

**FORMULATION AND EVALUATION OF D-TAN BODY**

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**ABSTRACT**

The D-Tan body pack is a skincare formulation designed to reduce tanning caused by prolonged sun exposure, improve skin tone, and promote a brighter, more even complexion. This research focuses on the formulation development and evaluation of a natural D-Tan body pack composed of herbal ingredients known for their skin-lightening, anti-inflammatory, and antioxidant properties. Key components such as Sandal wood powder, Orange peel powder, Multani mitti, kaolin clay, licorice powder, Rose water, glycerine, were selected based on their traditional use and scientific efficacy in reducing melanin accumulation and soothing sun-damaged skin. The body pack was evaluated for its organoleptic properties, physicochemical properties, physical properties, irritancy test and stability studies. Results indicate that the D-Tan body pack improves

skin texture with no irritation. This study supports the potential of using natural bioactive ingredients in cosmetic formulations as safe and effective alternatives for skin de-tanning and rejuvenation.

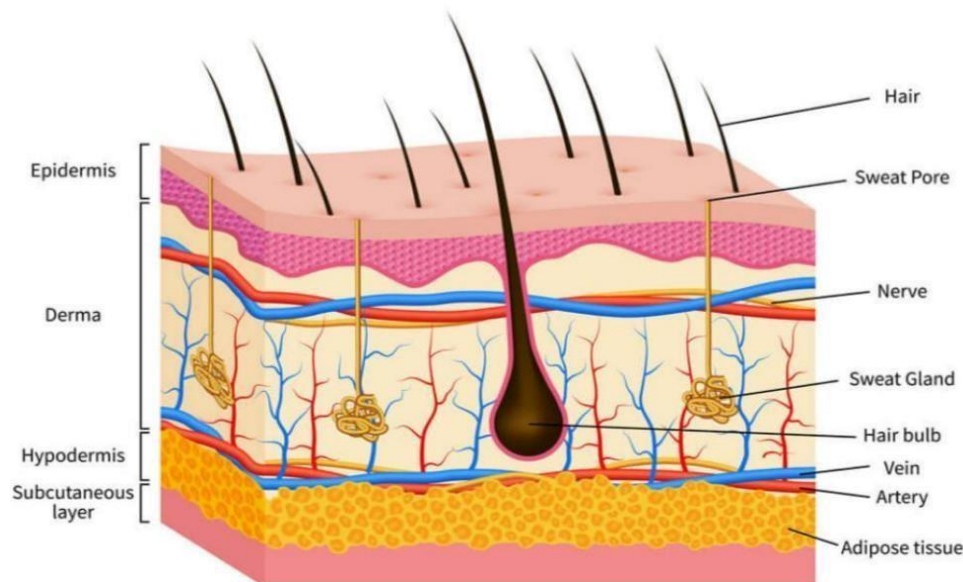
**KEYWORDS:** D-tan, Skin lightening, d-tan body pack, Herbal, Evaluation Skincare, Powder.

**1. INTRODUCTION****A. SKIN**

The skin is the largest organ in the body, covering its entire external surface. The skin has 3 layers—the epidermis, dermis, and hypodermis, which have different anatomical structures and functions (see Image. Cross Section, Layers of the Skin). The skin's structure comprises

an intricate network that serves as the body's initial barrier against pathogens, ultraviolet (UV) light, chemicals, and mechanical injury. This organ also regulates temperature and the amount of water released into the environment.

#### □ Structure and Function



**Fig. no. 1: Structure of skin.**

#### □ Epidermis

The epidermis, the skin's outermost layer, is composed of several strata and various cell types crucial for its function.

Layers of the epidermis: From the deepest to the most superficial, the epidermal layers are the stratum basale, stratum spinosum, stratum granulosum, stratum lucidum, and stratum corneum. The stratum basale, also known as stratum germinativum, is separated from the dermis by the basement membrane (basal lamina) and attached to it by hemidesmosomes. The cells in this layer are cuboidal to columnar, mitotically active stem cells that constantly produce keratinocytes. This layer also contains melanocytes. The stratum spinosum, comprising 8 to 10 cell layers, is also called the prickle cell layer.

