	76.75	86.58	85.37
Blank	Blank	00.0	1.08	0.589	0.554	00.00	00.00	00.00

Figure 2: % Scavenging activity of Ascorbic acid, Green Tea (G.T) and Moringa Oleifera (M.O)

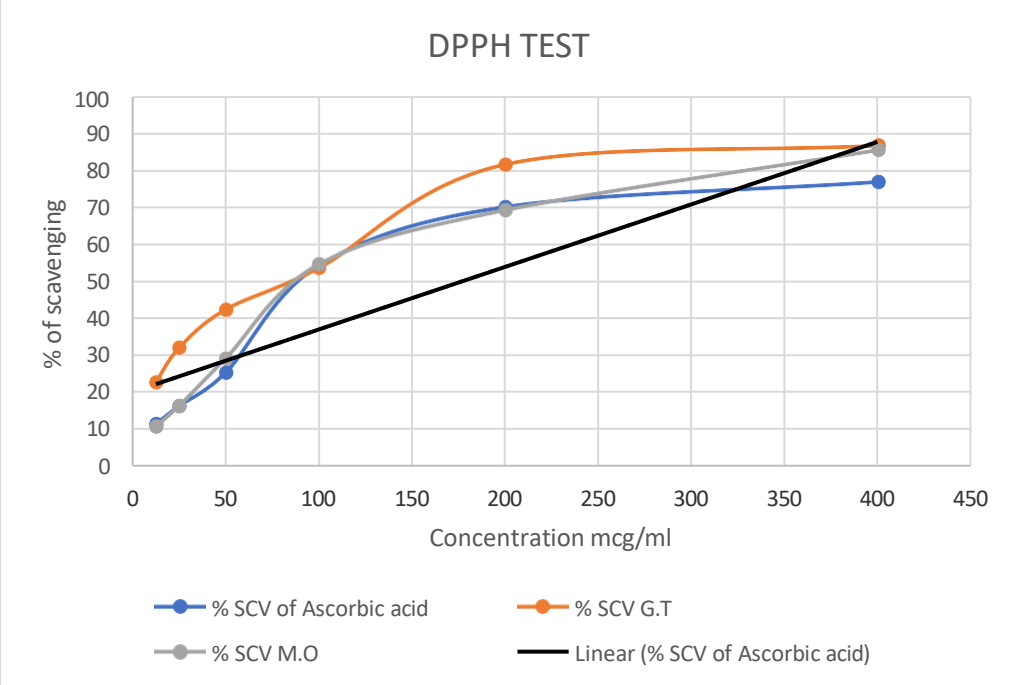


Table 4: % scavenging activity of Ascorbic acid, Green Tea and Moringa Oleifera

Extract	DPPH assay IC50 (mcg/ml)	Ascorbic acid (mcg/ml)
Green Tea	102.29	177.45
Moringa Oleifera	146.50	

Table 5: Organoleptic evolution test

Test	Observation	Result
Colour	Creamish colour observed	Acceptable
Consistency	Smooth and uniform consistency	Good consistency
State	Semi-solid	Suitable for topical application
Odour	Pleasant characteristic odour	Acceptable

Physiochemical evolution test

Table 6: Physiochemical evolution test result

Test	Observation	Result
pH Determination	pH found in the range of 5.5 – 7	Suitable for skin (non-irritant)
Emulsion Type	Cream easily mixed with water, non-greasy nature observed	Oil-in-Water (O/W) emulsion
Washability Test	Cream was easily removed with water	Good washability
Homogeneity Test	Smooth texture, no lumps or grittiness observed	Homogeneous formulation
Stability Test	No change in color, odor, pH, or phase separation under different conditions	Stable formulation

CONCLUSION

The present study successfully formulated and evaluated an anti-pollution herbal cream containing green tea and Moringa extracts as a stable oil-in-water emulsion with suitable physicochemical properties, skin-friendly pH, good spreadability, and excellent homogeneity without phase separation. The formulation demonstrated significant antioxidant effects by neutralising free radicals, reducing oxidative stress, and preventing pollution-induced

skin damage. It also improved skin hydration, supported barrier function, and showed good washability and user acceptability. Stability studies confirmed its consistency under various storage conditions, indicating reliability for long-term use. The synergistic action of green tea catechins and Moringa bioactive compounds enhanced overall efficacy, making the formulation a safe, effective, and promising herbal cosmeceutical product for daily skin protection against environmental pollutants.

