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# FORMULATION AND EVALUATION OF A POLYHERBAL ANTI-AGING PEEL - OFF FACE MASK

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## ABSTRACT

Skin aging is influenced by intrinsic and extrinsic factors, with oxidative stress playing a major role in accelerating the aging process. This study aimed to formulate and evaluate a polyherbal anti-aging peel-off face mask containing extracts of butterfly pea flower, red rice bran, soybean, and liquorice. Peel-off mask formulations were prepared using polyvinyl alcohol (PVA) as the film-forming agent. Among the various gel base concentrations evaluated (5%, 7.5%, and 10%), the 7.5% gel base was selected due to its optimal drying time and flexibility. Three formulations (F1, F2, and F3) were assessed for physicochemical properties, including pH, homogeneity, viscosity, drying time, washability, folding endurance, and antioxidant activity. All formulations showed acceptable characteristics for topical application and good skin compatibility. Antioxidant activity, determined by the hydrogen peroxide scavenging assay, was highest in F3 (97%), while F2 demonstrated comparable activity (96.2%) with better overall formulation characteristics. Therefore, F2 was identified as the optimized formulation. The developed polyherbal peel-off face mask shows promising antioxidant and anti-aging potential, making it a suitable natural skincare formulation.

**KEYWORDS:** Polyherbal face mask, Anti-aging, Antioxidant activity, Skin rejuvenation, Exfoliation, Anti-blemish.

## INTRODUCTION

### POLYHERBAL FACE MASK

In pharmaceutical and cosmetic sciences, face masks are widely used topical formulations designed to improve skin health and facilitate the delivery of active ingredients. The mechanism of action involves hydration and occlusion of the stratum corneum, enhancing the penetration of bioactive compounds into deeper skin layers. The effectiveness of these formulations depends on factors such as molecular size, solubility, pH, vehicle composition, skin hydration, and contact time.

Polyherbal formulations are gaining importance due to their synergistic action, where multiple plant-based ingredients work together to provide enhanced therapeutic effects with minimal side effects. These formulations are rich in natural antioxidants, vitamins, and bioactive compounds that help in skin rejuvenation, repair, and protection.

### PEEL-OFF FACE MASK

Peel-off face masks are innovative cosmetic formulations that form a thin, elastic film on the skin surface. Upon drying, the film can be peeled off easily, removing dead skin cells, dirt, and excess oil. These masks improve skin texture, enhance blood circulation, and promote a clearer and smoother complexion. They also facilitate deeper penetration of active ingredients, making them effective for targeted skin treatments such as anti-aging, exfoliation, and skin tightening.

Examples include charcoal masks for deep cleansing, vitamin C masks for brightening, and fruit-based masks for nourishment and rejuvenation.[1]

### ANTI-AGING POLYHERBAL PEEL-OFF FACE MASK

Skin aging is a natural biological process influenced by intrinsic factors (genetics, hormonal changes) and extrinsic factors (UV radiation, pollution, oxidative stress). It is characterized by wrinkles, fine lines, loss of elasticity, uneven skin tone, and blemishes. One of the major contributors to skin aging is oxidative stress caused by free radicals, which damage cellular structures and accelerate collagen degradation.

A polyherbal peel-off face mask formulated with natural ingredients can effectively combat these issues by providing antioxidant, anti-wrinkle, skin tightening, anti-blemish, and

exfoliating effects. Herbal ingredients offer a safer and more sustainable alternative to synthetic chemicals, reducing the risk of irritation and long-term damage.[2]

The present formulation incorporates a combination of herbal ingredients selected for their proven dermatological benefits. Butterfly pea is rich in anthocyanins, which possess strong antioxidant properties that protect the skin from oxidative stress and premature aging. Rice bran contains gamma oryzanol and vitamin E, which help brighten the skin, reduce wrinkles, and improve overall skin texture. Soybean is a rich source of isoflavones that stimulate collagen production, enhance skin elasticity, and provide skin-tightening effects. Liquorice is well known for its skin-lightening and anti-pigmentation properties, helping to reduce blemishes, improve uneven skin tone, and promote a healthier complexion. Together, these herbal ingredients provide antioxidant, anti-aging, skin-brightening, and protective effects, making them suitable for incorporation into a polyherbal peel-off face mask.

