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Research Article

Formulation And Evaluation Of The Various Physicochemical, Rheological, And Stability Properties Of The Herbal Face Pack

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ABSTRACT

Objective:

The present work deals with the development and evaluation of the stability behavior and various physicochemical and rheological parameters of herbal face pack. Materials and Methods: Multani mitti, Safed Chandan powder, mint powder, aloe vera powder, turmeric powder, orange peel powder, and neem powder were purchased from the local store. They were combined geometrically, dried, and ground into a powder before being placed in an airtight container and passed through sieve number 44 for further examination. Results: Four distinct formulations (B1 to B4) containing natural ingredients were prepared with different concentrations. An irritancy test was conducted along with several other parameters, such as stability, rheological, physicochemical, and organoleptic properties, to assess all prepared formulations. Conclusion: Out of all the formulations, B4 was found to have the best physical parameters; it was also the least irritating to the skin and maintained its consistency even under stable storage conditions. Face packs are primarily used to improve the skin's fairness, smoothness, and glow. They are non-allergic, non-toxic, and have fewer side effects. Therefore, the formulation and evaluation of the herbal face pack using natural

INTRODUCTION

The current generation is obsessed with having fair, glowing skin. This is due to the fact that the

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majority of teenagers use costly, potentially harmful cosmetics containing chemicals that may damage the squamous epithelium in an attempt to achieve instantaneous, glowing, and fairer skin tones. Acne, blackheads, dark spots, pigmentation, dark circles, tanning, and other issues are generally caused by the regular use of chemical cosmetics, sedentary lifestyles, poor eating habits, stressful lives, and blood impurities. Neem, turmeric, safed chandan, mint, orange peel powder, tulsi, ginseng, ashwagandha, giloy, and other herbs are among those used in Ayurveda that are said to be beneficial for blood purification and glowing skin. These herbs are used in many herbal face packs and cosmetic products because of their unique blood purifying qualities. The herbal paste of these various herbs is applied to the face to treat acne, pigmentation, scars, and marks known as "Mukha lepa." The application of this herbal mixture to the face is referred to in Ayurveda as "Mukha lepana." This face pack is applied topically to promote blood flow, revitalize the skin, retain the pliability of the skin, and remove dust from skin pores. A good herbal face pack should provide the skin with essential nutrients. It should be able to reach the subcutaneous tissues to nourish the skin and provide the necessary nutrients. Face packs are prepared with rose water or regular water, applied as a paste, let to dry, and then set to form a film that tightens, strengthens, and cleanses the skin. Usually, they are applied to the skin and left there for 10 to 25 minutes to let the water evaporate. The face pack creates a thin layer that enables the ayurvedic ingredient to permeate the skin and exert its unique effect. As a result, the resulting film contracts, solidifies, and is readily removed. The application of this face pack results in a tightening and warming sensation. This study investigates the physicochemical and rheological parameters, as well as the formulation and stability behavior, of a herbal face pack intended to lighten and brighten skin. Natural ingredients that

promote glowing skin include aloe vera powder, safed chandan, neem, turmeric, and orange peel powder. Additionally, Multani Mitti helps remove debris and oil from the skin.

Advantages of face pack

- The exfoliating qualities of herbal face packs aid in pore cleaning and blackhead removal.
- They reduce the accumulation of dead skin cells.
- Face packs hydrate the skin, minimize dryness, and regulate excessive oil production.
- Using a face pack every day keeps the skin looking young and healthy.
- They minimize the signs of early skin aging.
- Herbal face packs reduce the appearance of fine lines, wrinkles, acne, and blemishes on the face.
- Regular use of herbal face masks helps lessen skin dullness, pigmentation, and sun tanning.
- Face packs are essential for maintaining the elasticity of the skin and boosting its inner glow.
- Face packs provide deep cleansing of the skin and reduce skin imperfections.

Ideal Properties of the Face Pack:

- It should be non-toxic.
- It should be non-irritating to the skin.
- It should be stable both physically and chemically.
- Its ingredients should be evenly distributed.
- It should be very fine and should not have any gritty particles.
- It should remove dirt, grease, and dust from the face.
- It should form a smooth paste.
- It should have a pleasant odor.
- After the application, it should be easily removable.

