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FORMULATION & EVAULATION OF POLYHERBAL FACIAL HAIR REMOVAL POWDER

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1. ABSTRACT

This study focuses on the formulation and evaluation of a polyherbal facial hair removal powder utilizing natural ingredients known for their skin benefits. The powder comprises a blend of turmeric, rice flour, sandalwood powder, orange peel powder, manjistha powder, Multani mitti (Fuller's earth), and cocoa powder. These ingredients were selected for their reputed effectiveness in promoting skin health and reducing unwanted facial hair. The formulation process involved optimizing the proportions of each ingredient to ensure maximum efficacy while maintaining skin safety. Subsequently, the powder was evaluated for its physical characteristics, such as color, odor, texture, and particle size distribution. Moreover, the skin compatibility and hair removal efficacy of the powder were assessed through evaluation and user feedback. The results of this study demonstrate the successful formulation of a polyherbal facial hair removal powder with promising attributes for skincare. The inclusion of natural ingredients enhances its appeal to consumers seeking gentler alternatives to chemical-based hair removal products. Further research and development may explore additional enhancements to optimize the powder's performance and market acceptance.

KEYWORD: Polyherbal, Hair removal, Depilatory.

2. INTRODUCTION

Unwanted hair has been a common problem in human being since an era. Almost 80 % of the women are facing the problem of excessive hair growth[1] and approximately 21% of women are affected by excessive facial hairs specifically on area of chin and upper lips thus hirsutism, growth of hair on women body in male pattern, is one of the perplexities of the time. Various procedures have been employed to remove unwanted hair since a long but more or less every technique has some disadvantages or side effects that are given below.[2,3]

Table 1: Classical Hair Removing Methods and their Consequences.

Sr. No	Hair removing method	Consequences
1	Plucking & waxing	It's painful & time-consuming process. Folliculitis may occur
2	Depilatory creams	Fast regrowth, redness, irritation & darkening of skin are associated with it.
3	Shaving	Time consuming & Folliculitis may occur
4	Electrolysis/laser/intense pulse light(IPL)	Sometime painful, expensive, risk of hyper pigmentation, rare cases of hypertrichosis and scarring also reported[4]
5	Antiandrogen /oral contraceptives	Long term treatment required, menstrual problems can occur as an adverse effect[5]
6	Substitute cream (Eflornithine)	Indefinite use require & not actually remove hairs but help to stop regrowth[6,7]

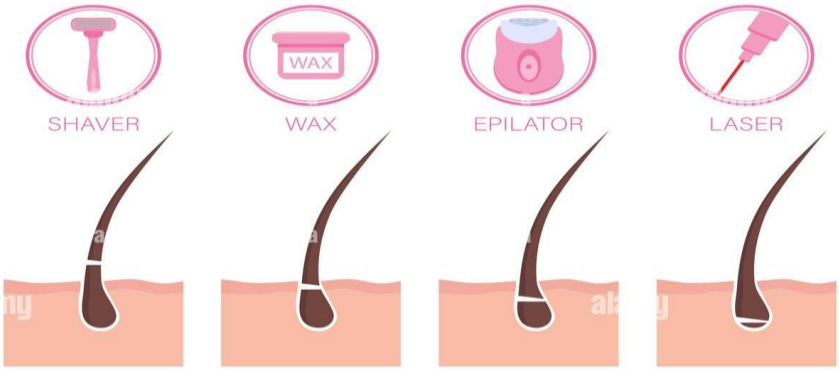

Fig. 1: Hair Removal Methods.

Several studies has also reported that there is no single effective hair removing method available that suits on every type of skin and does not show any side effect.[3,8] The exact reason of hirsutism is still unknown. It ranges broadly from genetic & endocrine disorder to drug induced-hirsutism.[9] Endocrine disorders, excessive androgen production or increase insensitivity of circulating androgens are more likely to be the cause of excessive hair growth.[10] The patient of hirsutism suffers from anxiety, depression and low self-esteem.[11] Various studies have reported the use of in-vivo compound to stop regrowth of hairs. Aminoethyl pyrazoles series were prepared and in vivo tested in mouse model but it was found slightly less efficient than Eflornithine.[12] Many other studies has reported that inhibition of synaptic nerve transmission is one of the effective method for treatment of cochlear hairs.[13-14] However a lot have been researched for hair inhibition but very less approaches are available to stop or reduce hair regrowth specifically from herbal source therefore our study is broadly confined to inhibit hair regrowth by using a miraculous herb, Curcuma longa, turmeric. As the matter of fact turmeric has a great many skin benefits of antimicrobial, anti-aging, anti-wrinkle, anti-neoplastic, anti-acne, anti-fungal and anti-inflammatory functions and it is associated with treatment of various dermatological conditions.[15-16-17] The major constituent of turmeric for skin benefit is curcumin and shows the safest profile.[18,19] Its versatile use has been known since 4000 years ago either topical or ingested[20] but our study is narrowed to its hair inhibitory topical effect on integumentary organ or skin that will lead us to explore one more of its health benefit because none of the study has reported this one benefit till yet. Moreover it may remarkably lead us to overcome the problem of excessive hair growth or hirsutism.

