INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES
[ISSN: 0975-4725; CODEN(USA): IJPS00]
Journal Homepage: https://www.ijpsjournal.com

OPEN ACCESS

Research Article

Formulation and Evaluation of Cooling Gel using Fruit Punch

Roshni Sajikumar*, Jahanvi Patel, Dhwani Puwar Pareshsinh, Jay Shah Manish, Kushang Shah Jigneshkumar, Harshbhai Rameshbhai Padshala

SAL Institute of Pharmacy, Science City-380060, Ahmedabad, India.

ARTICLE INFO

Published: 24 June 2025
Keywords:
Cooling gel, Sunburn relief, Fruit punch Extracts, UV induced skin damage, Topical gel
DOI:
10.5281/zenodo.15727632

ABSTRACT

Excessive ultraviolet (UV) exposure is the main cause of sunburn, which causes erythema, inflammation, and discomfort on the skin. In this study, a novel fruit punch-based cooling gel that relieves sunburn symptoms while hydrating and supporting antioxidants is formulated and evaluated. By utilizing the complementary qualities of aloe vera and natural fruit extracts,[1] the formulation seeks to provide a calming, environmentally responsible, and cosmetically, pleasing substitute for traditional treatments. Fruit punch concentrate, gelling agents and active botanical ingredients were carefully combined to create the gel while preserving the ideal pH and product stability. Stability studies, sensory analysis and dermal compatibility and potential irritant assessments comprised the comprehensive evaluation. The results demonstrate this formulation's potential as an effective, economical, and long-lasting sunburn treatment.

INTRODUCTION

As consumers search for substitutes to synthetic, chemically-loaded products, the skincare business has seen a growing paradigm shift toward natural, plant-based formulations, especially those including fruit extracts and aloe vera in recent years. Growing knowledge of skin health, sustainability, and the medicinal value of botanical actives fuels this metamorphosis. Against this background, the current research presents a fruit punch-based topical cooling gel intended to provide both aesthetic attractiveness and functional efficiency in addressing UV-induced skin irritation.[2] The first line of defence against environmental insults is the human skin, a complex, multilayered organ made up of the epidermis, dermis, and hypodermis. UVB radiation is the primary cause of sunburn, an acute inflammatory reaction that results in DNA damage, cytokine release, immune cell infiltration, and the subsequent development of erythema,

***Corresponding Author:** Roshni Sajikumar
Address: *SAL Institute of Pharmacy, Science City-380060, Ahmedabad, India.*
Email ✉: roshnivinita@gmail.com

Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

edema, pain, and desquamation.[3] Formulations that restore barrier integrity, reduce inflammation, and hasten re-epithelialization are necessary because the stratum corneum, the outermost barrier, frequently experiences dehydration and disruption during such episodes.[4] In order to address these therapeutic needs, the gel's formulation incorporates extracts of strawberries, kiwis, dragon fruit, and cucumbers, along with aloe vera, vitamin E, menthol, and peppermint oil. These ingredients were chosen for their scientifically proven abilities to soothe inflammation, mitigate oxidative stress, and restore dermal moisture. Its composition is carefully chosen to exclude synthetic excipients, so improving biocompatibility and consumer acceptability.

Aim:

Formulation and Evaluation of Cooling Gel using Fruit Punch

Objective of work done

To create a cooling gel formulation that is entirely free of synthetic color agents, preservatives, and additives in order to improve its suitability for sensitive skin types and reduce unfavorable dermatological reactions. In order to satisfy contemporary consumer demands for clean-label and plant-based skincare products, a topical dosage form that is patient-compliant, easy to use, and optimizes skin adhesion and aesthetic acceptability must be designed. Through improved percutaneous absorption and bioactivity of the included botanicals, the formulation will be optimized for a quick therapeutic onset, guaranteeing immediate relief from erythema, inflammation, and discomfort related to UV-induced skin injuries.

METHODOLOGY:

Carefully designed, the formulation process produced a natural, fruit-based cooling gel with therapeutic potency against sunburn. Initially investigated were several natural fruit extracts and gelling agents in order to find the best fit components for a sunburn relief gel. Developed under controlled conditions, the formulation was tested per usual pharmacopeial guidelines for pH, spreadability, viscosity, and stability.

