

## Mangifera Indica L plant extracts formed a whitening and antiaging peel-off Mask

Jusvir Mishra<sup>1</sup>, Bhavesh Joshi<sup>2</sup>, Gulam Khan<sup>3</sup>, Ankita Mishra<sup>4</sup>, Darshana Mhatre<sup>5</sup>

<sup>1,2,3,4</sup>Research Scholar, Ideal College of Pharmacy and Research, Kalyan, Maharashtra

<sup>5</sup>Research Guide, Ideal College of Pharmacy and Research, Kalyan, Maharashtra

Submitted: 20-04-2023

Accepted: 30-04-2023

**ABSTRACT**— This study determined the antioxidant activity of Mangifera Indica L leaves extract and a face mask prepared from it that is a peel-off gel. It also produced a mask that met the standards. Protein, oligosaccharides, saponin, phytates, phenolic compounds, flavonoids, and isoflavones abound in Mangifera Indica L extract. Photoprotection and exogenous antioxidants prevent early aging best—everyone ages due to physiological changes. Antiaging peel-off gel masks with Mangifera Indica L. ethanolic extract will be studied. For this, tropical and subtropical plants contain C-glucosyl-xanthone mangiferin. Plant-derived antioxidants. Natural cosmetics are better, safer, and greener than synthetic ones. Photoprotection work on skin.

Chemical or natural compounds that penetrate the dermis, inhibit ECM enzyme activation, and offer radioprotection can postpone skin ageing. Antiaging may not stop biological ageing. Cosmetic procedures slow ageing. Antiaging supplements include antioxidants. It may heal face skin. Mango leaves contain antioxidants. Exogenous antioxidants and photoprotection are the best ways to delay ageing. A face mask made from herbal cosmetics can reduce wrinkles naturally. Mangifera indica L's leaves and bark contain the greatest Mangiferin, a common plant compound. Mangiferin, a natural antioxidant, offers many medicinal benefits. Synthetic antioxidants can harm the skin, thus, natural antioxidants are safer. After two washings, the leaves were shade-dried for eight to ten days. A round-bottom flask contained 500ml of ethanol and 1:1 distilled water. The flask was placed on a 75°C heating mantle. Mangifera Indica L leaf extract was utilized to examine the formulation's potential to scavenge free radicals. The formulation was safe, non-irritating, and better-looking. It was easy to clean. The formulation was stable up to 10°C but unstable above 50°C.

**Index Terms**—Mangiferin, Scavenging, Anti-aging, Antioxidants.

### I. INTRODUCTION

Humans have always wanted to avoid aging and preserve their youth. They've had several procedures to halt skin aging. "Antiaging" doesn't necessarily imply preventing aging biologically. "Antiaging" now focuses on life quality. Antioxidant pills are one way people try to delay aging.<sup>1</sup> Antioxidant delay or stop aging. Mango leaves are one source of naturally occurring antioxidants; vegetables and fruits are others. The leaves are rich in protein, oligosaccharides, saponin, phytates, phenolic compounds, flavonoids, and isoflavones. Several cosmetic methods aim to postpone aging. Possible formulations include phytosomal gel microemulsion and a peel-off mask. Peel-off masks may protect the face from the elements that cause skin aging; it may heal facial skin. <sup>1,2</sup>Polyvinyl alcohol may generate a strong, thin covering that dries quickly and protects the skin. The researcher wanted to use mango leaf ethanol extract to make a peel-off gel mask, test its physical properties, and see if it had an antiaging effect.<sup>1</sup>