#### □ Dermis

The dermis is connected to the epidermis by the basement membrane. The dermis consists of 2 connective tissue layers, papillary and reticular, which merge without clear demarcation. The papillary layer is the upper dermal layer, which is thinner and composed of loose connective tissue that contacts the epidermis.

### □ **Hypodermis**

The hypodermis, also known as the subcutaneous fascia, is located beneath the dermis. This layer is the deepest skin layer and contains adipose lobules, sensory neurons, blood vessels, and scanty skin appendages, such as hair follicles.

### □ **Functions**

The skin's comprehensive roles highlight its complexity and importance in maintaining overall health and well-being. These roles are discussed below.

#### □ **Barrier function**

The skin has multiple protective roles, acting as a barrier against various external threats. The skin shields the body from excessive water loss or absorption, invasion by microorganisms, mechanical and chemical trauma, and UV light damage.

#### ❖ **Regulation of homeostasis**

The skin plays a vital role in maintaining body temperature and water balance. This organ regulates heat exchange with the environment, particularly through the blood vessels and sweat glands. The skin manages the rate and amount of water evaporation and absorption.

#### ❖ **Sensory functions**

The skin is equipped with nociceptors that allow for the sensation of touch, heat, cold, and pain, facilitating interaction with the environment. The skin's sensory roles are essential for an individual's movement, protection, and interaction with the environment.<sup>[1-14]</sup>

### **B. D-Tan Body Pack**

The abbreviation DTAN, or D-Tan, stands for —de-tan, and it refers to skincare products or treatments that are intended to eliminate undesired sun damage or tan from the skin, leaving it with a natural shine and a more even tone. The Pack helps to remove dead skin cells, unclog pores, and reveal a brighter complexion. By incorporating nourishing elements, D-Tan Packs not only target pigmentation but also enhance skin texture and glow. These Packs can be particularly beneficial for individuals who frequently expose their skin to the sun and wish to counteract the effects of UV rays. Regular use can lead to a more uniform skin tone and improved skin clarity.

Since the beginning of time, people have utilized herbs to manage, clean, and beautify themselves. Cosmetics are items used to clean, beautify, alter one's appearance, or make one

appear more appealing. and Packs create the appearance of smooth, glowing, and velvety skin.<sup>[2]</sup>

The herbal paste used on the face to treat acne, blemishes, scars, and pigmentation is called —Mukha Lepal in Ayurveda. —Mukha LEPANAL is the term for applying a herbal mixture topically.

A tan is the skin's natural protection against UV rays. When ultraviolet photons enter the skin, they produce pheomelanin, a reddish-brown pigment that protects the skin from burning. The result is a tan, which darkens the skin.<sup>[15-22]</sup>

## **Benefits**

### **I. Helps Remove Excess Oil**

Multani Mitti and Kaolin Clay absorb excess sebum and surface impurities, leaving the skin fresh and clean.

### **II. Improves Skin Brightness**

Orange peel powder provides mild exfoliation, helping remove dead skin cells and improving skin radiance. Multani Mitti may also give a temporary brightening effect.

### **III. May Reduce the Appearance of Tan and Hyperpigmentation**

Licorice extract is one of the natural ingredients that has shown effectiveness in managing hyperpigmentation and uneven skin tone in clinical studies.

### **IV. Provides a Cooling and Soothing Effect**

Multani Mitti and Sandalwood are traditionally used to provide a cooling sensation and soothe sun-exposed skin.

### **V. Cleanses and Purifies Skin**

Clay-based ingredients help remove dirt, oil, and impurities from the skin surface, improving skin texture.

### **VI. May Improve Skin Texture**

Gentle exfoliation and cleansing can make the skin feel smoother and softer after regular use.

#### **Antioxidant and Skin-Protective Properties**

Sandalwood, orange peel, and licorice contain natural antioxidant compounds that may help

protect the skin from environmental stress.

### Advantages

- I. Helps to remove excess oil and impurities
- II. Provide gentle exfoliation.
- III. Improve skin brightness and glow.
- IV. May reduce the appearance of tanning and uneven skin tone
- V. Cooling and soothing effect.
- VI. Help to keep pores clean
- VII. Make skin feels soft and refresh.