A. Ingredients: -

- Aloe vera
- Cucumber Extract
- Strawberry Extract
- Kiwi Extract
- Dragon Fruit Extract
- Guar Gum
- Water
- Vitamin E(Tocopherol)
- Glycerin
- Sodium Benzoate
- Peppermint Oil
- Menthol

1. Aloe vera gel: -

Figure 1: Aloe Vera

Biological Source: Aloe vera gel is harvested from the inner mucilage of the leaves of Aloe barbadensis Miller, a succulent plant from the

Asphodelaceae family, originally from North Africa but now grown all over the world.[5]

Benefits: Aloe vera is celebrated for its anti-inflammatory, wound-healing, antimicrobial, and moisturizing benefits. It effectively reduces redness from sunburn and encourages the regeneration of the skin's outer layer. [6,7]

Chemical Constituents: Acemannan (polysaccharide), Glucomannan, Aloe-emodin, Saponins, Vitamins A, C, and E, Amino acids, Enzymes (oxidase, amylase, catalase).

2. Cucumber Extract: -

Figure 2: Cucumber Extract

Biological Source: Cucumber extract comes from the fruits of Cucumis sativus, a herbaceous vine belonging to the Cucurbitaceae family, which hails from the Indian subcontinent. This extract has been a staple in traditional Ayurvedic medicine for centuries.[8]

Benefits: Cucumber is known for its cooling and soothing properties, making it perfect for calming irritated or sunburned skin. It serves as a gentle astringent, helps reduce puffiness, hydrates the skin, and eases inflammation.

Chemical Constituents: Caffeic acid, Ascorbic acid, Cucurbitacins, Tannins, Flavonoids, Sterols, Glycosides.

3. Strawberry Extract: -

Figure 3: Preparation of Strawberry Extract

Biological Source: Strawberry extract comes from the fruit of Fragaria × ananassa, a hybrid species in the Rosaceae family. This delightful fruit is the result of crossing two wild strawberry species from North and South America. It’s widely grown in temperate regions, celebrated for its delicious, nutrient-packed red berries.

Benefits: Strawberry extract is loaded with vitamin C and anthocyanins, giving it impressive antioxidant properties. It helps shield the skin from oxidative stress, calms UV damage, reduces redness, and aids in restoring skin texture. Plus, it encourages the production of ceramides in the outer skin layer, enhancing the skin's barrier function. [9,10]

Chemical Constituents: Ascorbic acid (Vitamin C), Ellagic acid, Flavonoids (quercetin, kaempferol), Anthocyanins (pelargonidin), Tiliroside, Tannins.

4. Kiwi Extract: -

Figure 4: Preparation of Kiwi Extract

Biological Source: Kiwi extract is derived from Actinidia deliciosa and Actinidia chinensis, both part of the Actinidiaceae family. This vibrant fruiting vine hails from China and is now widely cultivated in New Zealand. The extract is made from the pulp and peel of the ripe fruit.[11]

Benefits: Known for its impressive antioxidant capacity, kiwi extract is rich in vitamin C and polyphenols. It boosts collagen production, aids in wound healing, and helps reduce inflammation. Additionally, it contains exfoliating enzymes that promote skin renewal, making it perfect for post-sun exposure care.

Chemical Constituents: Vitamin C (ascorbic acid), Vitamin E, Actinidin enzyme, Flavonoids (catechins, epicatechins) Polyphenols, Amino acids, Carotenoids.[11]

5. Dragon Fruit Extract: -

Figure 5: Preparation of Dragon Fruit Extract

Biological Source: Dragon fruit extract is sourced from the fruit of Hylocereus undatus, a tropical climbing cactus in the Cactaceae family. This unique fruit is native to Central America and is now widely cultivated across Asia.

Benefits: This extract is loaded with antioxidants and vitamins that work to neutralize free radicals, calm inflamed skin, and lessen the redness from sunburn. Plus, its hydrating properties help with moisture retention and skin repair.[12]

Chemical Constituents: Vitamin C, Betacyanins, Polyphenols, Flavonoids, Carotenoids, Essential fatty acids. [12,13]

6. Guar Gum: -

Figure 6: Guar Gum

Biological Source: Guar gum comes from the endosperm of the seeds of Cyamopsis

tetragonoloba, a hardy legume that thrives in dry areas of India and Pakistan.[14]

Benefits: This natural thickening and stabilizing agent is great for improving the texture and Spreadability of topical gels. Plus, it helps keep moisture locked in on your skin.[15]

Chemical Constituents: Galactomannan (a polysaccharide made up of galactose and mannose units), Small amounts of protein and minerals.