When applying a face pack, take the following precautions:



- Based on your skin type, choose the appropriate face pack.
- It is recommended to remove the face pack from the face after no more than 15 to 20 minutes.
- Keeping it for an extended period of time can cause wrinkles, skin sagging, and increased open pores.
- Apply room-temperature water to your face and then take off the dried face pack.
- Roll an ice cube over the skin of your face after removing the mask. This tightens the skin and helps in closing open pores. It also soothes and tones the skin
- Don't scrub your face too hard. This could lead to dark spots and pimples breaking out. Once you have applied a face pack, avoid exposure to the heat.
- Keep face packs away from the "eye zone." The skin surrounding the eyes is extremely thin and may get damaged during the face pack removal process.

MATERIALS AND METHODS

The face pack was made with a number of natural ingredients, such as multani mitti, Safed Chandan powder, mint powder, alovera powder, turmeric powder, orange peel powder, neem powder, and rose water. These ingredients are rich in vitamins and minerals that are essential for having healthy and glowing skin. We obtained all of the natural ingredients for our research in the form of dried powder from the local store owned by ayurvedic practitioners. All of the details about the plant material used to make the face pack are included below:

1. Multani Mitti (Fuller's Earth):

Multani mitti is also known as Fuller's earth and consists of hydrated aluminum silicate and magnesium chloride. Multani mitti is an essential ingredient in herbal face packs. It prevents skin irritation and provides cooling, soothing action to the face. It helps to tighten the skin, remove

impurities and dead skin cells, remove oil from the face, improve the complexion, and make the skin glow and shine.



2. Safed Chandan Powder:

It is derived from the heartwood of the Santalum album and belongs to the Santalaceae family. It consists of α - and β -Santalol (antibacterial activity against *Helicobacter pylori*), Epi- β -Santalene (active against *S. typhimurium*), Anthocyanic pigment cyanidin-3-glucoside (antioxidant activity), and Santalols (anti-inflammatory activity). Due to its chemical constituents, safed Chandan is popularly advantageous for cosmetic as well as medicinal purposes. It is commonly used in face packs for skin cleansing, to treat acne and pimples, and to treat sunburn and achieve glowing skin.



3. Mint Powder

It is also known as mentha, which is obtained from the "dehydrated leaves of *Mentha piperata*, belonging to the family Lamiaceae. Mint powder contains 35–60% menthol, which provides a cooling effect on the skin. It also consists of rosmarinic and caffeic acids, carvone (not less than 50%), l-carvone (not less than 50%), linalool, and phellandrene. It is commonly used in face packs to

remove dark circles and blackheads. It is helpful to provide moisture to the skin and is used in the cleansing of the skin.



4. Aloe-vera Powder:

Aloe vera is also known as Ghritkumari, which is derived from the dehydrated leaves and juice of *Aloe barbadensis* belonging to the family Liliaceae. Aloe vera is a rich source of aloe, Aloe emodin, isobarbaloin, Aloesin (Purgative). Aloe vera is rich in antioxidants and minerals, which can be beneficial for healing the skin. It also helps to deep cleanse the skin, fade out scars and blemishes, and moisturize the skin with bright complexion.



5. Turmeric Powder

Turmeric consists of dried and fresh rhizomes of the plant *Curcuma longa*, which belongs to the family Zingiberaceae. It is also known as Indian saffron. Turmeric powder contains curcumin, an anti-inflammatory agent that helps reduce acne and brighten skin tone. It also acts as an exfoliator and helps remove blackheads, scars, dark circles, pigmentation, and dead skin cells. Turmeric

powder has antibacterial, antiseptic, and anti-aging properties that enhance the beauty of the skin



6. Orange Peel Powder:

Orange peel powder is derived from the dehydrated peel of *Citrus sinensis*, belonging to the family Rutaceae. Due to its high content of Vitamin C, it works as a skin-lightening agent and helps remove tan. It also contains citral (4%) and limonene (90%), which act as anti-aging agents and prevent oxidative stress in skin cells, promoting youthful and glowing skin.