### Disadvantages

- I. Can cause skin dryness.
- II. May irritate sensitive skin
- III. Possible allergic reactions.
- IV. Temporary skin tightness after application.
- V. Not suitable for damaged skin.
- VI. Results are not immediate and vary between individuals.
- VII. Overuse may increase skin sensitivity.<sup>[22-24]</sup>

### How to apply d-tan body pack

- Take prepared face pack powder in a bowl as per the requirement.
- Add a liquid to mix it well and apply the skin surface.
- Kept as it is for complete drying for 15 to 20 min.
- Then wash it.

## 2. LITERATURE SURVEY

### 1. Hollinger JC *et al.* (2018)

Title: Are Natural Ingredients Effective in the Management of Hyperpigmentation? A

#### Systematic Review

This systematic review evaluated natural ingredients used for reducing hyperpigmentation.

The authors reported that licorice extract showed significant skinbrightening and depigmenting effects due to its ability to inhibit melanin production. The study supports the use of licorice in D-Tan formulations for improving skin tone and reducing tanning.<sup>[25]</sup>

**2. Fisk WA *et al.* (2014)**

Title: The Use of Botanically Derived Agents for Hyperpigmentation: A Systematic

**Review**

The review analyzed botanical agents used for hyperpigmentation treatment. Results indicated that several plant-derived ingredients, including licorice and other herbal extracts, demonstrated potential in improving uneven skin pigmentation. The authors suggested that botanical formulations can be effective alternatives in cosmetic skinlightening products.<sup>[26]</sup>

**3. Khandagale DV *et al.* (2025)**

Title: Review Article on Polyherbal Anti-Tan Mask The authors formulated a polyherbal anti-tan mask containing ingredients such as sandalwood, orange peel, turmeric, and starch. Evaluation studies showed acceptable quality, stability, and effectiveness against tanning. The study concluded that herbal anti-tan preparations can be useful cosmetic products for managing sun-induced tanning.<sup>[27]</sup>

**4. Kumar A *et al.* (2024)**

Title: Preparation and Evaluation of Herbal Face Pack

This study formulated a herbal face pack containing Multani Mitti, sandalwood, orange peel, aloe vera, and rose water. Evaluation tests demonstrated satisfactory physicochemical properties and user acceptability. The authors reported that herbal face packs improve cleansing, skin freshness, and overall appearance.<sup>[28]</sup>

**5. Pawar MR *et al.* (2024)**

Title: A Review on Formulation and Evaluation of Herbal Face Pack for Glowing Skin The review highlighted the cosmetic benefits of Multani Mitti, sandalwood, and orange peel powder. These ingredients were reported to possess cleansing, soothing, antioxidant, and skin-brightening properties, making them suitable for herbal skincare products including D-Tan body packs.<sup>[29]</sup>

**6. Nayana PV *et al.* (2025)**

Title: Formulation and Evaluation of Herbal Face Pack

The study reviewed formulations containing Multani Mitti, sandalwood powder, orange peel powder, and other herbal ingredients. The authors concluded that these ingredients provide antimicrobial, anti-inflammatory, antioxidant, and skin-brightening effects, supporting their

use in herbal anti-tan preparations.<sup>[30]</sup>

### **7. Chaurasiya, C Tyagi *et al.* (2025)**

Title: Pure Herbs Based D-Tan Face Pack: Formulation and Evaluation

The authors developed a herbal D-Tan face pack containing sandalwood powder, orange peel powder, Multani Mitti, beetroot powder, rose petal powder, gram flour, aloe vera gel, honey, and vitamin E. The formulation was evaluated for physicochemical properties, stability, and irritancy. Results showed improvement in skin texture, reduction in tanning, and no significant irritation.<sup>[31]</sup>

### **8. Lakambare S *et al.* (2025)**

Title: A Comprehensive Review of Herbal Face Pack: Efficacy, Formulations and Skin Benefits This review discussed herbal face packs containing Multani Mitti, orange peel, aloe vera, turmeric, and other natural ingredients. The authors concluded that herbal face packs possess cleansing, antioxidant, anti-inflammatory, and skin-brightening properties, making them useful for skincare and tan management.<sup>[32]</sup>