## MATERIALS AND METHODS

### METHODOLOGY

### EXTRACTION METHODS OF HERBAL CONSTITUENTS

**BUTTERFLY PEA:** Butterfly pea flower powder was subjected to extraction by maceration method using methanol as the solvent. About 35 g of the powder was taken in a conical flask and 150 mL of methanol was added. The solvent was acidified by adding 2–3 drops of concentrated hydrochloric acid. The mixture was shaken thoroughly, covered with aluminium foil, and kept aside for 24 hours at room temperature with occasional shaking. After 24 hours, the mixture was filtered, and the filtrate obtained was the methanolic extract of butterfly pea flower.[3]

**LIQUORICE:** Liquorice powder was extracted by the decoction method using a solvent mixture of methanol and water in the ratio of 80:20. About 25 g of liquorice powder was added to the solvent and shaken thoroughly. The mixture was then heated at about 80°C for 15–30 minutes. After boiling, the solution was allowed to cool and then filtered. The extract obtained was further concentrated by pouring it into petri plates and allowing it to dry.[4]

**RED RICE BRAN:** Red rice bran was subjected to extraction using 40% acetone prepared in water. The solvent was prepared by mixing 40 mL of acetone with 60 mL of water to obtain 100 mL of hydroalcoholic solution. About 40 g of red rice bran was added to the acetone solution and the mixture was kept aside for 18 hours at room temperature to macerate. After

the maceration period, the mixture was filtered, and the filtrate was collected. The extract was then obtained by evaporating the solvent using a water bath.[5]

**SOYBEAN:** Soya powder was subjected to extraction using a solvent mixture of methanol, acetone, and water in the ratio of 40:20:20. About 5 g of soya powder was taken in a suitable container and mixed with the solvent. The mixture was kept at room temperature for about few minutes and then subjected to probe sonication at 20°C for 2 hours. After sonication, the resulting solution was kept for a certain period to allow proper extraction. The mixture was then filtered, and the filtrate was collected. The extract was then obtained by evaporating the solvent using a water bath.[6]

**PHYTOCHEMICAL ANALYSIS**

**Test for tannins:** About 0.5 g of the extract was boiled in 10 mL of water in a test tube and then filtered. A few drops of 0.1% ferric chloride was added and observed for brownish green or a blue-black colouration.

**Test for saponins:** 0.5 g of extract was added 5 mL of distilled water in a test tube. The solution was shaken vigorously and observed for a stable persistent froth. The frothing was mixed with 3 drops of olive oil and shaken vigorously after which it was observed for the formation of an emulsion.

**Test for steroids:** One mL of the extract solution was added to 10 mL of chloroform and equal volume of concentrated sulphuric acid was added through sides of the test tube. The upper layer turns red and sulphuric acid layer shows yellow with green fluorescence which indicates the presence of steroids.

**Test for terpenoids:** 2 mL of chloroform was added to 0.5 g each of the extract. Concentrated $H_2S0_4$ (3 mL) was carefully added to form a layer. A reddish-brown colouration of the interface indicates the presence of terpenoids.

**Test for triterpenoids:** 10 mg of the extract was dissolved in 1 mL of chloroform. To this 1 mL of acetic anhydride, 2 mL of Conc. $H_2SO_4$ was added. Formation of reddish violet colour indicates the presence of triterpenoids.

**Test for anthraquinones:** 0.5g of the extract was boiled with 10 mL of sulphuric acid and filtered while hot. The filtrate was shaken with 5 mL of chloroform. The chloroform layer

was pipetted out into another test tube and add 1 mL of dilute ammonia to it. The resulting solution was observed for colour changes.