7. Neem Powder

Neem powder is obtained from the dehydrated leaves of *Azadirachta indica* (Meliaceae). It contains nimbin, nimbidin, and nimbinin, which possess antibacterial and antifungal properties and aid in reducing the level of toxins and skin problems like acne, rashes, and eczema. Neem powder is commonly used to remove facial impurities. Its antibacterial properties are helpful in the treatment and prevention of acne or pimples.



Methods of Preparation:

All the required herbal powders for the face pack preparation were accurately weighed individually using a digital balance and named B1 to B4. The

concentration of each ingredient was listed in Table No. 1. All of the herbal powders, including neem powder, mint powder, aloe vera powder, turmeric powder, orange peel powder, Multani mitti, Safed Chandan powder, and mint powder, were transferred to a mortar and pestle and triturated. Then, for uniform mixing, all of the ingredients were mixed geometrically using the serial dilution method after passing through sieve number 44. After that, the face pack powder was labeled, prepared, and put into a self-sealable polyethylene bag (Fig. No. 1) for use in additional research.



Fig. No. 01: Formulated Herbal Face Pack

Table No. 1: Formulation of Herbal Face Pack

| Sr. No. | INGREDIENT | QUANTITY (30gm) | | | |
|---------|----------------------|-----------------|---------|-------|-------|
| | | B1 | B2 | B3 | B4 |
| 1. | Multani Mitti Powder | 9gm | 10.5 gm | 8.4gm | 7.5gm |
| 2. | Safed Chandan Powder | 6gm | 5.4gm | 6.6gm | 7.5gm |
| 3. | Mint Powder | 4.5gm | 3gm | 3.6gm | 4.5gm |
| 4. | Aloe vera Powder | 3gm | 3.6gm | 3gm | 4.5gm |
| 5. | Turmeric Powder | 2.4gm | 3gm | 1.8gm | 0.6gm |
| 6. | Orange peel Powder | 3gm | 3.6gm | 2.4gm | 3.6gm |
| 7. | Neem Leaves Powder | 2.1gm | 0.9gm | 4.2gm | 1.8gm |

| | | | | | |
|----|------------|-------|-------|-------|-------|
| 8. | Rose water | Q. S. | Q. S. | Q. S. | Q. S. |
|----|------------|-------|-------|-------|-------|

Procedure for the application of face pack

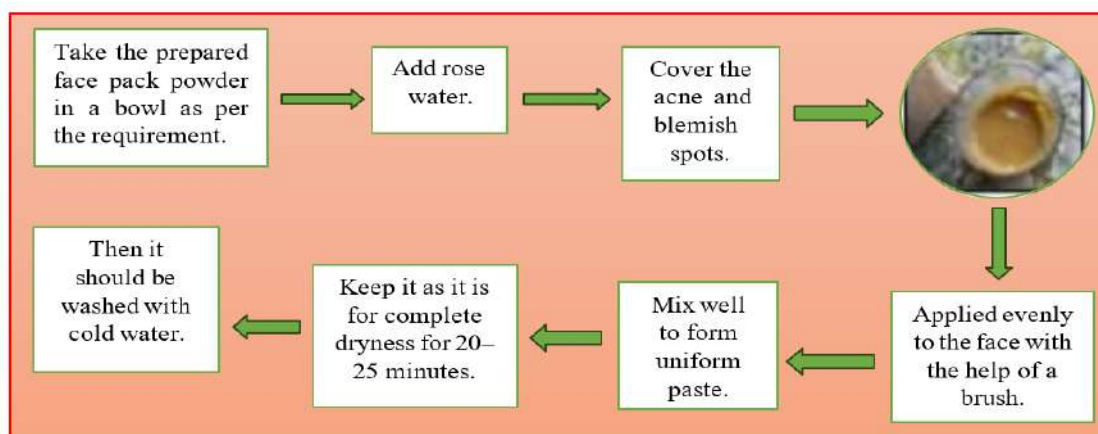


Fig. No. 02: Procedure for the application of face pack

Evaluation Parameters

a. Organoleptic Evaluation

Organoleptic parameters, including appearance, color, odor, texture, smoothness, and washability, of the dried mixture of herbal powder were tested manually.