### **9. Kumar J *et al.* (2023)**

Title: Advance in Recent Poly-Herbal Face Pack Formulation, Assessment and Their Screening Potential to Acne-Prone, Dark and Dull Skin The study formulated a polyherbal face pack containing Multani Mitti, lemon peel powder, aloe vera, turmeric, saffron, and rice flour. Evaluation showed good stability, acceptable physicochemical properties, and potential benefits for dull and uneven skin tone.<sup>[33]</sup>

### **10. Ashok Kumar *et al.* (2023)**

Title: Preparation and Evaluation of Polyherbal Face Pack

This study prepared and evaluated polyherbal face packs containing orange peel, sandalwood, Multani Mitti, aloe vera, neem, and turmeric. The formulations demonstrated satisfactory organoleptic and physicochemical characteristics and were considered suitable for cosmetic use.<sup>[34]</sup>

## **3. AIM AND OBJECTIVE**

### **Aim**

To formulate and evaluate a herbal D-tan body pack using natural ingredients to remove tanning and improve skin appearance.

**Objective**

- Formulate herbal D-tan body pack.
- Evaluate physicochemical properties.
- Study effectiveness in tan removal.
- Develop economical cosmetic product.

**4. PLAN OF WORK**

1. Literature survey
2. Selection and procurement of ingredients
3. Pre-formulation studies

**A. Identification of ingredients**

- Organoleptic properties
- Texture
- PH

**B. Ingredients compatibility study****4. Formulation of D-tan body pack**

- A. Selection of ingredients
- B. Preparation of D-tan body pack by using
  - Geometric mixing method
  - Geometric trituration method

**5. Evaluation of D-tan body pack****A. Physical Evaluation**

a Colour

b Odour

c Texture

**B. Bulk density**

A. Tap density

B. Angle of repose

C. Irritation test

D. Stability

## 5. INGREDIENT PROFILE

### 1. Multani mitti



**Fig no. 2: Multani mitti.**

- **Synonym:-** Fuller's Earth,  
Bleaching clay
- **Biological Source:** - Natural mineral clay
- **Chemical Constituents:-** Hydrated aluminium, Silicates Magnesium chloride.
- **Uses:** - Oil absorption, deep cleansing, cooling effect, etc.<sup>[35]</sup>

### 2. Sandalwood Powder



**Fig. no. 3:- Sandalwood Powder.**

- **Synonyms:** - Chandan powder  
White sandalwood  
Yellow sandalwood  
Santalum powder
- **Biological Source:** - Obtained from the heartwood of Santalum album
- **Family:** - Santalaceous

**• Chemical Constituents**

Santalol ( $\alpha$ -santalol,  $\beta$ -santalol) – major active components

Santalales

Santalic acid

Terpenoids

Resin and volatile oils

**• Uses:** - Skin brightening.<sup>[36]</sup>

**3. Orange peel powder**

**Fig. no. 4:- Orange peel powder.**

**a. Synonyms:-** Orange peel powder

Dried orange peel

Citrus peel powder

Orange rind powder

**b. Family:** - Belongs to the family Rosaceae

**c. Chemical Constituents:** - Essential oils (mainly Limonene)

Flavonoids (Hesperidin, Naringin)

Vitamin C (Ascorbic acid)

Pectin Carotenoids Citric acid

**d. Uses:** - Helps reduce tan and pigmentation

Used in body packs, scrubs, and masks.<sup>[37]</sup>

#### 4. Licorice powder



**Fig. no. 5:- Licorice powder.**

**a. Synonyms:-** Mulethi

Yashtimadhu

Sweet wood

**b. Biological Source:-** Licorice powder obtained from the dried roots and underground Stems (Rhizomes) of the plant.

**c. Family:-** Fabaceae (Leguminosae family)

**d. Chemical Constituents: -** Active compounds like

Glycyrrhizin,

Glabridin, liquiritin

Flavonoids, saponins, coumarins

Sugar and starch.

**e. Uses: -** Reduce tanning and pigmentation.

Helps to brighten skin tone.