Fig. 2: Hair Growth Cycle.

3. MATERIAL AND METHOD

3.1. Plant material

3.1.1. Turmeric

Family : Zingiberaceae

Biological source: Curcumin is the active ingredient of the dietary spice turmeric and is extracted from the rhizomes of curcuma longa

Genus: Curcuma longa L.

Species: Curcuma

Fig. 3: Turmeric Powder.

Turmeric might help purify and nourish the blood which may lead to healthy and glowing skin. It might be effective for skin diseases like acne, eczema, etc. due to its antiseptic and antibacterial properties. It may also help against premature ageing. Turmeric is also a constituent of sunscreens and cosmetics. However, its effects on skin need to be further researched.[21]

3.1.2. Rice flour

Rice flour

Family:Poaceae/ Gramineae

B.source:Rice is the seed of the grass species Oryza sativa (Asian rice).

Genus: Oryza

Species: Sativa

Fig. 4: Rice Flour.

Using rice flour to reduce facial hair is a natural and cost-effective method that has been practiced for centuries in various cultures. Rice flour contains compounds that help weaken hair follicles inhibit hair growth over time and decreases sebum level.

3.1.3. Multani mitti

It may show anti-acne, anti-inflammatory, demonstrate astringent activity & skin brightening property.[23]

Fig. 5: Multani Mitti.

3.1.4. Sandalwood Powder

Family: Santalaceae

Biological source: Sandalwood oil is obtained by distillation of sandalwood, Santalum album Linn.

Genus: Santalum

Species: Santalum album linn

Fig. 6: Sandal Wood Powder.

Sandalwood due to antiseptic, anti-microbial, and anti-inflammatory actions, might make it useful in reducing the redness, itching, and inflammation that develops in scabies.[24]

3.1.5. Orange Peel Powder

Family: Rutaceae

Biological source: Orange peel is the fresh or dried outer part of the pericarp of Citrus aurantium Linn,

Genus: Citrus

Species: Citrus sanseis

Fig 7: Orange Peel Powder.

Orange peel powder offers various skincare benefits, including exfoliation, acne treatment, skin brightening, anti-aging effects, oil control, and soothing properties. Rich in antioxidants and vitamin C, it helps in improving skin tone, reducing dark spots, and promoting a radiant complexion when used in DIY face masks or scrubs.[25]

3.1.6. Manjistha powder

Family: Rubiaceae

B. Source:Manjistha consists of dried roots of Rubia cordifolia, belonging to the family Rubiaceae.

Genus: Rubia
Species:R. cordifolia

Fig. 8: Manjistha Powder.

Manjistha, an Ayurvedic herb, benefits skin with its anti-inflammatory and antioxidant properties. It helps in treating acne, reducing blemishes, and promoting an even skin tone. Manjistha aids in detoxification, enhancing skin radiance, and maintaining overall skin health when used in skincare formulations or consumed internally.[26][27]

3.1.7. Cocoa Powder

Family: Malvaceae
B.Source:Cocoa, derived from the Theobroma cacao tree.
Genus: Theobroma
Species: T. Cacao

Fig. 9: Cocoa Powder.

