



FORMULATION AND EVALUATION OF HERBAL ANTI-PIGMENTATION GEL FOR TREATMENT OF MELASMA.

**Ms. Sonawane Mansi S.^{1*}, Ms. Wagh Mansi D.¹, Mr. Sutawane Rishi M.¹, Prof. Kedar Tejashree R.²,
Dr. Prof. Darekar Avinash B.³**

1-Students of KVN Naik Institute of Pharmaceutical Education and Research, Canada
Corner, Nashik, Maharashtra 422002.

2-Prof.of KVN Naik Institute of Pharmaceutical Education and Research, Canada Corner,
Nashik, Maharashtra 422002.

3-Principal of KVN Naik Institute of Pharmaceutical Education and Research, Canada Corner, Nashik,
Maharashtra 422002.

Address of Correspondence:

Ms. Sonawane Mansi Sudhakar

Research Scholar,

KVN Naik Institute of Pharmaceutical Education and Research, Canada Corner, Nashik,
Maharashtra 422002.

ABSTRACT:

Herbal substances has been used in India since ages for treatment of variety of skin conditions. Melasma is skin condition in which dark patches appears on the face especially on forehead, cheeks, etc. the formulation of anti-pigmentation gel is the novel approach for the treatment of melasma. Gel form is light weight, non-greasy formulation made to make it convenient to use during daytime as well as during night (twice a day) for rapid result without any greasy feeling on skin. It is also suitable for peoples with oily skin. It contains Alum, Banana peel extract, green tea extract, cucumber juice, aloe-vera gel, all of this ingredients has anti- pigmentation action along with soothing and skin brightening effect which makes the formulation effective.

KEYWORDS:

Melasma, Anti-pigmentation Gel, Herbal, Banana Peel Extract, Alum, Extraction, Green-tea extract, Natural, Efficacy, Skincare, Cosmetics, Traditional Use, Cucumber juice, Evaluation. .

1. INTRODUCTION:

Melasma is the condition characterized by brown patches appears on the skin especially on the face. This condition generally occurs due many reasons predominantly due to over or excess production of melanin. Melanin is responsible for coloring of the skin. Most people get the dark patches on chick, forehead, nose, and upper lip area.

Melasma is also occurs in pregnancy due to hormonal misbalance, It also seen in women's taking oral contraceptives and hormones.

In today's modern era the need of natural and herbal drug is increased due to increasing side effects of chemicals seen on human body. The herbal preparations are considered as a promising alternatives for conventional therapy. Herbal ingredients are utilized in India since long time for cosmetic and medication purposes. There are variety of herbal ingredients which have shown great effects on the pigmentation, including their potential to regulate melanin secretion, antioxidant activity, etc.

The anti-pigmentation gel is the innovative, novel approach for reducing the prevalence of the pigmentation, with minimum side effects. The gel formulation is also has hydrating, moisturizing property without any greasy, oily feel thus also give very good results to oily skin type peoples.

This non-oily formula permits the user to use the gel any time in day or night. By combining the properties of the herbal drug, essential oil, these gel aims to reduce the dark spots, make the texture of skin even and provide a radiant complexion.

The Research paper mainly focuses on the development and evaluation of the herbal anti-pigmentation face gel along with is evaluation parameters for treatment of the melasma.

The key ingredient of the formulation is Alum, Banana Peel Extract, Cucumber Juice, and Green tea Extract, etc.

2. MELASMA:

Melasma is the skin condition characterized by brown to black spots or patches on the face. It is predominantly seen on the forehead, nose, and cheeks. Most common reason behind the melasma is hormonal changes, commonly occurs in pregnancy and menopause. It is most commonly seen in women's than men. It is also seen in women's taking oral contraceptives. The main cause of Melasma is overproduction of melanin which causes formation of dark pigments, also called as pigmentation.

Etiology: Various factors involve in this condition are,

- 1) **Genetics:** Approximately 50% reports of melisma condition has family history. Identical twins has also chances of developing the melisma.
- 2) **Sunlight Exposure:** UV radiation causes formation of free radicals by peroxidation of lipids. Formation of this free radical promotes melanin production in excess.
- 3) **Hormonal Influence:** Pregnant women, postmenopausal women's, women's taking oral contraceptives and hormones are susceptible to melisma skin condition.