Anti- inflammatory and Anti- oxidant property.<sup>[38]</sup>

## 5. Kaoline clay



**Fig. no. 6:- Kaolin clay.**

- **Synonym:** - China Clay, porcelain clay, Kaolinite, white clay.
- **Biological Source:** - it's natural hydrated aluminium silicate mineral.
- **Chemical Constituents**  
Chemical formula: -  $\text{Al}_2\text{Si}_2\text{O}_5(\text{OH})_4$   
Silica ( $\text{SiO}_2$ ),  
Allumina ( $\text{Al}_2\text{O}_3$ ),  
Trace mineral
- **Uses:** Gentle cleanser, removes impurities, detoxification, exfoliant.<sup>[39]</sup>

## 6. Rose water



**Fig. no. 7: Rose water.**

- **Synonyms:** - Gulab Jal

Rose distillate

Rose hydrosol

Aromatic rose water

- **Biological Name:**- Rosa damascene

- **Family:** - Rosaceae

- **Chemical Constituents:** - Essential oils (citronellol, geraniol, nerol)

Phenolic compounds

Flavonoids, Terpenes,

Glycosides

- **Uses:** - Hydrates and refreshes skin

Helps reduce redness and irritation

Maintains skin pH balance.<sup>[40]</sup>

## 7. Glycerine



**Fig. no. 8: Glycerine.**

- **Synonyms:**- glycerol, glycerine

Propane 1,2,3- triol

Glycyl alcohol

- **Biological Source:**- Glycerine is obtained by hydrolysis or Saponification of fats and oil. It can also be synthetically prepared.

- **Family:** - Polyol compound

- **Chemical Constituents:** - chemical formula (C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>)

Contains: - three hydroxyl group

- **Uses:** - use as a excellent moisturizer and humectant.

Softens rough and dry skin.

Use in creams, lotion, face pack.<sup>[41]</sup>

## 6. MATERIAL AND EQUIPMENT

### 6.1 Material

**Table no. 1: List of Material.**

Sr	Name Of Ingredient	Active Constituents	Use/Purpose	Name of supplier
1	Multani Mitti	Hydrated aluminum	Oil absorption	Local market
2	Sandalwood powder	Santalol ( $\alpha$ - santol, $\beta$ santalol)-major active component, santalols, santalic acid	Skin brightening	Local market
3	Orange peel powder	Essential oils (mainly Limonene) Flavonoids	Helps reduce tan and pigmentation used in body packs	Local market
4	Licorice powder	Licorice powder obtained from the underground stem plant	Anti-oxidant property	Local market
5	Kaoline clay	Chemical formula – Al <sub>2</sub> Si <sub>2</sub> O <sub>5</sub> (OH) <sub>4</sub> silica (SiO <sub>2</sub> ), Alumina (Al <sub>2</sub> O <sub>3</sub> ), Trace mineral	Detoxification exfoliant	Local market
6	Rose water	Essential oils phenolic compounds	Hydrates and refreshes skin, maintain skin pH	Local market
7	Glycerin	Chemical formula (C <sub>3</sub> H <sub>8</sub> O <sub>3</sub> ) contains three hydroxyl group	Use as a excellent moisturizer	Local market

### 6.2 Equipment

**Table no. 2:- List of Equipment.**

Sr.no	Equipment
1.	Weighing machine
2.	Mortar and pestle
3.	Spatula
4.	Sieve
5.	Measuring cylinder
6.	Funnel
7.	Burette stand
8.	China dish

## **7. EXPERIMENTAL WORK**

### **7.1 Preparation of D-tan body pack**

#### **1. Weighing of Ingredients**

All the herbal ingredients required for the preparation of the D-Tan Body Pack were accurately weighed according to the formula given in Table No. 1 using a calibrated digital weighing balance. Individual ingredients such as Multani Mitti powder, Orange Peel powder, Sandalwood powder, Kaolin Clay, Licorice powder, were weighed separately in clean and dry weighing boats. Care was taken to ensure accuracy and prevent contamination.

#### **2. Mixing of Ingredients**

The accurately weighed ingredients were transferred into a clean and dry mortar. The powders were mixed thoroughly using a mortar and pestle by the trituration method. Mixing was continued for sufficient time until a uniform and homogeneous powder blend was obtained. The mortar and pestle method ensured proper blending of all ingredients and helped achieve uniform distribution of the herbal powders throughout the formulation.