Cocoa powder contains antioxidants like flavonoids, which help improve skin texture by increasing blood flow, promoting hydration, and protecting against UV damage. Its high content of vitamins and minerals can also aid in reducing inflammation, fighting signs of aging, and enhancing overall skin health.[28]

3.1.8. Barium sulphide

Barium sulphide is a chemical compound used in depilatory creams for hair removal. It works by breaking down hair proteins, making them easier to remove. However, it can cause skin irritation and allergic reactions in some individuals. Caution should be exercised when using products containing barium sulphide.[29]

Fig 10: Barium Sulfide Powder

3.2 METHOD OF PREPRATION

1. To prepare the hair removal powder, gather the necessary herbs and dry them thoroughly before grinding into a fine powder.
2. Take each ingredient separately and grind it into a fine powder using a mortar and pestle. Ensure there are no lumps in the powder.
3. Pass each powdered ingredient through a sieve with a mesh size of 120. This will help in obtaining a fine and uniform texture for the powder.
4. In a clean mixing bowl, add the turmeric powder, sandalwood powder, and rice flour, manjistha powder, orange peel powder, cocoa powder, barium sulfide and Multani mitti geometrically, meaning layering one over the other. Use a spoon or spatula to gently mix the powdered ingredients together until they are thoroughly combined. This ensures even distribution of each component in the mixture
5. Once the powder mixture is well mixed, scoop it into polythene bags.Seal the polythene bags tightly to prevent any moisture from entering.

Table 2: Table of Content.

Sr. no.	Ingredient	F1 (20gm)	F2(20gm)	F3(20gm)	Use
1	**Turmeric**	3	2	2.5	Hair removal & Antiseptic
2	**Rice flour**	4	5	6	Reduces sebum level
3	**Multani mitti**	4	3	1.5	Anti acne
4	**Sandal wood powder**	3	1.5	2.5	Anti-microbial
5	**Orange peel powder**	1.5	2	1	Skin brightning
6	**Barium sulfide powder**	3	4	1	Hair Removal
7	**Manjistha powder**	1.5	1.5	4	Reduce blemishes
8	**Cocoa powder**	2	1	1.5	Antioxidant

Fig. 11: Formulation F1, F2 & F3.

4. METHOD OF APPLICATION

1. Take 1-2 tablespoons of powder (depending on your preference and the area you want to cover) in a clean bowl. Gradually add rose water or tap water to the powder while stirring continuously. Add enough rose water or tap water to form a smooth paste-like consistency. Aim for a thick paste that will adhere well to your skin.

2. Before applying the paste, ensure your face is clean and free from any makeup, dirt, or oil. Use a gentle cleanser and pat dry with a clean towel.

3. Using clean fingertips or a clean brush, apply the paste evenly to your face, avoiding the sensitive areas around your eyes and mouth. Ensure you cover the entire face evenly with a thick layer of the paste.

4. Once applied, allow the paste to sit on your face for about 5-10 minutes. During this time, you may feel a slight tightening sensation as the paste begins to dry.

5. After 5-10 minutes, moisten your fingertips or a soft cloth with water. Gently massage the paste on your face using circular motions. This will help loosen the paste and it remove the hair follicle on your skin. Continue massaging until all of the paste has been removed from your face.

6. Once the paste is removed, splash your face with lukewarm water to ensure all residue is washed away. Pat your face dry with a clean towel.

7. Follow up with your favorite moisturizer to hydrate and nourish your skin after the treatment. You can repeat this procedure 1-2 times per week, depending on your skin type and tolerance

5. EVALUATION OF POWDER

5.1. Organoleftic evaluation

Organoleptic Evaluation aimed to saw physical appearance of cream which involves color, odor, texture.
a) Colour: On a white background, the formulation's colour was examined.
b) Odour: The odour of cream checked by taking a smell.
c) Texture: The texture was assisted by application on the skin.

5.2. Ash Value

The ash value is a measure of the total amount of minerals present in a plant sample. The ash value can be used to determine the extractive values of the plant, as well as the nutrient content of the plant. The ash value is also a good indicator of the purity of the plant sample.

Total ash

Procedure

Weigh accurately about 3 g of the material in the dish, previously dried in an air-oven and weighed. Heat the dish gently on a flame at first and then strongly in a muffle furnace at 550±10°Ctill grey ash results. Cool the dish in a desiccator and weigh. Heat the dish again at 550±10°C for 30 minutes. Cool the dish in a desiccator and weigh. Repeat this process of heating for 30 minutes, cooling and weighing until the difference between two successive weighing is less than 1 mg. Record the lowest weight formula.

Total ash(%) = 100(W2-W1)/ W

Where,
W1 = weight, in g, of the empty crucible,
W2 = weight, in g, of the crucible with ash, and
W = weight, in g, of the test sample.

5.3. Moisture content

Moisture content refers to the amount of water present in a substance or material, typically expressed as a percentage of the total mass.