3. Formulation Of Anti-pigmentation cream:

• Materials:

Sr. no	Ingredients	% w/w	Function
1.	Banana peel extract	10%	Anti-oxidant, Brightening
2.	Alum (fine Powder)	2%	Reduces Dark Spots, Astringent
3.	Cucumber juice	10%	Cooling, Depigmentation, Hydration
4.	Green Tea Extract	5%	Anti-oxidants, Reduce inflammation
5.	Aloe vera gel	50%	Soothing, Hydration, Skin Barrier repair
6.	Amla powder extract	5%	Natural vitamin C, skin renewal
7.	Vitamin E (tocopherol Acetate)	1%	Skin Repair, hydration
8.	Ascorbic Acid (vitamin C)	0.1%	Skin Brightening, Collagen Booster
9.	Glycerin	3%	Humectant, Retains moisture
10.	Tragacanth gum (hydrated)	1.5%	Thickener, Natural stabilizer, Gel forming agent
11.	Methylparaben	0.2%	Preservative(antifungal)
12.	Propylparaben	0.05%	Preservative(antibacterial)
13.	Coloring agent (turmeric)	0.01-0.05%	For aesthetic appeal
14.	Fragrance	0.01-0.05%	For aesthetic appeal
15.	Distilled Water	q.s. to 100%	Solvent, base

Table no. 1 Formulation table

• Procedure

❖ Extraction Procedure:

1. Banana Peel Extract(3):

Glycerin based method

- Material needed: Banana Peel(ripe) – 10 gm,
Glycerin-50 ml
Distilled Water_50 ml
Citric acid – 0.2 gm

▪ Procedure :

Wash the banana thoroughly and chop it into small pieces.

In a clean beaker of 250 ml, combine 50 ml glycerin and 50 ml distilled water.(1:1)

Add 0.2 gm citric acid and stir to dissolve it.

Add chopped banana peel to the above beaker.

Heat gently to 50-60 C for 30 minutes. Stir.

Let it sit at room temperature for 24 hours to complete extraction occurs.

Add other preservatives (optional)

Strain through muslin cloth, and store into a dark glass bottle.

2. Amla Powder Extract(4) :

- Material Needed: Amla Powder (fine)-5 gm.

Distilled Water- 50ml

Glycerin – 50 ml

Citric Acid – 0.2 gm.

- Procedure:

Add 5 gm Amla powder to the glycerin water (1:1) with citric acid solution.

Heat gently at 50-60 C for 30 min and let it sit for 24 hours.

Filter and add Preservative (optional).

3. Green tea Extract (5):

- Materials Needed: Green Tea Leaves- 5 gm

Distilled Water – 50 ml

Citric acid – 0.2 gm

- Procedure :

Add the green tea leaves to distilled water and heat it to approx. 60 C for 1 hour.

Do not Boil, Stir occasionally.

Add citric acid to prevent oxidation and maintain pH.

Cool to room temperature.

Strain the solution through filter paper and store in dark container.

❖ Other Preparations:

1. Cucumber Juice:

Wash the cucumber thoroughly. Peel it and chop into small piece.

Blend the cucumber into fine paste by using electric grinder also add small amount of water during grinding.

Filter the paste by using muslin cloth to obtain the clear juice.

Add citric acid to maintain pH. Add preservatives and store into dark glass container.

2. Alum powder solution:

Grind the Alum stone in mortar and pastel and pass through a fine mesh (preferably 100 mesh) for smooth texture

Store it in airtight container.

During preparation of gel, take 2 gm alum and dissolve in approx. 3-5 ml warm water.

3. Hydration Of Tragacanth Gum:

Hydrate Tragacanth Gum (1.5%) in warm water (50-60 C) for 6 -8 hours or preferably overnight. Stir it vigorously with glass rod or with magnetic stirrer to avoid any lumps.

Use directly to form the gel.

❖ Final preparation of gel:

Step 1: Take a beaker and add hydrated tragacanth gel, aloe vera gel, glycerin, and vitamin E and mix well with glass stirrer.

Step 2: take banana peel extract, amla powder extract, green tea extract, cucumber juice, and alum solution in another beaker.