**Test for Flavonoids:** A few drops of 1% $NH_3$ solution is added to the aqueous extract of plant sample in a test tube. A yellow coloration is observed if flavonoids compound are present.

**Test for alkaloids**: 0.5 g of extract was diluted to 10 mL with acid alcohol, boiled and filtered. To 5 mL of the filtrate 2 mL of dilute ammonia, 5 mL of chloroform was added and shaken gently to extract the alkaloid base. The chloroform layer was extracted with 10 mL of acetic acid. This was divided into two portions. Mayer's reagent was added to one portion and Dragendorff's reagent to the other. The formation of a cream (with Mayer's reagent) or reddish-brown precipitate (with Draggendorff's reagent) was regarded as positive for the presence of alkaloids.

**Test for cardiac glycosides**: 0.5 g of extract was dissolved in 5 mL water and 2 mL of glacial acetic acid was added containing one drop of ferric chloride solution. This was underlayed with 1 mL of concentrated sulphuric acid. A brown ring at the interface indicated the presence of a deoxy-sugar characteristic of cardenolides. A violet ring may appear below the brown ring, while in the acetic acid layer a greenish ring may form just above the brown ring and gradually spread throughout this layer.[7]

**Test for phenols**: Formation of black/brown colour results in presence of phenols upon addition of 0.5%fecl$_3$ to 0.1% extract solution.[5]

**PREPARATION OF PEEL-OFF MASK**

**FORMULATION OF PEEL-OFF MASK**

**PROCEDURE:** All three formulations (F1, F2, and F3; 10 g each) were prepared using a similar composition, with variation only in the concentration of butterfly pea flower (BPF). In F1, 1 g of BPF was used, while F2 and F3 contained 2 g and 3 g, respectively. Red rice bran, liquorice, and soya were maintained constant across all formulations at 0.30 g, 0.2 g, and 2 g, respectively. PVA mucilage was used at a fixed concentration of 7.5% in all batches. Preservatives, including 0.015 g of methyl paraben and 0.003 g of propyl paraben were added, followed by 2–3 drops of essential oil. The mixture was then blended thoroughly to obtain a uniform peel-off mask formulation.[3]

**Table.1: Formulation of peel off mask.**

| INGREDIENTS | F1 | F2 | F3 |
|---|---|---|---|
| Butterfly pea flower(g) | 1 | 2 | 3 |
| Red rice bran(g) | 0.30 | 0.30 | 0.30 |
| Liquorice(g) | 0.2 | 0.2 | 0.2 |
| Soybean(g) | 2 | 2 | 2 |
| Gel base | 7.5% | 7.5% | 7.5% |
| Methylparaben(g) | 0.015 | 0.015 | 0.015 |
| Propyl paraben(g) | 0.003 | 0.003 | 0.003 |
| Essential oil | 2-3drops | 2-3drops | 2-3drops |

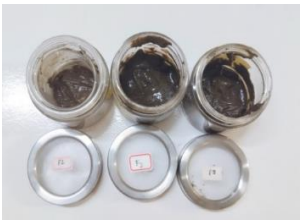

**Figure.1. Polyherbal peel-off mask formulations (F1, F2, F3).**

## EVALUATION OF PEEL-OFF MASK

**Organoleptic Evaluation:** Manual assessment of the formulation's physical properties. Colour, Odour, Appearance.

**Texture and consistency**: Assessment of smoothness and ease of spreading without grittiness.

**Homogeneity Test:** The homogeneity of the formulation has been tested by visual appearance. A small quantity of formulation pressed between thumb and index finger, and the consistency of the formulation noticed whether homogeneous or not.

**pH determination:** The pH of the formulation was determined by using digital pH meter. Before usage, the pH meter was calibrated using standard buffer solution at pH 4,7 and 9. The ideal range should be between 4.5 and 6.5, which is compatible with the skin's natural pH, to avoid irritation.