7. Water: -

Biological Source: Purified water (Aqua) may not come from a plant or synthetic source, but it's known as a universal solvent and is considered safe for pharmaceutical use. It's produced through various purification techniques like distillation, reverse osmosis, or deionization, ensuring that it's free from any contaminants or pathogens.

Benefits: Water is the main solvent in gel formulations, helping to evenly mix and dissolve both active and supportive ingredients. It's crucial for keeping a smooth, spreadable texture and is essential for hydrating the skin—especially when treating sunburn, where the skin barrier is damaged and moisture loss is high. Plus, water provides an instant cooling effect upon application, which can soothe the burning and stinging sensations that come with sunburn. It also acts as a carrier for active ingredients like aloe vera gel, fruit extracts, menthol, and vitamins, enhancing their absorption.

Chemical Nature: Chemical formula: H_2O

Physicochemical role: Solvent, hydrating agent, dispersion medium, temperature regulator.

8. Vitamin E(Tocopherol): -

Figure7: Vitamin E Capsule

Biological Source: Tocopherol is a natural compound that you can find in plant oils, nuts, seeds, and those vibrant green leafy veggies. When it comes to cosmetics, it's usually extracted from sunflower or soybean oil.

Benefits: Vitamin E is a powerful antioxidant that helps neutralize free radicals caused by UV exposure. It boosts skin hydration, enhances protection from the sun, and aids in the repair of skin cells.[16]

Chemical Constituents: Alpha-tocopherol, Beta-, gamma-, delta-tocopherols, Tocotrienols.[16]

9. Glycerine: -

Biological Source: Glycerine, also known as glycerol, is a trihydroxy alcohol that's typically produced as a byproduct during biodiesel production or through the hydrolysis of plant triglycerides, particularly from coconut or palm oils.

Benefits: This ingredient is a fantastic humectant, meaning it draws in and holds onto moisture. It helps to soften the skin, enhances the skin's barrier function, and provides relief for dry or irritated areas.[17]

Chemical Constituents:

Glycerol ($C_3H_8O_3$) – pure compound

10. Sodium Benzoate: -

Figure 8: Sodium Benzoate

Biological Source: Sodium benzoate is the sodium salt derived from benzoic acid, which can be found naturally in fruits like cranberries, prunes, and apples. However, it's mostly made synthetically for commercial purposes.

Benefits: This compound acts as a versatile antimicrobial preservative, effectively preventing the growth of unwanted microorganisms.[18]

Chemical Constituents: Sodium benzoate ($C_7H_5NaO_2$)– a stable salt derived from benzoic acid.

11. Peppermint Oil: -

Figure 9: Peppermint Leaves

Biological Source: This essential oil is extracted from the leafy parts of Mentha × piperita, a hybrid mint that's widely grown for its delightful aroma and therapeutic properties.

Benefits: Peppermint oil is known for its pain-relieving, anti-inflammatory, and antimicrobial qualities. It offers a refreshing scent and boosts the cooling effect in topical products.[19]

Chemical Constituents: Menthol, Menthone,1,8-cineole, Limonene, Pulegone.[19]

12. Menthol: -

Figure 10: Menthol Crystals

Biological Source: Menthol is a monocyclic terpene alcohol derived from the essential oil of Mentha × piperita, commonly known as peppermint, which belongs to the Lamiaceae family. [19,20]

Benefits: Menthol delivers a quick cooling effect by activating the cold-sensitive TRPM8 receptors in the skin. It's also effective in alleviating itching and mild discomfort.[20]

Chemical Constituents: (-)-Menthol, Menthone, Isomenthol, Neomenthol

B. Procedure: -

1. Preparation of Fruit Extracts:

To start, take fresh slices of strawberries, kiwis, dragon fruit, and cucumbers—100 grams of

each—and place them in sterile glass jars. Next, pour in 90 grams of vegetable-derived glycerol to coat the fruit. Seal those jars up tight and let them sit at room temperature for 30 days. Remember to give them a gentle shake every other day to help with the extraction process. Once the month is up, filter the mixtures through a fine strainer and then through cheesecloth. Collect the clear extracts and store them in airtight glass containers until you're ready to use them.[21]

2. Preparation of Extract Mixture:

Measure out 1.5 ml of each extract—cucumber, kiwi, strawberry, and dragon fruit—along with some glycerin, and mix them together in a clean beaker until everything is nicely blended.

