WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.453
Volume 14, Issue 14, 730-741. Research Article ISSN 2277–7105

# FORMULATION AND EVALUATION OF ANTIMICROBIAL HERBAL BATH POWDER

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Article Received on
30 May 2025,

Revised on 19 June 2025,
Accepted on 09 July 2025

DOI: 10.20959/wjpr202514-37564

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## ABSTRACT

**Objectives:** The development and standardization of an herbal bath powder for skin whitening and anti-microbial activity is the main objective of the present study work. **Methods:** Commercially available shade dried turmeric, rose powder, rice flour, red lentil flour, orange peel, and other natural powders are employed. All natural powdered ingredients were initially sieved by using #120 mesh, accurately weighed powders, and geometrically blended for equal preparation before being analysed for characteristics such as macroscopical, irritancy, antimicrobial, and stability studies. **Results:** Formulated herbal bath powder from widely accessible ingredients. We found that the flow properties were passable, that there was no skin irritation, and that the storage conditions were stable. The outcomes of the study scientifically proved that herbal bath powder have the potential to provide an excellent glowing and antimicrobial effect on skin. **Conclusion:** A good, practical way to improve utilization as an herbal bath powder is to create a concept of herbal bath powder that consists of many herbal powders. According to the results of the trials, the powder can promote skin whitening, remove grime and also have antimicrobial activity.

**KEYWORDS:** Herbal ingredients, Turmeric, Skin whitening, Skin care products, Hydrating, Retaining, Anti-microbial Activity.

## INTRODUCTION

People utilize a range of Skin care preparations, from lipsticks to complexion creams, from mouth wash to foot powers and so on, in the hope of developing a charming personality, protecting their bodies and avoiding bad smell. Skin care preparations are described as article intended to be rubbed, poured, sprinkled, or sprayed on, introduced into or otherwise applied to human body or any part thereof, for cleansing, beautifying, promoting attractiveness or altering the appearance.[1]

Herbal bath powders have been used for centuries, and they do much more than simply clean our skin. Herbal bath powders are one of the simplest methods to include herbal products into our daily lives. Bath powders, which include body wash and face wash powders, are produced with anti-bacterial, astringent, healing, cleansing, antiseptic, and nourishing characteristics that maintain the skin blemish- free.[2]

The herbal pack/paste smeared on face to treat acne, pimple, scars, marks, and pigments. The main advantage of using herbal cosmetic is that it is pure and does not have any side effects on the human body. Facial skin is a major part of the body, which indicates the health of an individual.[3]

### Benefits of applying Herbal Bath Powder[2]

- Nourishes the skin.
- Helps to reduce, acne, pimples, scars and marks.
- Regular use of natural herbal bath powder bring glow to skin, improve skin texture acne complexion.
- Experience deeply exfoliated skin after you scrub away dead skin cells, and germs from the upper layer of the skin.
- Provide relief from skin irritation and inflammation.
- Gives freshness to body and it removes tan, it makes skin smooth and silky, and it lightens the complexion.
- It removes dirt from body cleans skin pores.
- The natural goodness of ingredients reverses sun damage, giving you brighter, glowing and healthy skin.
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and healthy skin.

- The powder is free from any preservative, chemicals added color or fragrance.

## MATERIALS AND METHOD

**Table 1: List of ingredients**.

| INGREDIENT NAME | SUPPLIER |
|---|---|
| Turmeric powder | Prepared in laboratory |
| Orange peel powder | Prepared in laboratory |
| Hibiscus powder | Prepared in laboratory |
| Rose petals powder | Prepared in laboratory |
| Multan mitti | Purchased from market |
| Rice flour | Purchase from market |
| Red lentil flour | Prepared in laboratory |
| Amla powder | Prepared in laboratory |
| Almond powder | Prepared in laboratory |