The skin is the most sensitive and protective part of an animal or human body's covering. As people age, their skin matures naturally, affected by the environment and other factors. Age spots, dryness, wrinkles, and drooping skin are skin aging symptoms. Loss of fat results in the skin being less smooth, a hallmark of skin aging.<sup>3,4</sup> When melanocytes decline, skin thins, lightens, and becomes more transparent. Large pigment blotches and aging patches appear.<sup>[12,14]</sup> All these symptoms necessitate antiaging therapy, such as medications or treatments that boost the body's natural collagen synthesis or loss. Even while sunbathing, UV radiation from the sun induces accelerated aging, extracellular matrix

degeneration, and skin cancer components.<sup>3-5</sup> Long-term UV exposure may harm human skin cancer, sunburns, oxidative stress, and photoaging are some of them.<sup>6</sup> Everyone will age due to physiological changes throughout their lives. Photoprotection and exogenous antioxidants are the most effective ways to postpone premature aging. Polyphenol chemicals inhibit oxidative skin damage, making them antiaging. This is done by reducing reactive oxygen species, which may be created by outside sources (like UV radiation) and internal factors (like hormones).<sup>1,7,8</sup>

Antioxidants help shield the skin from free radicals in skin care products, mainly anti-aging therapies. Mangiferin, a natural antioxidant found in *Mangifera Indica* L. leaves, whitens and regenerates the skin.<sup>1</sup> One of the available herbal cosmetics is a face mask, which may be made into natural facial masks that erase wrinkles. Because they may rejuvenate skin, peel-off natural gel masks are famous for face skin treatment. Natural cosmetics are greener, better, and safer than synthetic ones. It absorbs excess oil, removes impurities from the skin, cleans clogged pores, and removes blackheads. Phenolic chemicals decrease oxidation, alleviate free radical damage, and regulate gene expression.<sup>9,10</sup> These molecules can be employed as natural medications to replace synthetic antioxidants or antiaging beauty chemicals.<sup>4,11</sup> Polyphenols from mango are anti-inflammatory, antibacterial, antifungal, anti-diabetic, antipyretic, immunomodulatory, and analgesic.<sup>2,7</sup> *Mangifera Indica* L. hydroalcoholic extract peel-off gel masks will be formulated, and evaluated as an antiaging agent. Mangiferin is abundant in mango leaves and bark. It's a powerful antioxidant and a radical scavenger.<sup>1,7,8</sup>

There are several photo protectors that function on the skin's surface. Chemical or natural compounds that provide photoprotection penetrate the dermis and decrease ECM enzyme activation and activity may postpone skin aging.<sup>12</sup> Recently, interest in pharmacologically active, less dangerous, naturally occurring compounds has grown. Plant-derived compounds are used as antioxidants<sup>4,11,13</sup>. Mangiferin, a C-glucosyl-xanthone found in

tropical and subtropical plants, may be used for this purpose. *Cyclopia* sp. (Fabaceae) and *Anemarrhena asphodeloides* (Liliaceae) contain Mangiferin. (*Mangifera Indica*, L. Anacardiaceae) It also includes Mangiferin and other plants.<sup>14,15</sup> Many studies have focused on preparing and applying mangiferin formulations to the skin. Mangiferin's solubility in cosmetic and medicinal solvents isn't well studied.

## II. MATERIALS AND METHODS

### Plant Collection

The mango leaves weighing approx 450–500 gm were collected from the surroundings of the college and verified by the botany department of the Ramniranjan Jhunjhunwala College, Ghatkopar, Mumbai

### Chemicals

The chemicals, Glycerine, Polyvinyl alcohol (PVA), Carbapol(940 grade), Sodium Carboxymethyl Cellulose (NaCMC), Methyl paraben, Propyl paraben, Talcum powder, Triethanolamine, were obtained from Pallav chemicals private limited (India), 1,1-diphenyl-2-picryl-hydrazyl (DPPH) were obtained from Sigma Aldrich Co. Ltd. (India) UV-visible spectrophotometer (Shimadzu 1900i).