3. Preparation of the Gel Base:

Take 38 ml of aloe vera gel in a separate clean beaker. In another beaker, disperse 1.2 grams of guar gum in 3 ml of slightly warm distilled water, stirring continuously until it's fully dissolved.[22]

4.Incorporation and Homogenization:

Add the extract mixture to the aloe vera base and stir it well to ensure everything is uniform. Heat both the guar gum solution and the aloe vera-extract mixture in a water bath until they're slightly warm. Gradually mix the guar gum solution into the base while stirring continuously until you achieve a gel-like consistency.[22]

5.Addition of Fragrance and Preservative:

Once that's done, let the mixture cool to room temperature. Then, add 3 to 4 drops of peppermint oil and Mentha extract, along with 0.3 grams of sodium benzoate to act as a preservative.

6. Filling and Storage:

Use a spatula or filling apparatus to transfer your final gel formulation into clean, sterilized containers. Seal them up and store them in a cool, dry place, away from direct sunlight.

C. Optimized Formula for the preparation of Cooling gel using Fruit Punch: -

Sr. No.	Ingredients	Quantity	Uses
1.	Aloe vera Gel Base	38ml	Acts like Vehicle, Anti-inflammatory, Humectant
2.	Cucumber Extract	1.5ml	Helps Cool the burn, Subsides Irritation
3.	Strawberry Extract	1.5ml	Promote Ceramides Production
4.	Kiwi Extract	1.5ml	Helps heal the skin faster
5.	Dragon Fruit Extract	1.5ml	Acts as Antioxidant
6.	Guar Gum	1.2gm	Rheology Modifier (Gelling Agent)
7.	Water	3ml	Vehicle
8.	Vit E(Tocopherol)	1 cap.	Neutralizes Free Radicals
9.	Glycerin	1.5ml	Emollient
10.	Sodium Benzoate	0.3gm	Preservative
11.	Peppermint Oil	3-4 drops	Essential Oil
12.	Mentha	3-4 drops	Cooling Agent

Figure 11: Fruit Punch Cooling Gel

Evaluation Study:

1. Organoleptic evaluation:

The formulated gel was assessed for its organoleptic properties including color, odor, and physical state. The appearance was evaluated based on color intensity and texture, with grading performed accordingly. The gel was stored for a period to observe any potential changes. It was found that there was no alteration in its organoleptic characteristics, indicating stability in color, odor, and consistency.[23] The detailed results are presented in the table below.

Sr. No.	Parameter	Observation
1.	State	Semi - solid
2.	Color	Green
3.	Odor	Characteristics
4.	Texture	Smooth

2. Viscosity:

Viscosity of the formulation was determined by Brookfield Viscometer. The appropriate spindle number is selected. The developed formulation was poured into the adaptor of the viscometer and the angular velocity increased gradually from 0.5 to 20 rpm. The viscosity of gel was in between 2000-2500 cps which indicates that the gel is easily spreadable, stable, and provides a smooth application without being too thick or runny, ensuring better user experience and effectiveness. [23,24]

3. Spreadability studies:

An essential criterion for semi-solid formulations is good Spreadability, which determines how easily the gel spreads upon application to the skin. Spreadability is a key factor influencing the therapeutic efficacy of formulation. The gel was evaluated for its spreading ability, Spreadability is expressed in terms of time in seconds taken by two slides to slip off from gel that is placed in between the slides under the direction of certain load and results showed that it spread easily within a short time, indicating good application properties. [23,24,25] The detailed results are presented in the table below.