Procedure

1) Dry and clean the silica crucible and then weigh it and record it mass as W1.
2) Place 4 gm of sample in the crucible and close it with lid. Then weigh and record the mass as W2.
3) Put the container in an electric oven with the temperature set to about 110±5ºC for 24hrs.
4) After drying, remove the container from the oven with tongs and allow it to cool inside the desiccator.
5) Weigh the mass of the container with its lid and dry soil sample and record it as W3.

Formula

W=(W2-W3/W3-W1)100

Where,
W1=Mass of empty moisture can with lid.
W2=Mass of the moisture can with wet sample and lid.
W3=Mass of the moisture can with dry sample and lid.

5.4. pH

pH, short for "potential of hydrogen," is a measure of the acidity or alkalinity of a solution. It quantifies the concentration of hydrogen ions present in a substance, determining its level of acidity or basicity on a scale ranging from 0 to 14. A pH of 7 indicates neutrality, with values below 7 considered acidic and values above 7 being alkaline and it can be determined by electronic PH meter.

5.5. Skin irritation
Mark an area (1sq.cm) on the left hand dorsal surface. Definite quantities of prepared polyherbal powder were applied to the specified area and time was noted. Irritancy, erythema, edema, was checked if any for regular intervals up to 24 hrs. and reported.19

5.6. Spredability Test
Spreadability apparatus was used to gauge the formulations' spreadability. Two slides measuring 6 x 2 cm each had 500 mg of the sample preparation placed between them. The apparatus's board held the lower slide in place, while the upper slide was fastened to a rigid string, on which a 20-g weight was imparted with the aid of a straight forward pulley. Under the pressure of weight, the higher slide took a certain amount of time to move 6 cm and separated from the lower slide. In order to determine spreadability, the following equation was use:

spreadability = (w.l)/t

where
w is the weight tied to the upper slide,
l is the length of the glass slide, and
t is the time in seconds.

5.7. Washability
After applying the formulation to the skin, the extent and simplicity of water washing were manually assessed.

5.8. Stain
To determine whether the applied paste of powder causes any stain or not on the applied area.

5.9. Stability Testing
Stability testing of prepared formulation was conducted for formulation F2 by storing at different temperature conditions for the period of one month. The packed glass vials of formulations stored at different temperature conditions viz.., Room temperature, 35ºC, 40ºC and 45^0C were evaluated for physical parameters like Color, Odor, pH, Consistency and feel.

5.10. Pharmacological action on hair
Prepared paste of powder was applied on left hand & effect of the paste noted on hair.

5.11. Particle size
The Particle size of the formulation F1, F2 & F3 is determined using optical microscopy, a technique that involves the observation and measurement of particles under a microscope, allowing for the precise analysis of their dimensions and morphology.

6. ADVANTAGES OF POWDER
1. The best thing about hair removal powder is that they offer painless hair removal, as compared to threading, plucking, waxing or shaving.
2. The hair is dissolved and washed off with the prepared paste, going down the drain without causing
3. Hair removal powders are available in all cosmetic stores and are an affordable and painless hair removal option.
4. The powder don't damage the skin and cannot irritate.
5. Easy to use and commonly available
6. Can be done at home
7. Since the powder help remove hair below the surface of the skin, regrowth takes longer to become noticeable
8. Exfoliation: Ingredients like rice flour and orange peel powder can help in gently exfoliating the skin, removing dead skin cells and promoting a smoother complexion.
9. Hair Removal: Some of these ingredients, such as barium sulfide, may have hair removal properties, which could help in reducing facial hair over time.

7. DISADVANTAGES
1. Chemicals contained in the creams can cause irritation and discomfort.
2. Uneven Results: The effectiveness of herbal remedies for hair removal can vary from person to person, and some may experience uneven or incomplete hair removal.
3. Slow Results: Unlike chemical hair removal methods, herbal remedies may take longer to show noticeable results, requiring consistent use over time.
4. Should not be used on sensitive skin areas.

8. RESULT AND DISCUSSION

1. Organoleptic Evaluation
Physical evaluation such as colour, odour, Texture was detected

Table No 3: Organoleptic Evaluation.

Parameter	F1	F2	F3
Colour	Dark Brown	Grey	Brown
Odour	Odourless	Odourless	Odourless
Texture	Smooth	Smooth	Smooth

2. Ash value
Value of total ash are given below.

Table No 4: Determination of Ash Value.

Parameter	F1	F2	F3
Ash value	9%	8%	6%

3. Moisture Content
Value of moisture content are given below.

Table No 5: Determination of Moisture Content.