### Extraction

The leaves were distilled water washed twice, then shade dried for eight to ten days. After complete drying, when 2-3% moisture was present, the leaves were ground into fine particles and passed through the sieves to obtain a particle size of 2mm. Take an 80gm crude powder and put it in an extractor tube after sealing it in a muslin towel (to prevent sample leakage). As a solvent, 500 ml of ethanol and 500 ml of distilled water (ratio 1:1) are added to a round-bottom flask as a solution, and the flask is then put on a heating mantle with the temperature set at 75°C. The extraction process was continuous for two to three days. The extracted material was then concentrated by releasing the solvent. The obtained extract is shown in Table 1.1.

Table 1.1: Extraction

Weight Of Crude Drug(Powder)	Weight After Extraction	Percentage Of Hydroalcoholic Extract
80g	5.6g	7%

**Procedure for the formulation of peel-off Mask**

First, we combined 20 ml of water, methylparaben, and carbapol (940 grade) and waited until the carbapol swelled (phase I). After dissolving polyvinyl alcohol in 30 ml of hot water, we added sodium carboxymethyl cellulose and propylparaben in phase II. This phase ended when the PVA disintegrated. While churning, the mixture was kept at 60°C. Phase I is introduced to Phase II with a mechanical stirrer to ensure full mixing.

After adding extracts (Honey Extract and Mangiferin Extract, specifically), mix all components. To maintain pH and guarantee homogeneity, triethanolamine was added to the mixture. Talcum powder was used to maintain opaqueness. It was filled with purified water. The concoction was scented with rose oil. After adding each component, whisk the mixture to distribute it evenly. The formulation was then evaluated using additional factors.<sup>11,16-19</sup>

**Table 1.2:** Formula of Peel-Off Mask

Sr.no.	Ingredients	Optimized Concentrations (%)		
		F1	F2	F3
1.	Mangifera Extract	1gm	1.5gm	2gm
2.	Honey	-	0.5gm	1gm
3.	Glycerine	1gm	1gm	1.5gm
4.	Polyvinyl alcohol(PVA)	5gm	6gm	7gm
5.	Carbapol(940 grade)	0.5gm	0.5gm	0.5gm
6.	Sodium Carboxymethyl Cellulose	0.1gm	0.2gm	0.3gm
7.	Talcum powder	2gm	2gm	2gm
8.	Propyl paraben	0.02gm	0.02gm	0.02gm
9.	Methyl paraben	0.2gm	0.2m	0.2gm
10.	Triethanolamine	2ml	2ml	2ml
11.	Distilled Water	Qs	Qs	Qs

**Evaluation Parameters**

**Physical evaluation**

Physical characteristics, including color, look, and consistency, were evaluated for the formulation before use.<sup>11,13,19</sup>

**Folding Endurance**

They were manually measuring ready films' folding durability. Peel-off Mask covered skin. A 3x3 cm strip of film was dried, divided into equal pieces, and then folded repeatedly until it broke the number of folds the film could withstand at the exact location before breaking.

**pH and Spreadability**

The topical peel-off Mask's pH was measured digitally. One gram of formulation was dissolved in

100 ml of distilled water for two hours. Table 1.3 shows the pH readings of the formulations.<sup>11,18,20</sup>

**Spreadability:** The time it took two slides to separate from the cream, which was positioned in between the slides under a given force, was used to gauge the spreadability. The quicker the two slides can be separated, the better the spreadability.<sup>21</sup>

$$= \frac{M_{\text{weight tied to upper slide}} \times L_{\text{length of glass slides}}}{T_{\text{time is taken to separate slides}}}$$

**Thermodynamic Stability studies**

This experiment tested the peel-off formulations' low- and high-temperature stability. With 24-hour storage at each temperature, there are six cycles between 4 °C and 40 °C. When tested at these temperatures, the formulation was stable.<sup>21</sup>

**Table 1.3:** Thermodynamic Stability of Formulations

Thermodynamic Stability	Formulation code		
	F1	F2	F3
4 <sup>0</sup> C	Stable	Stable	Stable
40 <sup>0</sup> C	Stable	Stable	Stable