#### **3. Sieving of Powder Blend**

The prepared powder mixture was passed through a suitable sieve (Sieve No. 60) to obtain a fine and uniform powder. Sieving removed lumps and coarse particles, resulting in improved texture and smoothness of the formulation. The sieved powder was collected in a clean container for further evaluation.

#### **4. Evaluation of Powder Blend**

The prepared herbal body pack powder was evaluated for various physicochemical parameters, including color, odor, texture, pH, bulk density, tapped density, angle of repose, flow properties, and washability. These tests were performed to ensure the quality and acceptability of the formulation.

#### **5. Collection of Prepared Formulation**

After sieving and evaluation, the fine powder blend was carefully collected and the total yield was recorded. The formulation was visually inspected to ensure uniformity and absence of any foreign particles or agglomerates.

#### **6. Packaging and Storage**

The prepared D-Tan Body Pack powder was packed in clean, dry, airtight plastic containers.

## 7. Stability Study

The stored formulation was subjected to stability testing under room storage conditions. During the study period, observations were made for changes in color, odor, texture, pH, and overall appearance. The formulation remained stable without any significant changes.<sup>[42]</sup>

### 7.2 Formulation table

Different batches formula for powder preparation

**Table no. 3: Formula for powder.**

Sr. No.	INGREDIENTS	F1	F2	F3	F4	F5
1.	Orange peel powder	7gm	6gm	8gm	8gm	9gm
2	Multani mitti powder	13gm	9gm	3gm	8gm	5gm
3	Kaoline clay	5gm	7.5gm	6gm	6gm	4gm
4	Licorice powder	3gm	3gm	6gm	5gm	7gm
5	Sandalwood powder	2gm	4.5gm	5gm	3gm	5gm
6.	Total	30gm	30gm	30gm	30gm	30gm

### Formula for vehicle

**Table no. 4:- Formula for vehicle.**

Sr no	Ingredients	General formula
1	Rose water	25ml
2	Glycerine	5ml
3	Total	30ml

### 7.3 Evaluation of D-tan body pack

#### □ Physical evaluation

Color, odor, look, texture, and consistency were among the organoleptic parameters that were assessed for the prepared body pack. Touch and feeling, respectively, were used to visually assess color, odor, and texture.

#### □ PH

The PH of The D-tan body tack was determine to ensure compatibility with skin and to avoid irritation. The PH is measured by PH meter. Standard range of pH 5.5 - 7.0.

#### ❖ Bulk Density

Bulk Density is the ratio between the given mass of a powder and its bulk volume. Required amount of the powder is dried and filled in a 50 ml measuring cylinder up to 50 ml mark. Then the cylinder is dropped onto a hard wood surface from a height of 1 inch at 2 second intervals.

The volume of the powder is measured. Then the powder is weighed. This is repeated to get average values. Standard range of bulk density 1.00 – 1.76 g/cm<sup>3</sup>

Bulk density is calculated by using the below given formula.<sup>20</sup>

$$\text{Bulk Density} = \text{Volume/Mass}$$

#### ❖ Tapped Density

Tapped density is an increased bulk density attained after mechanically tapping a container containing the powder sample. After observing the initial powder volume or mass, the measuring cylinder or vessel is mechanically tapped for 1 min and volume or mass readings are taken until little further volume or mass change was observed. It was expressed in grams per cubic centimetre.

Standard range of tapped density 0.5 – 0.9g/cm<sup>3</sup>

#### ❖ Angle of Repose

It is defined as the maximum angle possible in between the surface of pile of powder to the horizontal flow. It required amount of dried powder is placed in a cylindrical tube open at both ends is placed on a horizontal surface. Then the funnel should be raised to form a heap. The height and radius of the heap is noted and recorded. For the above method, the angle of repose ( $\theta$ ) Can be calculated by using the formula.<sup>18</sup>

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

Standard range of angle of repose 35<sup>0</sup>-55<sup>0</sup>

#### □ Irritation test

Mark an area (1sq.cm) on the left-hand dorsal surface. Definite quantities of prepared D-Tan body packs powder was mixed with dispensed solvent, and applied to the specified area and time was noted. Irritancy, erythematic, edema, was checked if any for regular intervals up to 24 hrs and reported.