Formulation	Time in Seconds	Spreadability (gm cm/ sec)
F1	18	8.44
F2	10	15
F3	8	18.75
F4	11	13.64

The Spreadability was calculated from the following formula:

$$S = M \times L / T$$

M = weight tied to the upper slide (30g),

L =length of glass slide (5cm),

T =time taken in seconds

4. Measurement of pH:

The pH meter was calibrated using a standard buffer solution before measurement. 0.5 g of the gel was dissolved in 50.0 mL of distilled water, and its pH was recorded. The pH of the gel ranged between 5.5 and 6.7, which is ideal for skin application. All formulations showed pH values close to the skin's natural pH, ensuring good

compatibility and enhances product stability. F1=6.2, F2= 5.8, F3= 5.5, F4= 6 [24,25]

5. Stability studies:

Stability testing of drug products begins as a part of drug discovery and ends with the demise of the compound or commercial product. The stability studies were carried out as per ICH guidelines. The gel was filled with bottles and kept in humidity chamber maintained at 30 ± 2 °C/ 65 ± 5 % RH and 40 ± 2 °C / 75 ± 5% RH for two months. At the end of studies, samples were analyzed for the physical properties and viscosity. When formulation was subjected to long-term stability studies, i.e., for about a period of 2 months, it was found that there is no change in properties of gel like pH, color and viscosity as shown in Table below. [23,25]

6. Microbial load test:

The nutritional media was prepared by dissolving 5g of nutritional agar powder in 100ml of water, which was then heated to 80°C. The solution was poured into a petri dish and allowed to cool to room temperature.

Test Solution: the prepared agar media was poured into a petri dish. A 0.1g sample of the gel was placed on a nicrome wire loop and streaked onto the nutritional media. The petri dish was incubated for 24 hours to assess the presence of microbes in the formulation. After the 24-hour incubation, no microbial growth was observed on the agar media, indicating the absence of microbial contamination in the gel.

7. Homogeneity:

The homogeneity of the gel was evaluated through visual inspection and touch testing. The gel was checked for uniform texture, smoothness, and the absence of lumps or phase separation. A small amount was rubbed between fingers to ensure even consistency. The formulation was found to be homogeneous, indicating good stability and proper mixing of ingredients.[25]

8. Acute Skin Irritation Test:

The gel was tested for acute skin irritation to ensure its safety and compatibility. A small amount was applied to a patch of skin and observed for redness, itching, or irritation over 24hrs. The results showed no visible reactions, confirming that the gel is gentle and safe for skin application.[25]

9. Washability Test:

The washability of the gel was assessed by applying a small amount to the skin and rinsing it with water at room temperature. The ease of removal, presence of any residue, and post-wash skin feel were evaluated. The gel was found to be easily washable, leaving no sticky or greasy residue and ensuring a fresh, clean feel.[24]

RESULTS AND DISCUSSION

RESULTS:

The experimental study successfully created a fruit punch-based cooling gel that boasts both appealing pharmaceutical and aesthetic qualities. The final optimized formula showed fantastic spreadability, a consistent green hue, a smooth semisolid texture, and a delightful fruity scent. These attributes remained intact throughout the observation period, indicating strong stability of the formulation. The pH of the optimized gel was kept around 6.0, which matches the skin's natural pH, ensuring it's compatible with the skin and reducing the chance of irritation. Viscosity tests showed a range of 2000–2500 cps, which means it has the right thickness for easy application and good adherence to the skin. Spreadability tests confirmed that it

spreads smoothly with little resistance, making it comfortable and easy to use. Accelerated stability studies, conducted according to ICH guidelines, revealed no signs of phase separation, discoloration, or degradation, proving the formulation's durability under different environmental conditions. All these findings together confirm the physical and chemical stability of the cooling gel.

DISCUSSION:

We explored the creation and assessment of a refreshing fruit-based gel made from all-natural ingredients like aloe vera, strawberry, kiwi, cucumber, dragon fruit extracts, and essential oils. This blend of botanicals, packed with antioxidants, vitamins, and anti-inflammatory properties, aims to tackle sunburn-related skin damage in a comprehensive way. We chose guar gum as our gelling agent because it offers the perfect consistency, resulting in a gel that spreads easily and feels just right. To enhance the cooling sensation crucial for quick sunburn relief, we added menthol and peppermint oil, while vitamin E and glycerin work to boost skin hydration and aid in tissue repair. Our compatibility tests showed that all the ingredients work well together, leading to a formulation that is not only stable but also safe and effective for topical use. The success of this formulation highlights the potential for creating a natural, non-synthetic option for sunburn care, meeting both consumer needs and therapeutic requirements.

