

## **Formulation and Evaluation of Skin Brightening Liquorice Herbal Face Pack**

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**Abstract:** *The purpose of the project is to develop and test a cosmetic herbal face pack for all skin types utilising natural components in various ratios. 10 distinct formulations containing liquorice, multani, rose powder, and rakta chandan were made and then passed through sieve no 100, blended geometrically, and tested for organoleptic, physio-chemical, and rheological evaluation. The combined dry powder has an acceptable flow characteristic, making it ideal for use as a face pack. Different metrics such as organoleptic qualities, physio-chemical parameters, and stability, as well as an irritancy test and photo irritation, were used to evaluate all of the prepared formulations. Herbal face packs and masks are used to stimulate blood circulation, rejuvenate muscles, maintain skin elasticity, and remove dirt from skin pores. In this study, it was concluded that all of the formulations of face packs were good in physical parameters and free of skin irritations, so we found good properties for the face packs, and further optimization studies on this study are required to find the useful benefits of face packs on human use as cosmetic products.*

**Keywords:** Herbal face pack, liquorice, uses, formulation, evaluation.

## 1. INTRODUCTION:

Due to increased pollution and global warming the quality of air is deteriorated and harmful UV rays are causing much more damage to skin. In this time formulation of herbal face pack is like boon for skin healing. From the ancient period itself people use plants and natural plants extracts as essential needs for a healthy and beautiful skin. Cosmetics are the products used to clean, beautify and promote attractiveness of the skin.

### Cosmetics as Per Indian Regulation

As per the Drug and cosmetic act 1940, “cosmetic” means **any article intended to be rubbed, poured, sprinkled or sprayed on, or introduced into, or otherwise applicated to, the human body or any part thereof for cleansing, beautifying, promoting attractiveness, or altering the appearance.**

Cosmetics incorporated with active ingredients having medicinal benefits are known as cosmeceuticals.

Ayurveda describes skin problems are normally due to impurities in blood. Accumulated toxins in the blood during improper food and changing lifestyle are causing skin related diseases. The herbal paste made of natural herbs which is applied on face to treat acne, pimple, scars, roughness, wrinkles and pigments is known as “mukha lepa” in ayurveda. The process of smearing this herbal mix on face is known as “mukha lepana”.<sup>[1]</sup> The smooth powder which is used for facial application is “face pack”. A good herbal face pack must supply necessary nutrients to skin. It should penetrate the subcutaneous tissues in order to deliver the required nutrients. Different types of skin need different types of herbal face packs.

The herbal face packs which are mentioned in ayurveda help women to get rid of wrinkles, dark circles, pimples and acne. Herbal face packs increase the fairness and smoothness of skin. We can derive the maximum benefits of herbal face packs by using them according to our skin type. These face packs increase skin glow and are best ayurveda treatment to increase fairness. Herbal face packs are one of the oldest and beautiful methods of cleansing skin.

Herbal face packs are nowadays being used on a large scale, due to the various benefits of them over chemical-based packs. They are non-toxic, non-allergic and non-habit forming. They are natural in every aspect, having larger shelf lives. They have no added preservatives. They can be easily formulated and stored over a larger span of time.<sup>[1][2]</sup>

Here we made an attempt to prepare herbal face pack of active ingredient Glycyrrhiza glabra (liquorice) and other materials.

## 2. MATERIALS AND METHOD

The crude drugs used in this study were procured from the nearby local area. All the ingredients were washed, shade dried and powdered finely for further use.

### Herbal ingredients

#### a) Liquorice<sup>[3]</sup>

Scientific name: *Glycyrrhiza glabra*

Family: Leguminosae

Genus: *Glycyrrhiza*

Active constituents: The chief constituent of liquorice is a triterpenoid saponin known as glycyrrhizin (glycyrrhizic acid). Other constituents present are glabridin, glucose, sucrose; bitter principle glycyramarin resins, asparagin and fat. The flavonoids like liquiritin and isoliquiritin are present

Uses:

Traditionally, liquorice has been used as an expectorant and demulcent. It is used in cough.

Flavonoids used in peptic ulcer shows antigastric activity. In cosmetics liquorice has many beneficial effects like anti-aging, UV protection, hypopigmentation, anti-wrinkle and many more.

The glabridin shows anti-melanogenesis activity due to its tyrosinase inhibitory activity.

#### b) Multani Matti<sup>[3]</sup>

Scientific name: Armenian bole, fuller's earth

Active constituents: contains aluminium magnesium silicate

Uses:

Due to adsorbent property used in preparation of dusting powders.

Used in cosmetic products because it softens and smoothens skin and improves blood circulation.

It brings glow to the skin and acts as natural cleansing agent.