Conflict of interest

The authors declared no conflict of interest regarding this manuscript.

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REFERENCES

1. Surwase VB, Savale MM, Jadhav RS, et al, 2021. Polyherbal natural hand sanitizer: formulation and evaluation. J Univ Shanghai Sci Technol. 23(6), Pages 932-939. Doi: https://doi.org/10.51201/JUSST/21/05360.

2. Gambushe SM, Zishiri OT, El Zowalaty ME, 2022. Review of Escherichia coli O157:H7 prevalence, pathogenicity, heavy metal and antimicrobial resistance: African perspective. Infect Drug Resist. 15, Pages 4645-4673. Doi: https://doi.org/10.2147/IDR.S365269

3. Azam W, Rai V, Jawed Ret al, 2023. Comparison of antifungal and antimicrobial activities in different parts of Carica papaya linn. Asian J Pharm Res. 13(4), Pages 213-8. Doi: 10.52711/2231-5691.2023.00040.

4. Potbhare M, Khobragade D, 2017. In vitro evaluation of the antioxidantpotential of ayurvedic preparations lauha bhasma and mandura bhasma. Asian Journal Pharmaceutical Research. 7(2), Pages 63-6. Doi: 10.5958/2231-5691.2017.00011.9.

5. Kurahashi T, Fujii J, 2015. Roles of antioxidative enzymes in wound healing. J Dev Biol. 3(2), Pages 57-70. Doi: 10.3390/jdb3020057.

6. Sheikh SA, Purohit P, Teja Ram, 2026. Concomitant effect of present herbal formulation with marketed allopathic formulation for the evaluation of hair growth. Int J Drug Deliv Technol. 16(40s), Pages 133-136. Doi: 10.25258/ijddt.16.40s.14.

7. Prashant Purohit, Mahesh Kumar Kataria, 2024. Phytochemicals screening, antioxidant and antimicrobial activity of Carica Papaya leaf extracts. Int J Curr Pharm Sci. 16(3), Pages 95-98. Doi: https://doi.org/10.22159/ijcpr.2024v16i3.4087.

8. Prashant Purohit, Priyanka Mishra, 2025. Phytosomes as innovative delivery systems for phytochemicals: An updated review, International Journal of Pharmaceutical Research and Development. 7(1), Pages 16-25. Doi: https://doi.org/10.33545/26646862.2025.v7.i1a.89.

9. Prashant Purohit, Himisha Gaur, 2023. Lipid Based Nano Particles in Cancer Therapy. Indo American Journal of Pharmaceutical Research. 4(2023), Pages 225-29. Doi: 10.5281/zenodo.8210582.

10. Prashant Purohit, Priyanka Mishra, Manish Suthar, 2022. Diabetes and oral health: an overview. World Journal of Pharmaceutical Research. 9(2), Pages 319-328. Doi: 10.20959/wjpr2022-16603.

11. Y Yang, F Wang, D Yin, et al, 2015. Astragulus polysaccharide-loadedfibrous mats promote the restoration of microcirculation in/around skin wounds to accelerate wound healing in a diabetic rat model. Colloid Surf. B Biointerfaces. Doi: https://doi.org/10.1016/j.colsurfb.2015.09.006.

12. M T A Omar, A Alghadir, K K, Al-Wahhabi, 2014. Efficacy of shock wave therapy on chronic diabetic foot ulcer: a single-blinded randomized controlled clinical trial. Diabetes Res Clin Pract. Doi: https://doi.org/10.1016/j.diabres.2014.09.024.

13. M H Mohammadi, B Molavi, S Mohammadi, et al, 2016. Evaluation ofwound healing in diabetic foot ulcer using platelet-rich plasma gel: a single-armclinical trial, Transfus Apher Sci. Doi: https://doi.org/10.1016/j.transci.2016.

14. Purohit P, Gurudev, Lakhara S, 2026. Formulation and Physicochemical Evaluation of Herbal Cold Cream, Journal of Drug Delivery and Therapeutics. 16(6), Pages 80-85 Doi: https://doi.org/10.22270/jddt.v16i6.7795.