CONCLUSION:

The fruit punch cooling gel developed offers a fresh and innovative way to tackle sunburn, providing a natural and eco-friendly alternative to synthetic options. With its balanced pH, perfect viscosity, great spreadability, and impressive stability, it proves to be a practical choice for skincare. By skillfully blending natural extracts and polymers, we've created a formula that not only soothes sunburn but also boosts skin hydration and helps restore the skin's barrier. This study highlights the promise of fruit-based ingredients in shaping the future of skincare products. To fully understand its effectiveness and how well consumers accept it, further in-depth studies and larger trials may be needed, setting the stage for its entry into the herbal cosmeceutical market.

ACKNOWLEDGEMENT:

We would like to thank all those who helped us in this research. Special thanks to Dr. Harsha Patel, Principal for providing us academic environment. We are grateful to our guide Ms. Jahanvi Patel for her guidance, motivation and constructive criticism throughout the project. We also acknowledge the spirit of SAL Institute of Pharmacy for providing us infrastructure and academic atmosphere. We thank all our peers and staff who directly or indirectly contributed to this work.

REFERENCES

1. Ferdoushi Jahan, Afroza Akter Happy. 5-Revolutionizing plant-based extracts for skin care and therapeutics. Bangladesh: Elsevier; 2022.
2. Tanya Sharma, Vinika Tyagi, Megha Bansal, Determination of sun protection factor of vegetable and fruit extracts using UV–Visible spectroscopy: A green approach, Sustainable Chemistry and Pharmacy, Volume 18,2020,100347, ISSN 2352-5541.
3. Moore C, Cevikbas F, Pasolli HA, Chen Y, Kong W, Kempkes C, Parekh P, Lee SH, Kontchou NA, Yeh I, Jokerst NM, Fuchs E, Steinhoff M, Liedtke WB. UVB radiation generates sunburn pain and affects skin by

activating epidermal TRPV4 ion channels and triggering endothelin-1 signaling. Proc Natl Acad Sci U S A. 2013 Aug 20;110(34): E3225-34

4. Monika Michalak. Plants Extracts as Skin Care and Therapeutic Agents. 24(20):15444. International Journal of Molecular Sciences; 2023
5. Surjushe, Amar Vasani, Resham Saple, D G. Aloe Vera A Short Review. 53(4);p 163-166. Indian Journal of Dermatology;2008
6. Marta Sánchez, Elena González-Burgos, Irene Iglesias and M. Pilar Gómez-Serranillos. Pharmacological Update Properties of Aloe Vera and its Major Active Constituents. Molecules, 25(6), 1324;2020
7. Jiajun Zhu, Yuanru Zheng, Yanhui Ge, Study on the application of Aloe vera in cosmetology and clinical treatment of skin diseases. Volume 5, Issue 4, Pages 299-304, ISSN 2707-3688, Journal of Holistic Integrative Pharmacy,2024
8. Pulok K. Mukherjee, Neelesh K. Nema, Niladri Maity, Birendra K. Sarkar. Phytochemical and therapeutic potential of cucumber. Volume 84, Pages 227-236. Fitoterapia;2013
9. Takeda S, Shimoda H, Takarada T, Imokawa G.Strawberry seed extract and its major component, tiliroside, promote ceramide synthesis in the stratum corneum of human epidermal equivalents.13(10): e0205061. PLoS ONE;2018
10. Massimiliano Gasparrini, T amara Y. Forbes-Hernandez, Sadia Afrin,Patricia Reboredo-Rodriguez, Danila Cianciosi , Bruno Mezzetti , Josè L. Quiles, Stefano Bompadre , Maurizio Battino, Francesca Giampier. Strawberry-Based Cosmetic Formulations Protect Human Dermal Fibroblasts against UVA-Induced Damage 9(6), 605. Nutrients;2017
11. Sarita Ramesh Khutare 1, Amol Sampat Deshmukh. A review on various medicinal applications of kiwi fruit. 08(02), 193–206. International Journal of Science and Research Archive;2023
12. Punam P. Korde1, Mr. Rahul M. Rathod, Ms. Komal L. Kharane, Ms. Bhakti S. Bhawane, Kajal P. Kale. Betaglow Gel: Formulation and Evaluation of a Dragon Fruit Peel Based Serum Gel. Volume 10 Issue 4, 2455-2631, IJSDR; April 2025.
13. Disha Chatterjee, Shifa Mansuri, Neelam Poonia, Prashant Kesharwani, Viney Lather, Deepti Pandita. Therapeutic potential of various functional components presents within dragon fruit: A review, Volume 6, Hybrid Advances;2024, 100185
14. Pawan Kant, G. S. Randhawa, Rohit Kumar Bijauliya 2 and Dilip Kumar Chanchal. Guar Gum: Pharmaceutical And Therapeutic Applications. Vol. 4(9): 131-139. IJLSR;2018
15. Mohan R, Singh S, Kumar G, Srivastava M. Evaluation of Gelling Behavior of Natural Gums and their Formulation Prospects.54(4):1016-23. Indian J of Pharmaceutical Education and Research;2020
16. Al Abadie, M., Mahfoudh, M., Al-Rawi, A. H. (2024). Topical Vitamin E in Modern Skin Therapy: A Comprehensive Review. 9(2), 01-08. Int J Clin Expl Dermatol;2024
17. Lillian C. Becker1, Wilma F. Bergfeld, Donald V. Belsito, Ronald A. Hill, Curtis D. Klaassen, Daniel C. Liebler, James G. Marks Jr, Ronald C. Shank, Thomas J. Slaga, Paul W. Snyder, Lillian J. Gill, and Bart Heldreth. Safety Assessment of Glycerin as Used in Cosmetics. Vol. 38(Supplement 3) 6S-22S, International Journal of Toxicology;2019
18. Patrycja Głaz , Agata Rosińska, Sylwia Woźniak, Anna Boguszewska-Czubara, Anna Biernasiuk, Dariusz Matosiuk. Effect of Commonly Used Cosmetic Preservatives on Healthy Human Skin Cells. 12(7):1076. Cells;2023