b. Physical Evaluation:

Various physical parameters such as angle of repose, tapped density, bulk density, Hausner's ratio, and Carr's index were observed and calculated for the formulation. The angle of repose is used to quantify the flow properties of the powder because it influences the cohesion among the different particles. The tapped density of a powder can be used to predict both its flow properties and compressibility. The bulk density refers to the method used to indicate the packaging of particles or granules. Hausner's ratio is related to interparticle friction and can therefore be used to predict the powder's flow properties. Carr's index is another indirect method of measuring the powder flow based on bulk density.

c. Physicochemical Evaluation:

Moisture content was determined by the loss-on-drying (LOD) method. The total ash value was observed and determined to assess the quality and purity of a crude drug, particularly in its powdered form. Extractive values of crude drugs were used

to determine the quantity of active constituents present in a given amount of plant material when extracted with a solvent.

d. Irritancy Test:

Prior to the irritancy test, carefully wash the hands. Then, apply the prepared face packs to the specified area on the left-hand dorsal surface, and note the time. Check for irritancy and edema, if any, at regular intervals up to 24 hours and report any findings.

e. Stability Study:

The prepared herbal face pack was subjected to stability studies at room temperature and at 40°C +/- 1% for 1 month, and any changes were observed.

RESULT AND DISCUSSION

The different formulation batches of face packs were prepared and evaluated in terms of their physicochemical properties, stability behavior, and rheological features. Organoleptic parameters are shown in Table No. 2. The nature, color, odor, test, texture, washability, grittiness, moisture content, and pH of the herbal powder were examined. There was a yellowish tint to the herbal face pack. The prepared face pack formulation satisfied the texture and smoothness requirements of the cosmetic formulation and had a pleasing aroma. Table No. 3 shows the outcomes of the

rheological evaluation. The bulk density, tapped density, Carr's index, Hausner's ratio, angle of repose, and other relevant data were gathered for the dry powdered formulation. Every batch of the prepared formulation has excellent flow characteristics within reasonable bounds. The angle of repose for the powder formulation indicates a fair range. Hausner's ratio and Carr's index both indicate that it is not within the excellent range. The moisture content (LOD) is below the permissible limit to prevent the growth of microorganisms during extended storage. Additionally, the physicochemical characteristics of each batch fall within an acceptable range. Due to the formulation containing a relatively smaller

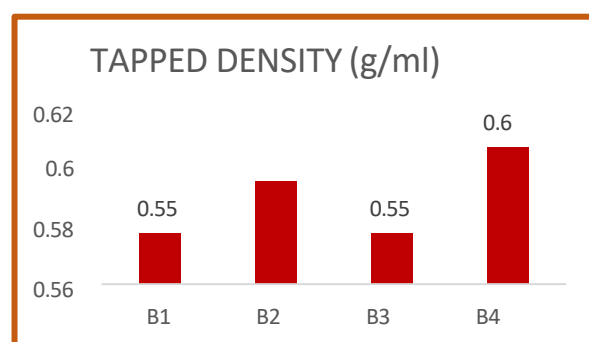
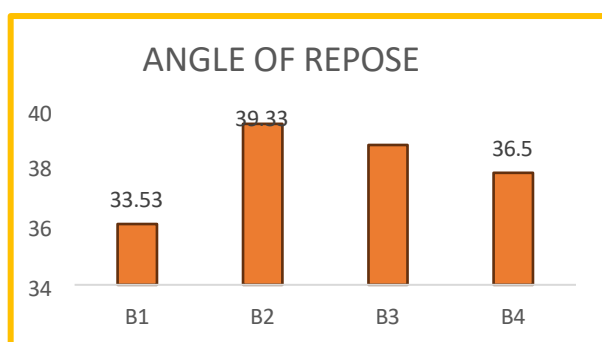
amount of inorganic residue, the water-soluble ash value is observed to be higher than the acid-insoluble value, while the ash value still falls within the standard range. As shown in Fig. No. 5, it does not irritate the skin upon application, and when stored for an extended period of time, it demonstrates stability under stress. Among the four batches, batch B4 is particularly notable because it possesses excellent flow properties and exhibits a higher extractive value in alcohol compared to water. This is due to the formulation containing essential oils, which are soluble in alcohol and acid but relatively less soluble or insoluble in water