#### Skin Irritation Study

Peel-off masks must not irritate or sensitize the skin. Using the Draize modified scoring method, the peel-off Mask was assessed for skin irritation. detected 0.0.<sup>1,16</sup>

#### Erythema-oedema skin response

No erythema or oedema was found on the skin's surface, and both cases scored zero.<sup>21</sup>

**Table 1.4:** Evaluation of Erythema and Oedema

Formulation code	Score	
	Erythema and Eschar formation	Oedema formation
F1	0	0
F2	0	0
F3	0	0

#### Peel Test

The peel mask was put on the skin in an even way. The peel was given time to dry. After 15 minutes, the peel was taken off the skin's surface.

Observations showed that the peel came off easily without breaking, as shown in Table 1.9 below.<sup>11,13,19</sup>

**Table 1.5:** Formulation peeling time

Formulation code	Peeling time (minutes)
F1	15.4
F2	15.3
F3	15

#### Scavenging activity onto DPPH radicals

50µl of an extract was mixed with 950µl of 0.004% DPPH ethanolic solution to create the combination, was then given a final amount of 1 ml and allowed to react at 37<sup>0</sup>C. After 10 minutes, the absorbance value was measured at 515 nm using a Shimadzu 1900i UV-visible spectrophotometer; the 950µl DPPH solution in ethanol with a 50µl ethanol/distilled water mixture was the negative control. In this test, the amount of extract (in mg/ml) required to inhibit 50% of the free radical scavenging activity was used to indicate scavenging activity (IC<sub>50</sub>). The acquired optical

density was transformed using the formula into free radical scavenging activity.

$$\% \text{ free radical scavenging activity} = \frac{[(A_{\text{negative control}} - A_{\text{extract}})] \times 100\%}{A_{\text{negative control}}}$$

Where, A is the absorbance.

The free radical scavenging activity percentage was displayed on the y-axis, and the IC<sub>50</sub> values were calculated using the different test plant extract concentrations (0–5 mg/ml). An extract from a plant is more effective as an antioxidant if its IC<sub>50</sub> value is low..<sup>1,11,21</sup>

**Table 1.6 :**Summary of antioxidant level

Sample	D1	D2
IC <sub>50</sub> value	152.74	165.84
Antioxidant Category	Weak Antioxidant	Weak Antioxidant

\*Where, D1= Dilution produced with the use of ethanol as a solvent, D2= Distilled water is used to diluted as a solvent.

### III. RESULT AND DISCUSSION

This study used different extract volumes to create peel-off gel masks. Each variation's gel Peel-Off mask recipe underwent testing. Physical, pH, homogeneity, thermostability, peel time, and spreadability tests are all part of the quality assurance process. Due to organoleptic variables, the observation was conducted on the seventh day, and the peel-off gel mask was light green in color and already had a gel-like shape. The Mask will therefore have a slightly runny shape and a dark green color depending on whether it is less than or greater than seven days. Organoleptic experiments

demonstrate how to make a colour-appealing peel-off gel mask stock, a tolerable scent, and a convenient shape. Table 3 displays the outcomes. Following the table's parameters for a peel-off gel mask, we may deduce that F1, F2, and F3 are semi-solid gels with a distinct odor (foul-smelling) and translucent green gel. The peel-off gel mask stock was tested for pH, and the results were made to have a pH between 4.5 to 8.0, the same as the skin pH. F1 peel-off gel mask has a pH of 7.29, whereas F2 and F3 have a pH of 7. Scaly skin and even inflammation result from a stock's pH level outside the pH range. In contrast, If it exceeds the skin's pH, it can make the skin feel slick, cause it to dry out quickly, and reduce flexibility. Table Number 1.3 displays the findings for numerous evaluations.