## FORMULATION OF HERBAL BATH POWDER

### Preparation

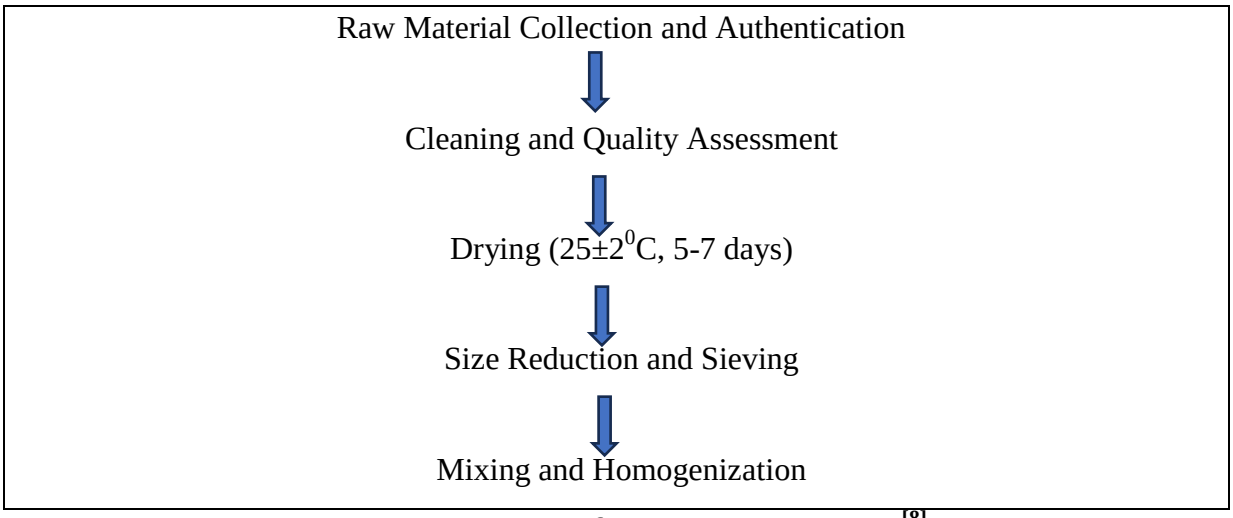


**Fig 1: Preparation of Herbal Bath Powder.**[8]

**Table 2: Formulation of herbal bath powder (50gm).**

| Sl. no | Name of the ingredients | Color | F1 | F2 | F3 |
|---|---|---|---|---|---|
| 01 | Amla powder | Brown | 5 | 6 | 4 |
| 02 | Rice flour | White | 5 | 6 | 6 |
| 03 | Orange peel powder | Light yellow | 10 | 10 | 8 |
| 04 | Almond powder | Creamish | 5 | 4 | 5 |
| 05 | Red lentil powder | Red | 5 | 6 | 4 |
| 06 | Multan mitti | Cream to yellow | 5 | 8 | 8 |
| 07 | Hibiscus flower petals powder | Red | 2.5 | 3 | 5 |
| 08 | Rose petals powder | Lighted/ pink | 2.5 | 3 | 4 |
| 09 | Turmeric powder | Yellow | 10 | 4 | 6 |

## EVALUATION

### 1. Organoleptic Evaluation

Herbal bath powder was evaluated for organoleptic parameters. The appearance of formulation was powder and colour of formulation was yellowish or brown. The odour of prepared formulations was pleasant and good acceptable which is desirable to cosmetic formulations. The taste is characteristics. Texture and smoothness were acceptable as per requirement of cosmetic formulations.

### 2. Total Ash Value

Place about 2 g of ground air dried material, accurately weighed, in a previously ignited and tarred crucible (usually of platinum or silica). Spread the material in an oven layer and ignite it by gradually increasing the heat to 500-600 °C until it is white, indicating the absence of carbon. Cool in desiccators and weigh. If carbon-free ash cannot be obtained in this manner, cool the crucible and moisten the residue with about 2 ml of water or a saturated solution of ammonium nitrate. Dry on a water-bath, then on a hot-plate and ignite to constant weigh. Allow the residue to bath, then on a hot-plate and ignite to constant weigh. Allow the residue to cool in suitable desiccators for 30 min and then weigh without delay. Calculate the content of total ash in mg per g of air-dried material.[4]


**Fig 2: Muffle Furnace.**

### 3. Acid insoluble ash value

To find contamination from sand or boil, use the residue left over after removing the whole ash and treating it with hydro alcoholic acid. Ash is boiled for five minutes with 25 ml of 2 m HCl, and then the residue is collected on ash less filter paper, washed in hot water, ignited in

desiccators, and weighed.[5]

**4. Determination of pH**

Using a pH meter, the pH of a 1% solution of powder formulation was determined.[6]