#### c) Rose powder<sup>[4]</sup>

Scientific name: *Rosa centifolia*

Family: Rosaceae

Genus: *Rosa*

Active constituents: Contains odorous constituents are geraniol and citronellol.

Uses:

Used for moisturizing and cooling effects.

Maintains skin tone and reduces skin blemishes.

Used for pleasant fragrance.

#### d) Rakta chandan<sup>[12]</sup>

Scientific name: *Pterocarpus santalinus*

Family: Fabaceae

Genus: *Pterocarpus*

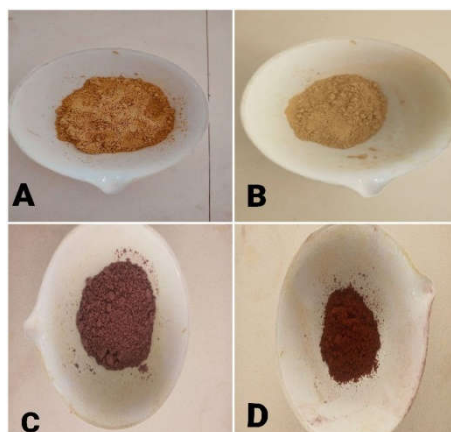
Active constituents: Contains pterocarpal, santalin A, B pterocarptriol

Uses:

Used to treat acne and skin allergies.

Improves blood circulation and brightens dark patches.

Brings glow to the skin.



**Figure 1. Ingredients in face pack**

**Table 1: List of ingredients**

Sr no	Ingredients (common name)	Category/ uses
A	Liquorice	Antiaging, Skin brightening, Antiwrinkle, Depigmentation
B	Multani	Anti-inflammatory and remove dead skin cells
C	Rose powder	Exfoliant, subdues, blemishes, maintain skin tone.
D	Rakta chandan	Cure skin allergies, antimicrobial, cooling and soothing effect.

### Method [5][6]

Step 1: The above-mentioned ingredients were weighed properly using digital balance triturated using mortar and pestle separately.

**Table 2: concentration of ingredients of various batches**

Sr. no.	Ingredients	B1(gm)	B2(gm)	B3(gm)	B4(gm)	B5(gm)	B6(gm)	B7(gm)	B8(gm)	B9(gm)	B10(gm)
1	Liquorice	25	20	20	25	18	18	20	15	18	20
2	Multani	10	15	10	12	15	15	10	20	15	12
3	Rose powder	10	10	10	8	10	12	15	8	10	12
4	Rakta chandan	5	5	10	5	7	5	5	7	7	6
<b>Total</b>		<b>50</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>50</b>

Step 2: These powders are mixed together as per specified quantity.

Step 3: The above mixture of powders is passed through sieve no. 100 to get fine texture.

Step 4: The prepared herbal face pack powder is stored in self-sealable polythene bag for further studies.



**Figure 2. Prepared herbal face pack**



**Figure 2: Batches prepared in packed in self-sealable polythene bags**

**Procedure of face pack application:**

- Take prepared face pack powder in a bowl as per the requirement and add rose water. Mix well to form a paste with optimum thickness.
- It should be applied evenly on the face with the help of a brush. Cover the acne and blemishes spots. Keep as it is for complete dryness for 20-25 minutes.
- Then it should be washed with cold water.

### **3. METHOD OF EVALUATION**

**Organoleptic Evaluation:** The organoleptic parameters such as its appearance, color, odour, texture, were evaluated manually for its physical properties.<sup>[12][13]</sup>

**Physicochemical Evaluation:** Physicochemical parameters were determined, including the determination of moisture content, extractive values, pH and ash values.<sup>[8][10]</sup>

**Determination of moisture content:** Moisture content determination is important for the plant drugs for detecting its quality and purity. The objectives of drying are:

To aid in their preservation.

To fix their constituents i.e., to check enzymatic or hydrolysis reactions that might alter the chemical composition of the drug.

To facilitate comminution.

To reduce weight and bulk.

Moisture content was determined by loss on drying (LOD). Weighed accurately 2gm of the powder drug was taken in a weighed petri dish and was placed in hot air oven at 100-108°C. It was weighed until constant weight was obtained. The loss in weight was recorded as moisture content.<sup>[10]</sup>

**Determination of extractive values:** Extractive values of drug or powder sample with particular solvent are the percentage of soluble components extracted by that solvent. These are the indicative of quality of crude drugs. Alcoholic and water-soluble extractive values

are official in pharmacopoeias and are generally considered as standards for evaluating crude drugs.<sup>[7][8]</sup>

**Water soluble extractive value:** 5gm of accurately weighed sample with 50ml chloroform water in a stoppered flask was macerated for 24 hours. Shaken frequently for first 6 hours. Filtered after 24 hours through filter paper and evaporate 25ml of filtrate to dryness in a petri dish. Evaporate to dryness on a water bath and completely dry the residue in an oven at 105° and weigh. Kept it in a desiccator. The residue was weighed and percentage extractive value was calculated.