Then add ascorbic acid already dissolved in 1-2 ml water in the solution.

Step 3: Mix the active ingredient solution to the gel base gently with uniform stirring to avoid formation of lumps.

Step 4: Now add preservatives (methyl paraben and propyl paraben in warm water) , coloring agent and fragrance. Stir well

Step 5: check the pH of the gel formed

Adjust the pH of the solution to range of 5 to 6 (ideal for skin to avoid irritation and the other side effects. pH is adjusted by using citric acid and sodium hydroxide.

Step 6: Stir gently to obtain a uniform gel and store in a sterile, airtight container. Label it.

• Storage :

- At room temperature : 2-3 months
 - In refrigerator: 6-7 months.
-

• Indication :

Apply all over the face especially on pigmented area twice a day.
Gently massage for 1 min on a clean face.



Fig.1 Aqueous phase and oil phase



Fig.2 Mixing of two phases

4. Evaluation tests :

Sr.	Test
1	Physical Appearance
	• Colour
	• Odour
	• Texture
2	Viscosity
3	Spreadability
4	pH
5	Homogeneity
6	Washability
7	Skin Irritation
8	Stability Study

Table no. 2 Evaluation parameters

5. RESULT :

The herbal anti-pigmentation gel for treatment of melasma is prepared.

Sr. no.	Physical Appearance	Observation
1	• Colour	Yellowish green
	• Odour	Pleasant (rose like)
	• Texture	Smooth
2	Viscosity	2000-2500 cP
3	Spreadability	Easily and evenly spread
4	pH	5-6 (ideal for topical application)
5	Homogeneity	No lumps or phase separation
6	Washability	Rinse off easily without residue.

7	Skin Irritation	No signs of redness, itching or irritation
8	Stability study	No significant changes, stable at all condition. At room temp. : 2-3 months In refrigerator : 6-7 months

Table 4: Evaluation parameter with observations

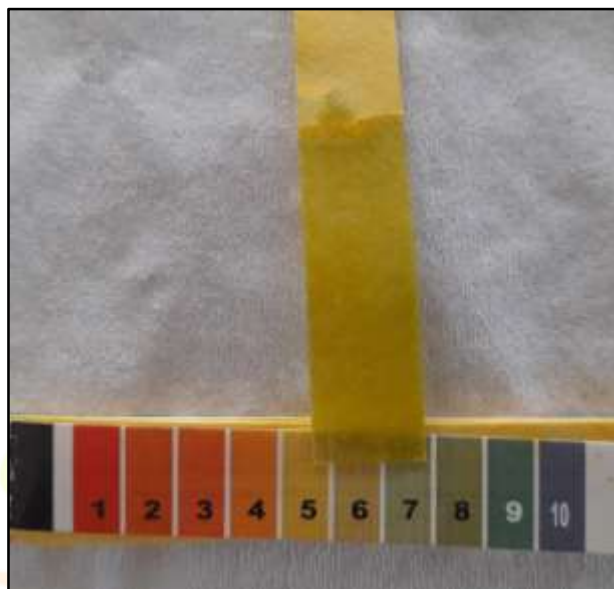


Fig. 3 pH testing

6. Conclusion :

The present study successfully developed and evaluated a novel herbal anti-pigmentation gel formulated using natural, readily available ingredients including banana peel extract, cucumber juice, amla extract, green tea, alum, aloe vera, and vitamins C and E. The Formulation was thickened using tragacanth gum and preserved with parabens to ensure stability. Extraction method was optimized to retain maximum antioxidant and depigmenting phytochemicals, while maintaining the safety and shelf life.

Physicochemical evaluation demonstrated acceptable pH, viscosity, spreadability And homogeneity. Stability testing indicate that the formulation remained stable under various condition for minimum 2 months. The presence of natural ingredients suggest that the gel will serve as a effective, low cost and safer alternative to synthetic antipigmenting agent.

Further studies including in vitro permeation and in vivo clinical evaluation are recommended to confirm its efficacy and explore commercialization potential.