**Table No.1.7:** Evaluation Results

Formulation code	F1	F2	F3
<b>Evaluation Parameters</b>			
Colour	Green	Green	Green
Odor	Sweet	Sweet	Sweet
Consistency	Semi-solid	Semi-solid	Semi-solid
Washability	Good	Good	Good
pH	7.29	7.00	7.31v
Spreadability (cm)	6.67	6.67	6.67
Skin Irritation	Non irritant	Non irritant	Non irritant
Peeling time (minutes)	15.4	15.3	15

### IV. CONCLUSION

Mangifera Indica L is commonly utilized in conventional medicine to treat and prevent a wide range of illnesses and has been discovered to be abundant in secondary metabolites. The therapeutic activities of plants may be explained by the presence of steroids, terpenoids, alkaloids, phenol, carbohydrates, resins, proteins, amino acids, flavonoids, tannins, and resinous materials. Utilizing methods like extraction, purification, separation, and crystallization allows for the further analysis and identification of these active components to take advantage of these

pharmacological capabilities. Mangifera indica L leaf extract peel-off mask was proven to be a successful formula with positive outcomes. The peel-off Mask demonstrated good spreading properties. The mixture demonstrated good peeling ability on human skin without irritating the skin or resulting in edema. The study also showed that the formulation could use a radical scavenging technique with an antiaging effect to lessen or block the free radical species. Studies on the formulation's thermodynamic stability were conducted. The formulation displayed promising findings for stability and was discovered to be

stable up to 400C. On healthy male volunteers, the erythema and skin irritation test was conducted. It was determined to be non-irritating when the erythema and edema score was zero. It can be inferred from the discussion above that *Mangifera Indica* L. Leaf extract can be used to create a gel peel-off mask. The recipe that has the ideal concentration satisfies the organoleptic specifications. It is also homogenous and stable, has a pH of 7, a 6.67 cm spreadability, a 15-minute peel time, and a weak antioxidant with an  $IC_{50}$  of 152.74 and 165.84. According to the study, the composition can potentially have antioxidant properties and can lessen skin aging symptoms.