**Drying time:** Drying time was performed by applying a sufficient amount of formulated base on a volunteer in a uniform layer and peeled off after drying and note the drying time. [8]

**Washability:** A small quantity of the prepared formulation was applied evenly to the skin and allowed to dry. The dried film was then rinsed with water, and the ease of removal was assessed manually.[1]

**Folding Endurance:** Film forming capability was checked by folding endurance of peel-off mask and it was performed by applying mask sample on skin and was rolled without breaking after drying. It checks the resistance of the peel-off mask for breaking.[9]

**Viscosity:** The viscosity of the formulations were determined using a Brookfield viscometer. A suitable spindle was immersed in the sample and rotated at a fixed speed at room temperature. After stabilization, the viscosity was recorded in centipoise (cP).[1]

**Antioxidant activity ($H_2O_2$ Scavenging test):** The hydrogen peroxide scavenging activity was determined using the ascorbic acid method. A 40 mm hydrogen peroxide solution was freshly prepared in 0.1 M phosphate buffer (pH 7.4). Ascorbic acid was used as the standard, and the test sample was prepared in distilled water at the required concentration. The reaction mixture consists of 0.6 mL of hydrogen peroxide solution, 3.3mL of phosphate buffer and 0.1 mL of standard or test sample solution, while the control contained hydrogen peroxide and phosphate buffer. A blank without hydrogen peroxide was used for baseline correction. All mixtures were incubated at room temperature for 10 minutes, after which the absorbance was measured at 230 nm using a UV–Visible spectrophotometer. The percentage hydrogen peroxide scavenging activity was calculated using the formula.

$$\%H2O2 = \frac{A(control) - A(Sample)}{A(Control)} \times 100$$

Where, A(control) and A(test) are Absorbance of control and test respectively. [10]

## RESULTS AND DISCUSSION

### Preliminary phytochemical screening of herbal extracts.

The preliminary phytochemical screening indicates that all selected herbal extracts possess a diverse range of bioactive constituents, which justify their incorporation into peel-off face mask formulations.

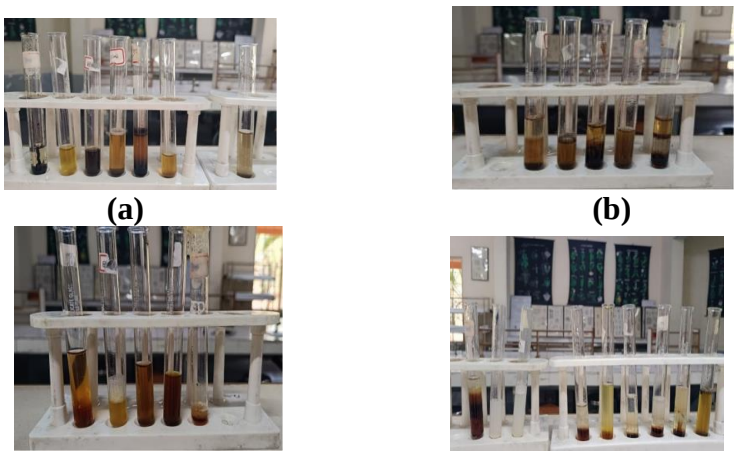


**Figure.2: Preliminary phytochemical screening of herbal extracts(a)butterfly pea flower, (b) red rice bran, (c) liquorice, (d) soybean**

**Table. 2: Preliminary screening of herbal extracts.**

| Phytoconstituent | Butterfly pea flower | Red rice bran | liquorice | soybean |
|---|---|---|---|---|
| **Flavonoids** | + | + | + | + |
| **Terpenoids** | + | + | + | + |
| **Phenols** | + | + | + | + |
| **Alkaloids** | + | + | - | + |
| **Saponins** | + | + | + | + |
| **Tannins** | + | + | + | + |
| **Triterpenoids** | - | + | + | + |
| **Steroids** | - | + | + | + |
| **Anthraquinone** | - | - | - | + |
| **Cardiac glycosides** | - | + | - | + |

Positive (+ve) indicates presence of the phytoconstituents whereas, negative (-ve) indicates absence of the constituents.