7. Reference:

1. Miss. Durunde Vaishnavi, Miss. Mahadik M.R., Dr. Garje S. Y. , DR. Sayyed G.A. (2024), RESEARCH ARTICLE FORMULATION OF HERBAL ANTIPIGMENTATION CREAM BY USING BANANA PEEL., International Journal of Research Publication and Reviews ,(5)6, 6599-6604.
2. Sowmya N.K., Goriparthi N.S., Patil P., Mehta D.S.(2022), Depigmenting Effect of banana stem and flower on melanocytes. Journal of Oral Biology and Craniofacial Research, 12(4), 454-457.

3. Ajila, C. M., Naidu, K. A., Bhatt, S. G., & Prasada Rao, U. J. S. (2007). Bioactive compounds and antioxidant potential of banana peel extract. *Food Chemistry*, 102(2), 411–419.
4. Pattanayak, S., Nayak, S. S., Dinda, S. C., & Panda, D. S. (2010). A review on emblica officinalis: A wonderful gift of nature. *International Journal of Drug Formulation and Research*, 1(3), 89–102.
5. Matsumoto, T. et al. (1998). Preparation of Green Tea Extracts and Their Use in Skin Care. *Journal of Cosmetic Science*, 49(5), 279–287.
6. Sharma, A., & Patel, V. K. (2013). Formulation and evaluation of polyherbal gel for acne treatment. *International Journal of Pharmaceutical Sciences and Research*, 4(5), 1781–1787.
7. Singh, K. M., & Patel, A. R. (2019). Development of herbal gel formulation using plant extracts for skin care. *Journal of Pharmacognosy and Phytochemistry*, 8(1), 222–227.
8. Bhalerao, S. S., & Raje, M. P. (2020). *Cosmetic science and technology* (pp. 115–132). Nirali Prakashan.
9. Sarma, A., & Mahanta, D. (2017). *A textbook of pharmacognosy and phytochemistry* (pp. 89–101). Elsevier.
10. Kumar, R., & Saini, S. (2014). Formulation and evaluation of herbal gel containing extract of Cucumis sativus. *International Journal of Pharmaceutical Sciences and Research*, 5(9), 3856–3860.
11. Indian Pharmacopoeia Commission. (2018). *Indian pharmacopoeia 2018* (Vol. 1, pp. 254–269; Vol. 3, pp. 1957–1962). Ghaziabad: Indian Pharmacopoeia Commission, Ministry of Health and Family Welfare, Government of India.
12. United States Pharmacopeial Convention. (2020). *United States pharmacopeia and national formulary USP 43–NF 38* (Vol. 1, pp. 735–745; Vol. 2, pp. 2415–2420). Rockville, MD: U.S. Pharmacopeial Convention.
13. Palanivelu, M., Venkatesan, M. (2022). A Review on Herbal Cosmetics for Skin Care. *International Journal of Pharmaceutical Sciences Review and Research*, 72(2), 179–185.
14. Yadav, A. (2021). Banana (*Musa acuminata*): Most popular and common Indian plant with multiple pharmacological potentials. *World Journal of Biology Pharmacy and Health Sciences*, 07(01), 036–044.
15. Ehiowemwenguan, G., Emoghene, A. O., & Inetianbor, J. E. (2014). Antibacterial and phytochemical analysis of banana fruit peel. *IOSR Journal of Pharmacy*, 4(8).
16. Priya RK, Srivastava S, Singh KK, Mathad C, Thind PS. Study of antioxidant and antimicrobial properties, phytochemical screening and analysis of sap extracted from banana (*Musa acuminata*) pseudostem. *Int J Adv Biotechnol Res*. 2014;5:649–658.
17. Shimada Y, Tai H, Tanaka A, et al. Effects of ascorbic acid on gingival melanin pigmentation in vitro and in vivo. *J Periodontol*. 2009;80:317–323.
18. Dummett CO. Physiologic pigmentation of the oral and cutaneous tissues in the Negro. *J Dent Res*. 1946;25:421.
19. Heravi G, Khazaeli P, Mehrabani M, Rahimi H, Nematolahi N. Cream formulation and in vitro evaluation of depigmenting and cytotoxic effect of *Musa sapientum* pericarp and *Spinacia oleracea* folium. *Res Pharm Sci*. 2021;7:5–15.

Research Through Innovation