Table No. 2: Organoleptic Evaluation

| Sr. No. | Parameter | B1 | B2 | B3 | B4 |
|---------|-------------|-----------------|-----------------|-----------------|-----------------|
| 1. | Appearance | Smooth, fine | Smooth, fine | Smooth, fine | Smooth, fine |
| 2. | Colour | Yellowish | Faint yellow | Yellowish | Yellowish |
| 3. | Odour | Pleasant | Pleasant | Pleasant | Pleasant |
| 4. | Texture | Fine | Fine | Fine | Fine |
| 5. | Smoothness | Smooth | Smooth | Smooth | Smooth |
| 6. | Washability | Easily washable | Easily washable | Easily washable | Easily washable |

Table No. 3: Rheological Evaluation

| Sr. No. | Parameter | B1 | B2 | B3 | B4 |
|---------|-----------------|----------|----------|----------|----------|
| 1. | Angle of repose | 33.53 | 39.22 | 38.10 | 36.52 |
| 2. | Tapped density | 0.55g/ml | 0.58g/ml | 0.55g/ml | 0.60g/ml |
| 3. | Bulk density | 0.50g/ml | 0.55g/ml | 0.51g/ml | 0.57g/ml |
| 4. | Hausner's ratio | 1.1 | 1.05 | 1.07 | 1.05 |
| 5. | Carr's index | 9.09% | 5.17% | 7.27% | 5.0% |