**Alcohol soluble extractive value:** 5gm of accurately weighed sample with 50ml alcohol in a stoppered flask was macerated for 24 hours. Shaken frequently for first 6 hours. Filtered after 24 hours through filter paper and evaporate 25ml of alcoholic extract to dryness in a petri dish. Kept it in a desiccator. The residue was weighed and percentage extractive value was calculated.

**Determination of pH:** It is the measurement of acidity or alkalinity of the product measured on a scale of 0-14. pH of formulated face pack in rose water was detected.

**Determination of Ash values:** The residue remaining after complete incineration of the drug or sample is the ash content or ash value of the powdered sample which represents inorganic salts, naturally occurring in sample or adhering to it or deliberately added. Ash values are helpful in determining the quality and purity of powdered sample or product. Ash values helps as a criterion for acceptance of powdered sample. Ash values can be determined by as follows,



Figure 3: (A) Incineration of powder



(B) Desiccator

- i. **Total Ash value:** About 2gm of the powdered sample was placed in a tared crucible. The sample was incinerated by gradually increasing the heat until free from carbon. It was then cooled in desiccator and weighed. Percentage total ash was calculated with reference to the air-dried sample.
- ii. **Acid insoluble Ash value:** To the crucible containing total ash, 25ml of HCl was added and covered with a watch glass. Boiled gently for 5min. The watch glass was rinsed with 5ml hot water and added into the crucible. The insoluble matter was collected on an ashless filter paper and washed with hot water until it was neutral. The filter paper containing the insoluble matter was transferred to the original crucible, dried on a hot plate and ignited to constant weight. Allowed to cool in a desiccator for 30min and weighed. Percentage acid insoluble ash was calculated in reference to air-dried sample.
- iii. **Water soluble ash value:** It is the difference in weight between total ash and residue after treatment of total ash with water. It is used to detect either the material is exhausted by water or not. To the crucible containing total ash, 25ml water was added and boiled for 5min. The insoluble matter was collected on an ashless filter paper. Washed with hot water and ignited in a crucible for 15min at a temperature not exceeding 450°C. Cooled and weighed. Percentage water soluble ash was calculated in reference to air dried sample.

**Rheological Evaluation:** It provides an overview of the product's viscoelastic flow behaviour. For the formulation, physical parameters such as angle of repose, tapped density, bulk density, and Hausner's ratio were observed and calculated.<sup>[12][14]</sup>

**Angle of repose:** Angle of repose: A granular material's angle of repose, also known as the critical angle of repose, is the steepest angle of descent or dip relative to the horizontal plane that can be piled without stumping. It is critical for the design of particulate material processing, storage, and conveying systems. It is also useful to quantify the flow properties of powder because they influence particle cohesion. The fixed funnel cone method involves calculating the height (H) above a piece of paper placed on a horizontal surface. The prepared pack was carefully poured through the funnel until the conical heap's peak just touched the tip of the funnel. The radius of the conical heap is denoted by 'R' in this case. The equation for calculating angle of repose ( $\theta$ ) is,

$$\theta = \tan^{-1} (h/r)$$



**Figure 4: Angle of repose determination**



**Bulk Density:** The volume of all the pores in the powder sample is included in the bulk density value. Bulk density is a word that describes how particles or granules are packaged. A weighted 25gm of powder was carefully poured into the graduated cylinder. The amount of space taken up by the powder was measured. The formula for calculating bulk density is,

$$D = M/V$$

Where, D = bulk density, M = mass of particles, V = total volume occupied by them.

**Tapped density:** The tapped density is a higher bulk density obtained by mechanically tapping a graduated measuring cylinder containing powder sample. A powder's tap density can be used to forecast both its flow characteristics and compressibility. A graduated cylinder can be used to calculate the capacity of packaging. With the help of a funnel, 25gms of weighed formulation powder was progressively added to the cylinder. After observing the starting volume, the sample was tapped until no further volume drop occurred. After tapping, the value obtained was recorded. The equation for calculating the tapped density is,

$$\text{Tapped density} = \text{weight of powder(gm)} / \text{Tapped volume(ml)}$$

**Hausner's Ratio:** Hausner's ratio is related to interparticle friction and as such can be used to predict the powder flow properties. The equation for measuring the Hausner's ratio is,

$$\text{Hausner's ratio} = \text{Tapped density} / \text{bulk density}$$

**Carr's Index:** Carr's index is another approach for estimating powder flow based on bulk density. It is proportional to the relative flow rate, particle size, and cohesiveness. It is a simple, quick, and widely used method of determining powder flow characteristics. The equation for measuring it is

$$\% \text{ compressibility} = \frac{\text{Tapped density} - \text{bulk density}}{\text{Tapped density}} \times 100$$