Parameter	F1	F2	F3
Moisture content	4.5%	2%	4%

4.pH

pH is determined by Digital pH meter.

Table No 6: Determination of pH.

Parameter	F1	F2	F3
pH	8	9	10

Normally the pH having 9, formulation show high hair removal property.

5. Skin Irritation.

Table No 7: Determination of Skin Irritation.

Parameter	F1	F2	F3	Observation
Irritant	Nil	Nil	Nil	No Irritation
Erythema	Nil	Nil	Nil	No Irritation
Edema	Nil	Nil	Nil	No Irritation

6. Spredability Test

Table No 8: Determination of Spredability.

Formulation	F1	F2	F3
Time(sec)	11	7	15
Spredability (cm/sec)	10.90	17.14	8

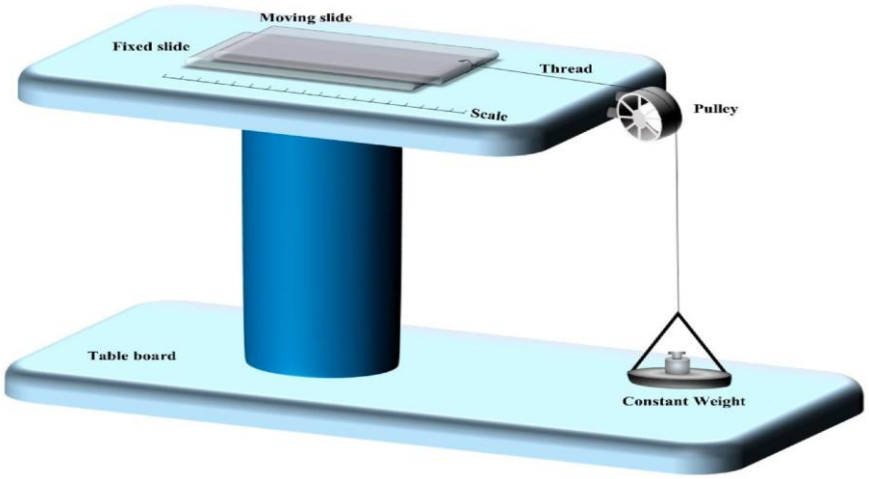

Fig. No 12: Spredability Test.

7. Determination Washability

Formulation applied on left hand and wash with water manually.

Table No 9: Determination of Washability.

Parameter	F1	F2	F3
Washability	Good	Good	Good

8. Determination of Stain

Table No 10: Determination of Stain.

Parameter	F1	F2	F3	Observation
Stain	Nil	Nil	Nil	No Stain

9. Determination Stability Testing of formulation 2

Table No 11: Determination of Parameters of Stability Testing.

Parameter	Room Temperature	35±0.5°C	40±0.5°C	45±0.5^{0}C
Colour	No change	No change	No change	No change
Odour	No change	No change	No change	No change
pH	9	9.06	9.08	10

10. Pharmacological action on hair

1. F1 formulation shows hair removal property more than F3 but less than F2.
2. F2 formulation shows more hair removal property as compare to F1 & F3.
3. F3 formulation shows negligible hair removal property as compare to the formulation F2&F1.

Fig. 10: Effect of Powder After Application.

11. Determination of Particle Size of formulation 2.

Size range	Mean of size range(µm)	No of particles(n)	Percent Particles(%)	logd
0-5	2.5	10	4.40	0.39
5-10	7.5	15	6.60	0.87
10-15	12.5	25	11.01	1.09
15-20	17.5	35	15.41	1.24
20-25	22.5	40	17.62	1.35
25-30	27.5	50	22.02	1.43
30-35	32.5	27	11.89	1.51
35-40	37.5	20	8.81	1.57
40-45	42.5	5	2.20	1.62

The particle size of formulations F2 was in the range of 2.5±2.85µm to 42.5±5.44 µm and most of the particles observed at the range of 27.5±5.44 µm.

9. CONCLUSION

Hair removal powder contain various ingredients with different pharmacological properties to potentially provide multiple benefits for the skin. a depilatory agent barium sulfide, which means it can dissolve hair at the surface of the skin, facilitating hair removal However, the efficacy and safety of such product depend on various factors, including individual skin type, sensitivity, and potential allergies to any of the ingredients. It is essential to perform a patch test before using the product extensively and to follow the recommended usage instructions to minimize the risk of adverse reactions.

In the above work batch F2 offers the best attributes, hence it is more effective for painless removal of facial hair.

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