#### □ Stability studies

Stability testing of prepared formulation was conducted by storing at room temperature[37<sup>0</sup>] conditions for the period of time. The packed formulation stored at room temperature and were evaluated for physical parameters like color, odour, pH, consistency and feel.<sup>[43]</sup>

## 8. RESULT AND DISCUSSION

### Evaluation test of different batches for powder formulation

#### 1. Physical evaluation

**Table no. 5:- Physical evaluation for Powder.**

Sr.no.	Batches	Colour	Odour	Texture
1.	F1	Pale yellow	Pleasant odour	Slightly coarse
2.	F2	Pale yellow	Pleasant odour	Slightly coarse
3.	F3	Pale yellow	Pleasant odour	Slightly coarse
4.	F4	Pale yellow	Pleasant odour	Slightly coarse
5.	F5	Pale yellow	Pleasant odour	Slightly coarse

The physical evaluation of D-tan body pack formulation (F1-F5) showed that all batches had a pale yellow colour, pleasant odour, and slightly coarse texture. These observations indicate good compatibility and uniform mixing of the herbal ingredient.

**Table no. 6: Physical evaluation test of vehicle.**

Sr no.	Evaluation test	Result
1.	Colour	Colourless
2.	Odour	Pleasant rose odour
3.	Appearance	Clear solution
4.	pH	5.8

The vehicle used in the formulation was evaluated for its physical characteristics, including colour, odour, appearance, and pH. The vehicle was found to be colourless with a pleasant rose odour, indicating good aesthetic acceptability. It showed a clear solution without any turbidity or particulate matter, suggesting good quality and purity. The pH was found to be 5.8, which is within the acceptable range for topical application and is compatible with the skin. Overall, the vehicle exhibited satisfactory properties and was considered suitable for incorporation into the DTan Body Pack formulation.

#### 2. pH Test for powder

**Table no. 7:- pH test.**

Sr no	Batches	PH result
1.	F1	5.8
2.	F2	6.1
3.	F3	4.5
4.	F4	6.8
5.	F5	6.3.

The pH value of the D-tan body pack formulation (F1-F5) ranged from 4.5 to 6.8. Formulation F1 (5.8), F2 (6.1), F4(6.8), and F5( 6.3) showed acceptable pH values and were considered suitable for topical application. However, F3 showed a pH of 4.5, which is lower than the desired range and may cause skin irritation; therefore, F3 was considered a failed batch. Among all formulations, F4 exhibited the most suitable pH value and was considered the optimized formulation due to its better skin compatibility and stability.

### 3. Bulk density powder

**Table no. 8: Bulk density.**

Sr no	Batches	Bulk density
1.	F1	0.79gm/cm <sup>3</sup>
2.	F2	0.90gm/cm <sup>3</sup>
3.	F3	1.08gm/cm <sup>3</sup>
4.	F4	1.13gm/cm <sup>3</sup>
5.	F5	1.05gm/cm <sup>3</sup>

The bulk density of the D-Tan Body Pack formulations (F1–F5) was found to range from 0.79 g/cm<sup>3</sup> to 1.13 g/cm<sup>3</sup>. Formulations F3 (1.08 g/cm<sup>3</sup>), F4 (1.13 g/cm<sup>3</sup>), and F5 (1.05 g/cm<sup>3</sup>) showed satisfactory bulk density values, indicating good packing characteristics and powder flow properties. However, F1 (0.79 g/cm<sup>3</sup>) and F2 (0.90 g/cm<sup>3</sup>) exhibited comparatively lower bulk density values, which may result in poor packing and handling properties; therefore, F1 and F2 were considered failed batches. Among all formulations, F4 showed the highest bulk density (1.13 g/cm<sup>3</sup>) and was considered the optimized formulation due to its superior powder characteristics.