#### 4. RESULTS AND DISCUSSION

**Organoleptic Evaluation:** Table 3 shows organoleptic evaluation of herbal face pack.

**Table 3: Organoleptic Evaluation**

Sr no	Parameter	Observations				
		B1	B2	B3	B4	B5
1	Appearance	Powder	Powder	Powder	Powder	Powder
2	Colour	Light brown	Light brown	Light brown	Light brown	Light brown
3	Odour	Pleasant	Pleasant	Pleasant	Pleasant	Pleasant
4	Texture	smooth	smooth	Smooth	smooth	Smooth

Sr no	Parameter	Observations				
		B6	B7	B8	B9	B10



1	Appearance	Powder	Powder	Powder	Powder	Powder
2	Colour	Light brown	Light brown	Light brown	Light brown	Light brown
3	Odour	Pleasant	Pleasant	Pleasant	Pleasant	Pleasant
4	Texture	smooth	smooth	smooth	smooth	smooth

**Physicochemical Evaluation:** Table 4 shows physiochemical evaluation of herbal face pack

**Table 4: Physiochemical Evaluation**

Sr no	parameter s	observations									
		B1	B2	B3	B4	B5	B6	B7	B8	B9	B10
1	Moisture content	6%	6.1 %	7.5%	6%	7%	6.2 %	6%	7.2%	7%	6%
2	Water soluble extractive values	4.1 %	4%	3.51 %	3.4%	4%	4%	3.6 %	3%	3.4%	3%
3	Alcohol soluble extractive values	3%	2.5 %	2.4%	2.18 %	2.3%	2.3 %	2.1 %	2.18 %	2%	2.18 %
4	pH	7.2	7.1	7.2	7.2	7.2	7.3	7.3	7.2	7.1	7.2
5	Total ash value	5%	5.2 %	5%	5.1%	4.95 %	4.8 %	5.2 %	5%	5.1%	5%
6	Acid-insoluble ash value	2.8 %	2.7 %	2.55 %	2.5%	2.7%	2.7 %	2.5 %	2.4%	2.44 %	2.5%
7	Water-soluble ash value	1.5 5%	1.5 %	1.5%	1.5%	1.4%	1.4 %	1.5 %	1.5%	1.55 %	1.5%

**Rheological Evaluation:** Table 5 shows rheological evaluation of herbal face pack

**Table 5: Rheological Evaluation**

Sr no	Parameters	Observations									
		B1	B2	B3	B4	B5	B6	B7	B8	B9	B10
1	Angle of repose	23.4°	20.1°	20.5°	20.1°	22°	23°	22°	20.5°	20.1°	20.1°
2	Bulk density(mg /ml)	0.378	0.370	0.320	0.350	0.320	0.315	0.360	0.365	0.357	0.310
3	Tapped density(mg /ml)	0.549	0.545	0.540	0.540	0.530	0.530	0.540	0.542	0.540	0.500

4	Hausner's ratio	1.45	1.47	1.64	1.5	1.65	1.6	1.5	1.48	1.51	1.61
5	Carr's index	20.4%	32.1%	40%	35.1%	39.6%	40%	33.3%	32.6%	33.8%	38%

**IRRITANCY TEST:** The prepared herbal face pack was tested for irritancy. Table 6 shows irritancy test results.

**Table 6: Irritancy Test**

Sr. no.	Parameters	Observations
1.	Irritation	No
2.	Redness	No
3.	Swelling	No
4.	Photo irritation	No irritation in presence of sunlight



**A: Before**



**B: After**

**Figure 5. Irritancy test**



**A: Before**



**B: After**

**Figure 6. Photo irritation (sun)**

#### **STABILITY STUDIES:**

Table 7 shows the results of the stability test. With the exception of pH, no change in colour, aroma, texture, or smoothness was noticed at the indicated stability conditions. The stability tests revealed a little variation in pH of a formulation.

**Table 7: Stability parameters**

Sr. no.	Parameters	At room temperature	At 40°C
1	Colour	Light brown	Light brown
2	Odour	Pleasant	No change
3	pH	7.2 $\pm$ 0.1	6.9 $\pm$ 0.2
4	Texture	Smooth	Smooth

## 5. CONCLUSION:

The dried powders of the combined pack demonstrated good flow properties, making them suitable for use as a face pack. Organoleptic analysis revealed that the pack has a smooth and pleasant odour. Rheological findings supported the pack's flow properties, which were discovered to be free flowing and non-stick in nature. The formulation was stable in every way, with no irritation. The pack's inertness was revealed by stability tests. Further optimization studies on its various parameters are required to determine its useful benefits to humans.

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