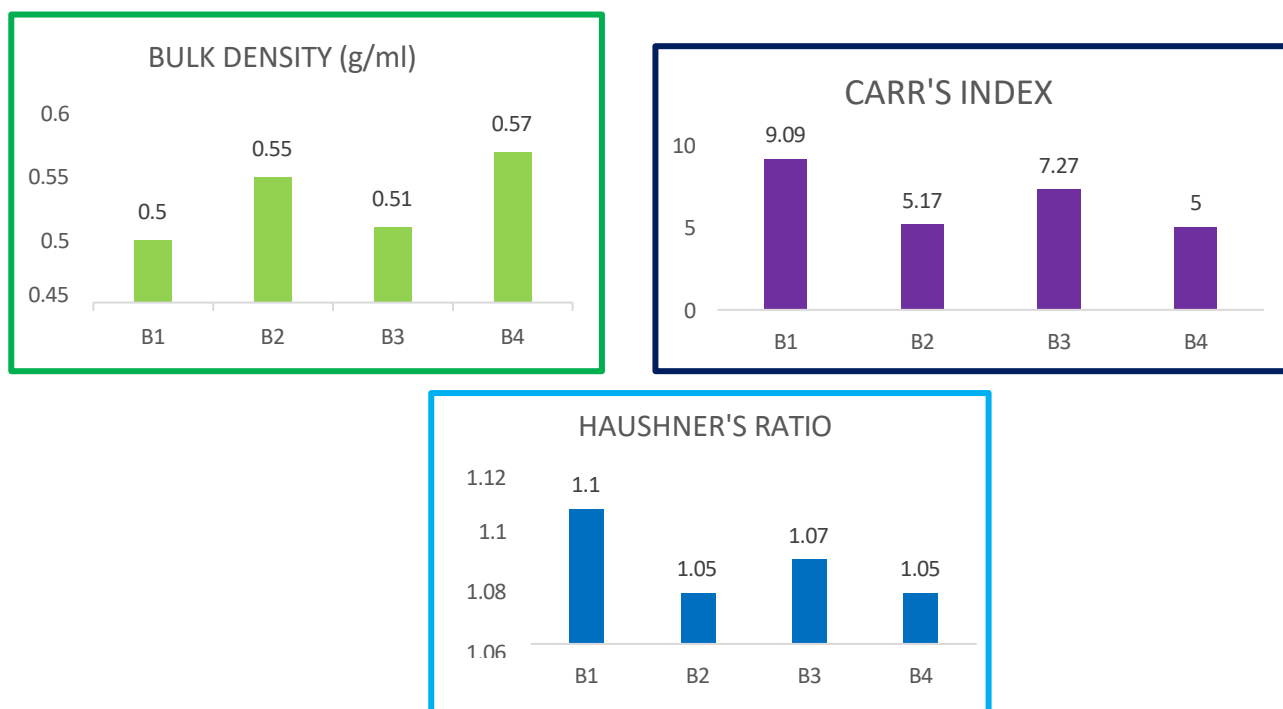


Fig. No. 03: Rheological Evaluation Parameters of batches B1-B4

Table No. 4: Physiochemical Evaluation

| Sr. No. | Parameter | B1 | B2 | B3 | B4 |
|---------|-------------------------|-------|--------|--------|-------|
| 1. | pH | 6.95 | 6.89 | 6.72 | 6.82 |
| 2. | Moisture content | 11.3% | 8.8% | 13.0% | 14.9% |
| 3. | Total Ash | 9.5% | 11.15% | 12.55% | 8.5% |
| 4. | Acid Insoluble Ash | 1.35% | 2.25% | 2.85% | 1.05% |
| 5. | Water Soluble Ash | 6.05% | 7.65% | 8.9% | 5.5% |
| 6. | Water Soluble Extract | 16.5% | 14.25% | 15.8% | 24.5% |
| 7. | Alcohol Soluble Extract | 19.6% | 17.0% | 17.9% | 39.2% |