### 4. Tapped density for powder

**Table no. 9: Tapped density.**

Sr.no.	Batches	Tap density result
1.	F1	0.38gm/cm <sup>3</sup>
2.	F2	0.43gm/cm <sup>3</sup>
3.	F3	0.69gm/cm <sup>3</sup>
4.	F4	0.71gm/cm <sup>3</sup>
5.	F5	0.66gm/cm <sup>3</sup>

The bulk density of the D-Tan Body Pack formulations (F1–F5) was found to range from 0.79 g/cm<sup>3</sup> to 1.13 g/cm<sup>3</sup>. Formulations F3 (1.08 g/cm<sup>3</sup>), F4 (1.13 g/cm<sup>3</sup>), and F5 (1.05 g/cm<sup>3</sup>) showed satisfactory bulk density values, indicating good packing characteristics and powder flow properties. However, F1 (0.79 g/cm<sup>3</sup>) and F2 (0.90 g/cm<sup>3</sup>) exhibited comparatively lower bulk density values, which may result in poor packing and handling properties;

therefore, F1 and F2 were considered failed batches. Among all formulations, F4 showed the highest bulk density (1.13 g/cm<sup>3</sup>) and was considered the optimized formulation due to its superior powder characteristics.

## 5. Angle of repose for powder

**Table no. 10: Angle of repose.**

Sr.no.	Batches	Result
1.	F1	32°
2.	F2	35°
3.	F3	46°
4.	F4	38°
5.	F5	46°

The angle of repose of the D-Tan Body Pack formulations (F1–F5) ranged from 32° to 46°. Formulations F1 (32°), F2 (35°), and F4 (38°) showed acceptable flow properties, indicating good powder flowability. In contrast, F3 (46°) and F5 (46°) exhibited higher angle of repose values, suggesting poor flow characteristics and reduced powder handling properties; therefore, these batches were considered less satisfactory. Among all formulations, F4 demonstrated good flowability along with satisfactory overall evaluation parameters and was selected as the optimized formulation for further studies.

## 6. Irritation Test

**Table no. 11: Irritation Test.**

Sr.no.	Batches	Result
1.	F1	Mild irritation and itching
2.	F2	No irritation
3.	F3	No irritation
4.	F4	No irritation
5.	F5	Mild irritation

The irritation test was performed to evaluate the skin compatibility of the D-Tan Body Pack formulations (F1–F5). Formulations F2, F3, and F4 showed no signs of irritation, indicating good skin compatibility and safety for topical application. F1 produced mild irritation and itching, suggesting slight sensitivity upon application. F5 showed mild irritation and was therefore considered a failed batch due to its potential to cause discomfort during use. Among all formulations, F4 exhibited the best skin compatibility with no irritation and was selected as the optimized formulation for further studies.

## 7. Stability Test

**Table no. 12: Stability test.**

Sr no.	Batches	Temperature	Colour	Odour	Texture	pH
1.	F1	Temp maintain 37 <sup>0</sup>	Pale Yellow	Pleasant	Slightly Coarse	5.7
2.	F2		Pale Yellow	Pleasant	Slightly Coarse	6.1
3.	F3		Pale Yellow	Pleasant	Slightly Coarse	4.3
4.	F4		Pale Yellow	Pleasant	Slightly Coarse	6.6
5.	F5		Pale Yellow	Pleasant	Slightly Coarse	6.4

The stability test of the d-tan body pack formulation [F1-F5] was carried out at 37° to evaluate change in colour, odour, texture and pH. All formulations show pale yellow colour, pleasant odour and slightly coarse texture, indicating no major physical changes during storage. The pH value range from 4.3-6.6. Among all batches, F4 showed the best stability and skin compatible. pH [6.6], making it the most suitable and optimized formulation for further studies.

Batch F3 showed lower pH, which may cause slight skin irritation compare to other formulation.



**Fig. no. 9: Different batches.**



**Fig. no. 10: Final batch.**

## 9. CONCLUSION

India is one of the largest countries gifted by variety of Ayurvedic plants. But due to globalisation, marketing many of us moved towards foreign cosmetic but in recent time many of the consumers observed its side effects. Due to this reason herbal face pack are always preferable than the other cosmetics which have many sides effect and many of them are carcinogenetic when used for longer duration of time. In this formulation studies we observed that combination of Sandal wood powder, orange peel powder, kaolin clay, licorice powder, multani mitti worked wonderfully. This herbal body pack used for premature aging, to remove dirt, rejuvenates These formulations are safe to use also affordable than the synthetic ones. The prepared body pack is nontoxic, safe and can be used for all type of skin.

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