### REFERENCES

1. Shamsuddin AM, Sekar M, Ahmad ZM. FORMULATION AND EVALUATION OF ANTIAGING CREAM CONTAINING MANGIFERIN. *International Research Journal Of Pharmacy*. 2018;9(6):55-59.
2. Matkowski A, Kus P, Goralska E, Wozniak D. Mangiferin – a Bioactive Xanthonoid, not only from Mango and not just Antioxidant. *Mini-Reviews in Medicinal Chemistry*. 2013;13(3):439-455.
3. Rinnerthaler M, Bischof J, Streubel M, Trost A, Richter K. Oxidative Stress in Aging Human Skin. *Biomolecules*. 2015;5(2):545-589.
4. Kohen R. Skin antioxidants: Their role in aging and in oxidative stress — New approaches for their evaluation. *Biomedicine & Pharmacotherapy*. 1999;53(4):181-192.
5. Kohen R, Gati I. Skin low molecular weight antioxidants and their role in aging and in oxidative stress. *Toxicology*. 2000;148(2-3):149-157.
6. Gilchrest BA, Blog FB, Szabo G. Effects of Aging and Chronic Sun Exposure on Melanocytes in Human Skin. *Journal of Investigative Dermatology*. 1979;73(2):141-143.
7. Imran M, Arshad MS, Butt MS, Kwon JH, Arshad MU, Sultan MT. Mangiferin: a natural miracle bioactive compound against lifestyle related disorders. *Lipids Health Dis*. 2017;16(1).
8. Dorta E, Lobo MG, González M. Improving the Efficiency of Antioxidant Extraction from Mango Peel by Using Microwave-assisted Extraction. *Plant Foods for Human Nutrition*. 2013;68(2):190-199.
9. Khorsandi D, Moghanian A, Nazari R. Personalized Medicine: Regulation of Genes in Human Skin Ageing. *J Allergy Ther*. 2016;07(06).
10. MONTAGNA W, CARLISLE K. Structural changes in ageing skin. *British Journal of Dermatology*. 1990;122(s35):61-70.
11. Susanti REE, Ayun Q. Formulation and Antioxidant Activity of Peel Off Gel Mask from *PaederiaFoetida* Extract. *JKPK (Jurnal Kimia dan Pendidikan Kimia)*. 2022;7(1):12.
12. Ochocka R, Hering A, Stefanowicz-Hajduk J, Cal K, Barańska H. The effect of mangiferin on skin: Penetration, permeation and inhibition of ECM enzymes. Santos HA, ed. *PLoS One*. 2017;12(7):e0181542.
13. Jani TA, Hakim A, Juliantoni Y. Formulation and Evaluation of Antioxidant Peel-Off Face Mask Containing Red Dragon Fruit Rind Extract (*Hylocereuspolyrhizus* Haw.). *JurnalBiologiTropis*. 2020;20(3):438-445.
14. Salomon S, Sevilla I, Betancourt R, Romero A, NuevasPaz L, AcostaEsquijarosa J. Extraction of mangiferin from *Mangifera indica* L. leaves using microwaveassistedbrtechnique. *Emir J Food Agric*. 2014;26(7):616.
15. Kulkarni V, Rathod V. Green Process for Extraction of MangiferinfromMangiferaindicaLeaves. *Journal of Biologically Active Products from Nature*. 2016;6(5-6):406-411.
16. TANJUNG YP, JULIANTI AIKA, ISNAYANTI I, R. A. FORMULATION AND EVALUATION OF PEEL OFF GEL FACIAL MASK FROM ARABICA COFFEE FRUIT PEEL EXTRACT (*COFFEA ARABICA* L.). *International Journal of Applied Pharmaceutics*. Published online December 2021:148-151.
17. Priani SE, Irawati I, Darma GCE. Formulation of Peel-Off Facial Mask from Mangosteen Pericarp (*Garcinia mangostana* Linn.). *Indonesian Journal of Pharmaceutical Science and Technology*. 2015;2(3):90-95.
18. T IH, Laila L. EVALUATION OF ANTI-AGING AND ANTI-ACNE EFFECT OF ANDALIMAN (*ZANTHOXYLUM ACANTHOPODIUM* DC.) ETHANOLIC EXTRACT PEEL OFF GEL MASK. *Asian Journal of Pharmaceutical and Clinical Research*. 2018;11(13):90.

19. Budiman A, Aulifa D, Kusuma A, Kurniawan I, Sulastri A. Peel-off gel formulation from black mulberries (*Morus nigra*) extract as anti-acne mask. *Natl J Physiol Pharm Pharmacol*. 2017;7(10):1.
20. Prasetyo BE, Rafika D, Laila L, Aminah F. Physical Evaluation and Anti-Aging Effect of Red Bean Ethanolic Extract (*Vigna angularis* (Wild.) Ohwi & Ohashi) Peel-Off Gel Mask. *Open Access Maced J Med Sci*. 2019;7(22):3907-3910.
21. Kulkarni S v, Arun DR, Gupta K, Abdul APJ. FORMULATION AND EVALUATION OF ACTIVATED CHARCOAL PEEL OFF MASK.
22. Yenny SW, Suryani YE. Polyphenols as Natural Antioxidants in Skin Aging. *Sumatera Medical Journal*. 2020;3(3).
23. Serino A, Salazar G. Protective Role of Polyphenols against Vascular Inflammation, Aging and Cardiovascular Disease. *Nutrients*. 2018;11(1):53.
24. Csekés E, Račková L. Skin Aging, Cellular Senescence and Natural Polyphenols. *Int J Mol Sci*. 2021;22(23):12641.
25. Hubbard BA, Unger JG, Rohrich RJ. Reversal of Skin Aging with Topical Retinoids. *Plast Reconstr Surg*. 2014;133(4):481e-490e.
26. Austin E, Huang A, Adar T, Wang E, Jagdeo J. Electronic device generated light increases reactive oxygen species in human fibroblasts. *Lasers Surg Med*. 2018;50(6):689-695.