Fig. No.04: Ash value



Fig. No. 4: Extractive values of Batches B1-B4

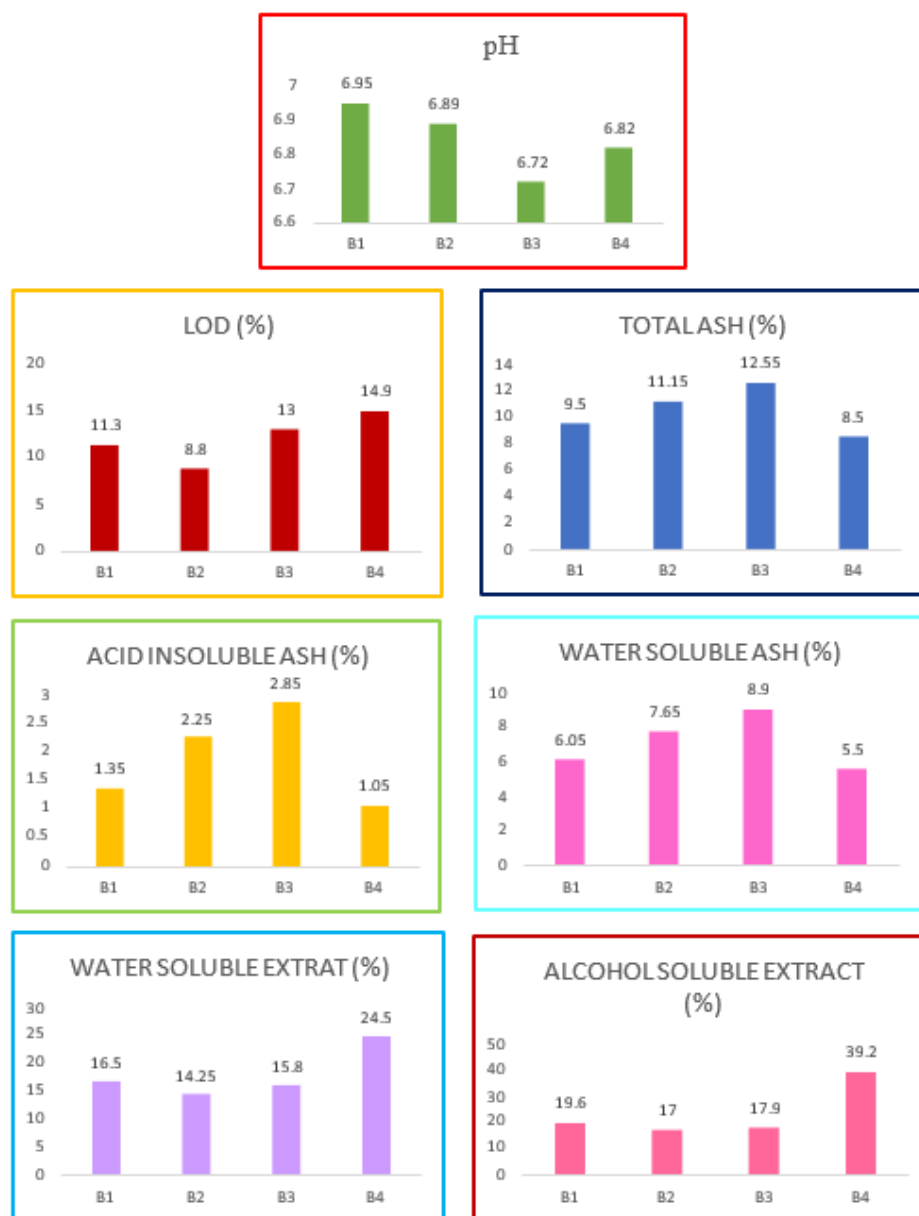


Fig. No. 05: Physicochemical Evaluation Parameters of Batches B1-B4

Table No. 5: Irritancy test

| Sr. No | Parameter | B1 | B2 | B3 | B4 |
|--------|------------------|--|--|--|--|
| 1 | Irritating | Minor irritating | Minor irritating | Minor irritating | Nil |
| 2 | Redness | Minor redness | Minor redness | Minor redness | Nil |
| 3 | Swelling | Nil | Nil | Nil | Nil |
| 4 | Photo irritation | No irritation No redness No swelling | No irritation No redness No swelling | No irritation No redness No swelling | No irritation No redness No swelling |



Fig. No. 06: Irritancy test for Batches B1-B4

Table No. 6: Stability Study

| Sr. No. | Parameter | B1 | | B2 | | B3 | | B4 | |
|---------|------------|--------------|-------------|--------------|-------------|--------------|-------------|--------------|-----------|
| | | Room temp | 40°C±1% | Room temp | 40°C±1% | Room temp | 40°C±1% | Room temp | 40°C±1% |
| 1. | Appearance | Smooth, fine | No change | Smooth, fine | No change | Smooth, fine | No change | Smooth, fine | No change |
| 2. | Color | Yellow | Dark yellow | Dark yellow | Light brown | Light yellow | Pale yellow | Pale yellow | No change |
| 3. | Odor | Pleasant | No Change | Pleasant | No change | Pleasant | No change | Pleasant | No change |
| 4. | Texture | Fine | Fine | Fine | Fine | Fine | Fine | Fine | Fine |
| 5. | Smoothness | Smooth | Smooth | Smooth | Smooth | Smooth | Smooth | Smooth | Smooth |
| 6. | pH | 6.95 | 7.6 | 6.89 | 7.0 | 6.82 | 6.0 | 6.72 | 6.77 |

CONCLUSION:

In the present study, an attempt has been made to evaluate the physicochemical, rheological parameters, and stability behavior of a naturally prepared face pack, which can be expected to provide whitening and glowing skin without any harmful effects on the skin. Daily use of this face pack is helpful in hydrating the skin, controlling excess oil production, reducing fine lines, wrinkles, blemishes, and pimples on the face, as well as reducing dullness, pigmentation, and sun tanning of the skin. The results obtained from this study illustrate that the naturally herbal powder contained in the face pack showed good flow properties, which are suitable for the face pack. Organoleptic parameters showed that the pack has a smooth and pleasant odor. Rheological parameter findings justified the flow properties of the pack, as it was found to be free-flowing and non-sticky in nature, Formulated batch B4 was stable in all aspects, with no irritancy, and stability tests revealed the inert nature of the face pack. However, batches B1, B2, and B3 showed minor redness and irritation on the skin, and they exhibited some minor changes in color and pH. Therefore, it is concluded that the prepared face pack powder is physicochemical stable, non-toxic in nature, beneficial, free from allergic reactions, and passes all the evaluation parameters.

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