**5. Moisture Content**

Weigh about 2 gm of powdered face pack into a weighed flat and thin porcelain dish. Dry it in Hot Air Oven at 100 °C-105 °C, until two consecutive weighing do not differ by more than 0.5 mg. Cool in desecrator and weigh the loss in weight is usually recorded as moisture.[7]

**6. Particle Size**

Particle size distribution was determined using mechanical sieve analysis. A series of standard sieves (BSS mesh numbers 20, 40, 60, 80, and 100) were arranged in descending order of mesh size. A 100g sample was placed on the uppermost sieve and mechanically shaken for 15 minutes using a sieve shaker. The weight of powder retained on each sieve was determined and the percentage of powder passing through each sieve was calculated.[8]

**General Powder Characteristics**

**1. Angle of Repose**

The material is poured through a funnel to form a cone. The tip of the funnel should be held close to the growing cone and slowly raised as the pile grows to minimize the impact of falling particles.[9]

Angle of repose was calculated by using following formula:

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

were,

$\theta$ = Angle of Repose

h = height of heap

r = radius of heap

**Fig 3: Determination of Angle of Repose.**

## 2. 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 centimeter (g/cm3). Tapped density calculated by using formula.[10]

Tapped Density = weight of powder/tapped volume

**Fig 4: Tapped Density tester.**

## 3. Bulk Density

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 sec intervals. The volume of the powder is measured. Then, the powder is weighed. This is repeated to get average values. The Bulk Density is calculated by using the below given formula.[11]

Bulk density = Mass/Volume

4. **Carr's index:** Carr's compressibility index, which was derived using the formula, was used to determine the blend's percent compressibility.

Carr's index=100(Tap Density-Bulk Density)/Tap Density

5. **Hausner's ratio:** Flow of powder easily index is evaluated by Hausner's ratio, which is calculating using the formula

Hauser's ratio = Tap density / Bulk density.[12]

6. **Irritancy Test**

Mark an area (1sq.cm) on the left-hand dorsal surface. Definite quantities of prepared bath powders with water were 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.[13]

## ANTIMICROBIAL ACTIVITY

The agar well diffusion test is widely used for the evaluation of the antimicrobial activity of plants or microbial extracts. In this work, the Petri plate's surface was inoculated by spreading 100 µl of the microbial suspension over the entire surface of the agar. Then, five perforations were made, and both the negative and positive controls were placed in the wholes. 10 repetitions were made per treatment for each microorganism. Adequate agar medium was used for the microorganisms under study. The microorganisms were inoculated in the corresponding agar medium, previously melted, and kept at 45 °C. The depth of each medium in each Petri plate was approximately 6 mm. The preparation and sterilization were carried out according to the indications of the culture media supplier. The negative control used was dimethyl sulfoxide at 1.0 $mg \cdot ml^{-1}$ and the positive control used was ampicillin with optimal 1.0, 0.007, 0.007, and 0.009 mg•ml−1 concentrations for the microorganisms *Escherichia coli Staphylococcus aureus* respectively. The concentration was found experimentally that allows working with the effective material concentrations so that the antibiotic did not inhibit the total development of the microorganism.[14]

## RESULTS

### 1. Organoleptic Evaluation

**Table 3: Organoleptic Evaluations.**

| Sl. No | Evaluation Parameters | Observation | | |
|---|---|---|---|---|
| | | **F1** | **F2** | **F3** |
| 01 | Appearance | Powder | Powder | Powder |
| 02 | Color | Yellow | Light yellow | Light yellow |

| | | | | |
|---|---|---|---|---|
| 03 | Odour | Astringent | Astringent | Astringent |
| 04 | Taste | Characteristics | Characteristics | Characteristics |
| 05 | Texture | Fine | Fine | Fine |

**2. Acid insoluble value, determination of pH, Moisture content, Particle Size.**

**Table 4: Determination of Physical Characteristics.**

| Sl. No | Evaluation Parameters | Observation | | |
|---|---|---|---|---|
| | | F1 | F2 | F3 |
| 01 | Ash value in % | 6% | 7% | 7.5% |
| 02 | Acid Insoluble Ash | 2.2g | 2.5g | 3.4g |
| 03 | pH | 7.2 | 7.4 | 7.5 |
| 04 | Moisture Content | 1.3% | 2% | 2.25% |