The universal presence of flavonoids across all extracts suggests strong antioxidant potential, which is beneficial in protecting the skin from oxidative stress and premature aging. Phenolic compounds, observed in butterfly pea flower and soybean, further enhance this antioxidant activity as shown in the Table.2 and Figure.2.

The physicochemical evaluation of all formulations was carried out, and the findings are summarized in Table 3.

**Table. 3: Summary of Evaluation Parameters.**

| Test | Result | Interpretation |
|---|---|---|
| Phytochemical Screening | Presence of flavonoids, phenols, terpenoids, tannins, saponins, etc. | Confirms antioxidant, anti-inflammatory and skin-protective properties. |
| Organoleptic Evaluation | Brownish colour, pleasant odour; F1 & F2 smooth, F3 viscous. | All formulations were aesthetically acceptable. |
| Homogeneity | No lumps or aggregates observed. | Indicates smooth, uniform application. |
| pH | F1: 6.3, F2: 6.5, F3: 6.2 | Suitable for topical application and compatible with skin pH. |
| Drying Time | F1: 15 min, F2: 18 min, F3: 20 min | Drying time increased with BPF concentration. |
| Washability | F1 and F2 good; F3 moderate. | F1 and F2 were easier to remove from skin. |
| Folding Endurance | F1: 4, F2: 4, F3: 5 folds | All formulations showed acceptable flexibility. |
| Viscosity | F3 > F2 > F1; decreased with | Indicates desirable |

| | | |
|---|---|---|
| | increasing RPM. | pseudoplastic behaviour. |
| $H_2O_2$ Scavenging Activity | F1: 84%, F2: 96.2%, F3: 97% | All formulations exhibited strong antioxidant activity. |

**Organoleptic evaluation:** All formulations exhibited a consistent brownish colour, which may be attributed to the presence of herbal ingredients. The odour was pleasant in all cases due to the incorporation of essential oil. Formulations F1, F2 displayed a smooth appearance, indicating uniform mixing and good consistency where F3 was viscous in appearance. Overall, the formulations were organoleptically acceptable and comparable.

**Texture and Consistency**: Texture and consistency play an important role in the application of topical formulations confirming the stability and acceptability of the formulations. All formulations exhibited good texture and consistency, indicating uniform mixing of ingredients and proper formulation design. No phase separation or grittiness was observed.

**Homogeneity:** Ensures uniform distribution of active ingredients throughout the formulation. All three formulations showed good homogeneity when applied to the skin, with no visible lumps or aggregates. This indicates proper blending of ingredients and uniformity of the formulations.

**pH:** Formulations F1, F2 and F3 had pH values closer to normal skin pH, indicating better skin compatibility. Thus, the formulations are considered to be safe for use.

**Drying time**: The drying time of the polyherbal formulations showed a gradual increase from F1 to F3. F1 dried within 15 minutes, while F2 and F3 required 18 and 20 minutes, respectively. This trend may be attributed to the increased concentration of active ingredients, which can slightly prolong film formation and moisture evaporation. Overall, F1 exhibited the fastest drying, whereas F3 showed the longest drying time among the formulations.

**Washability:** It is an important parameter that reflects ease of removal of the formulation after application. F1, F2 formulations showed good washability and could be easily removed using water without leaving residues on the skin compared to F3 due to its viscous nature.

**Folding endurance**: The folding endurance of the polyherbal formulations showed minimal variation among the batches. F1 and F2 exhibited folding endurance of 4 times, while F3 showed a slightly higher value of 5 times. This indicates that F3 possesses marginally better

flexibility and film strength compared to the other formulations, although all formulations demonstrated acceptable mechanical properties.

**Viscosity:** The viscosity evaluation of the polyherbal formulations (F1, F2, and F3) showed that viscosity increased from F1 to F3, with F3 exhibiting the highest viscosity and F1 the lowest. Similar to the gel base, all formulations demonstrated a decrease in viscosity with increasing RPM, indicating shear-thinning (pseudoplastic) behaviour. This suggests that the formulations become less viscous under applied stress, facilitating easy spreading during application. Overall, F3 was the most viscous formulation, while F1 showed the least resistance to flow.