19. Hui Zhao, Shan Ren, Han Yang, Shun Tang, Chenyang Guo, Maolun Liu, Qiu Tao, Tianqi Ming, Haibo Xu. Peppermint essential oil: its phytochemistry, biological activity, pharmacological effect and application, Volume 154, 113559, Biomedicine & Pharmacotherapy;2022
20. Bob Harris. Menthol: A review of its thermoreceptor interactions and their therapeutic applications. Volume 16, Issues 3–4, Pages 117-131, International Journal of Aromatherapy;2006
21. Maria Khushnood1, Freeha Hafeez1, Muhammad Suleman, Tayyaba Noor, Soha Siddique, Abu Bakar, Ruqaya Bano. Formulation and Evaluation of Strawberry Extract/Oil infused anti-aging and anti-pigmenting Face serum. Volume20 Issue 02, 914-924.Journal of Xi'an Shiyou University, Natural Science;2024
22. Maira Shuja, Imtiaz Majeed, Tehseen Riaz, Muhammad Ahsan Waqar, Naila Tabassam, Tooba Mehboob and Abeeha Imtiaz. Formulation of Aloe vera based curcumin topical gel and its in-vitro evaluation. Vol.36, No.6, pp.1720, Pak. J. Pharm. Sci; November 2023
23. Mahendra A Giri, Rasika D Bhalke. Formulation And Evaluation Of Topical Anti-Inflammatory Herbal Gel. Vol 12, Issue 7, 252-255. Asian J Pharm Clin Res;2019
24. Telange - Patil P. V., 2Miss. Mane S. S., 3Miss. Kedar S. S. Formulation and Evaluation of Sunscreen Gel. Volume 13, Issue 1, International Journal of Current Science (IJCSPUB); March 2023.
25. Ms. Sonali Khandu Jathar, 2Ms. Vaishnavi. S. Sake, 3Dr. Amol Navnath Khedkar, 4Ms. Deepali Dattatray Shinde. Formulation And Evaluation of Herbal Sunscreen Gel. Volume 9, Issue 5, International Journal for Research Trends and Innovation.

HOW TO CITE: Roshni Sajikumar*, Jahanvi Patel, Dhwani Puwar Pareshsinh, Jay Shah Manish, Kushang Shah Jigneshkumar, Harshbhai Rameshbhai Padshala, Formulation and Evaluation of Cooling Gel using Fruit Punch, Int. J. of Pharm. Sci., 2025, Vol 3, Issue 6, 3836-3847. https://doi.org/10.5281/zenodo.15727632