**General Powder Characteristics**

**Table 5: Determination of Flow Properties.**

| Sl. No | Evaluation Parameter | Observation | | |
|---|---|---|---|---|
| | | F1 | F2 | F3 |
| 1 | Particle Size | 26µ | 23µ | 24µ |
| 2 | Angle of repose | 45 | 44.6 | 44.81 |
| 3 | Bulk density | 0.634g/ml | 0.543g/ml | 0.656g/ml |
| 4 | Tapped density | 0.754g/ml | 0.657g/ml | 0.823g/ml |
| 5 | Carr's Index | 15.9% | 17.35% | 20.29% |
| 6 | Hausner's Ratio | 1.18 | 1.20 | 1.25 |

**Irritancy Test**

**Table 6: Irritancy Test.**

| Sl. No. | Parameter | Observation | | |
|---|---|---|---|---|
| | | F1 | F2 | F3 |
| 01 | Irritation | No | No | No |
| 02 | Swelling | No | No | No |
| 03 | Redness | No | No | No |

**ANTI-MICROBIAL ACT IVITY**

**Figure - 5 Antimicrobial activity.**

**Table 7: Antimicrobial activity.**

| Formulation code | *E. coli* | *S. Aureus* |
|---|---|---|
| **F1** | No zone | 16mm |
| **F2** | No zone | 15mm |
| **Control [ciprofloxacin]** | 25mm | 25mm |

## DISCUSSION

Organoleptic Evaluation

Herbal bath powder was evaluated for organoleptic parameters. The colour of formulation was creamish. The odour of prepared formulation was pleasant and good acceptable which is desirable to cosmetic formulations. Texture and smoothness were acceptable as per the requirement of cosmetic formulations.

### Angle of Repose

Angle of repose was performed by funnel method. For herbal bath powder formulation angle of repose was found in the range of (F1) 45, (F2) 44.6 and (F3) 44.81 degree of powder, which indicate passable properties.

### Bulk Density

The bulk density of herbal bath powder formulation was found to be in the range (F1) 0.634g/ml, (F2) 0.543gm/ml and (F3) 0.656g/ml. The values were used for calculating the % compressibility of powder.

### Tapped Density

Tapped density of herbal bath powder was found to be in the range of (F1) 0.754g/ml, (F2) 0.657gm/ml and (F3) 0.823g/ml. The values were used for calculating the % compressibility of powder.

### Carr's Index

The percent of (% compressibility) of bath powder mix was determined by Carr's compressibility index. The % compressibility of herbal bath powder formulation lie within the range of (F1) 15.91%, (F2) 17.3% and (F3) 20.29%, indicating fair flow property of powder**.**

### Hausner's Ratio

It is the indirect index of ease of powder flow. The values lie within the range of (F1) 1.189%, (F2) 1.209%, and (F3) 1.254% which indicate the herbal bath powder formulation

show fair flow properties.

**Irritancy Test**

The results of irritancy test were shown in Table 6. The formulation showed absence of irritation, redness and swelling during irritancy studies. This formulation has safe to use on skin.

**Washability**

This is the common method for checking the washability of the formulations. They were applied on the skin and then ease and extent of washing with water were checked manually by using 1 liter of water is used to remove all content of the formulation were applied on the surface.

**Antimicrobial activity**

Antimicrobial activity of herbal bath powder formulation was evaluated. The diameter of Escherichia coli**,** (F1, F2) was no zone formation. The diameter of S. aureus organism was (F1)16mm, (F2)15mm. It shows the antibacterial activity.

## CONCLUSION

- The base of herbal cosmetics is made from substances that are legal to use in cosmetics, and one or more herbal ingredients are added to cure various skin problems and enhance beauty.
- A good, practical way to improve utilization as a herbal bath powder is to create a concept of herbal bath powder that consists of many herbal powders.
- According to the results of the trials, the powder can promote skin whitening, remove grime and have antimicrobial activity.
- It is possible to do additional research on the created herbal bath powder.

## AKNOWLEDGEMENT

The authors are thankful to Hon. Chairman Governing Council Mr. Mallikarjun S Sasnur & Dr Y Srinivas, Principal, BVVS Hanagal Shri Kumareshwar College of Pharmacy, Bagalkot for their encouragement and providing necessary facilities to carry out the present research work.

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