**Anti-oxidant activity:** Although F2 (96.2%) and F3 (97%) exhibited comparable $H_2O_2$ scavenging activity, F2 was selected as the optimized formulation due to its excellent antioxidant potential along with more favourable drying characteristics**.**

## CONCLUSION

The present study successfully formulated and evaluated a polyherbal anti-aging peel-off face mask using natural ingredients such as butterfly pea flower, red rice bran, soybean, and liquorice. Preliminary phytochemical screening confirmed the presence of bioactive constituents including flavonoids, phenols, terpenoids, and saponins, which contribute to antioxidant and skin-protective properties. All formulations exhibited acceptable organoleptic characteristics, good homogeneity, skin-compatible pH, suitable viscosity, drying time, washability, and folding endurance, indicating their suitability for topical application.

The antioxidant activity study revealed that all formulations possessed significant hydrogen peroxide scavenging activity. Although F3 showed the highest antioxidant activity (97%), F2 exhibited a comparable scavenging activity (96.2%) along with more favourable drying time and application properties. Therefore, considering both antioxidant efficacy and formulation performance, F2 was identified as the optimized formulation.

Overall, the developed polyherbal peel-off face mask can be considered a safe, effective, and natural anti-aging cosmetic formulation with promising antioxidant potential and good user acceptability.

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**REFERENCES**

1. Birade P, Shete Y. Formulation and Evaluation of Herbal Peel Off Mask. Journal of Pharma Insights and Research, 2024 Feb 5; 2(1): 092-6.
2. Rinnerthaler M, Bischof J, Streubel MK, Trost A, Richter K. Oxidative stress in aging human skin. Biomolecules, 2015 Apr 21; 5(2): 545-89.
3. Wanegaonkar A, Jena N, Tembare D, Patil S. Formulation and evaluation of a peel-off face mask using butterfly pea flower (*Clitoria ternatea* Linn.) extract. Int J Pharm Sci, 2025 Jun 1. doi: 10.5281/zenodo.15564470.
4. Godse SD, Shinde V, Nimbalkar AS, Kamal SA. Formulation and Evaluation of Herbal Peel-off Facemask from Liquorice extract. Research Journal of Pharmacy and Technology, 2025; 18(8): 3911-6.
5. Sole TA, Rejeki ES, Purnamasari NA. Formulation and Evaluation of Red Rice Bran (Oryza rufipogon Griff.) Sleeping Mask with HPMC Variation. Indonesian Journal of Pharmaceutical Education, 2025 Apr 11; 5(2): 142-57.
6. Mirzajani R, Kardani F, Rezaie G. Comparative evaluation of soybean (Glycine max) seed extraction methods: Antioxidant potential and cytotoxic effects on cancer cells. Results in Chemistry, 2025 Nov 1: 102770.
7. Kumaran T, Citarasu T. Phytochemical screening, bioautography and antibacterial evaluation of the methanolic extract of Glycine Max (Soybean). screening, 2015; 9: 10-6.
8. Suhery WN, Anggraini N. Formulation and Evaluation of Peel-off Gel Mask from Red Rice Bran Extract with Various Kinds of Bases. In1st International Conference on Advance Pharmacy and Pharmaceutical Sciences 2016 Sep 6.
9. Lokhande S, Mankar S, Satpute A, Jadhao M. Formulation and Evaluation of Polyherbal Peel Off Mask. Asian Journal of Pharmaceutical Research and Development, 2024; 11(3): 23-8.
10. Gupta M, Dey A, Majumder S, Ghosh S, Barui A. Evaluation of antioxidant activity using by H2O2, DPPH, ABTS methods and phytochemical tests, TPC & TFC of commonly used medicinal plants of West Bengal. Int J Pharm Sci Rev Res, 2022; 72(1): 123-32.