

# Formulation and Evaluation of Herbal Handwash Containing Extracts of Jasmine and Hibiscus Flower

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## Abstract

Hand washing also known as hand hygiene, is the act of cleaning one's hands with soap or handwash and water to remove viruses/bacteria/microorganisms, dirt, grease, or other harmful and unwanted substances stuck to the hands. Drying of the washed hands is part of the process as wet and moist hands are more easily recontaminated. If soap and water are unavailable, hand sanitizer that is at least 60% (v/v) alcohol in water can be used instead, unless hands are visibly excessively dirty or greasy. Hand hygiene is central to preventing the spread of infectious diseases in home and everyday life settings. The World Health Organization (WHO) recommends washing hands for at least 20 seconds before and after certain activities. <sup>1,5</sup>These include the five critical times during the day where washing hands with soap is important to reduce fecal-oral transmission of disease: after using the toilet (for urination, defecation, menstrual hygiene), after cleaning a child's (changing nappies), before feeding a child, before eating and before/after preparing food. When both hand washing and using hand sanitizer are not available, hands can be cleaned with uncontaminated ash and clean water, although the benefits and harms are uncertain for reducing the spread of viral or bacterial infections. However, frequent hand washing can lead to skin damage due to drying of the skin. Moisturizing lotion is often recommended to keep the hands from drying out.

**Keywords:** hand hygiene, hand scrub, hand rinse

## 1. Introduction

Skin is one of the most exposed part of the body requires protection from the pathogens. To protect the skin from harmful micro organisms and to prevent spreading of many contagious diseases hand washing is absolutely an important precaution. <sup>2,3</sup>Food production workers and foodservice personnel must be taught to use correct hand and fingertip washing by management in preparation for work. Regulatory authorities do not require the use of a fingernail brush. However, correct use of a fingernail brush to wash hands and fingertips is the best way to assure removal of transient microorganisms. Hands are primary mode of transmission of microbes and infections. Hand hygiene is therefore the most important measure to avoid the transmission of harmful germs and prevent the infections. It is the single most important, simplest, and least expensive mean of preventing nosocomial infections<sup>3</sup>.



Hand washing is the act of cleaning hands with the purpose of removing soil, dirt, pathogenic microorganisms and avoid transmitting of transient micro organism. It removes visible dirt from hands and reduces the number of harmful micro organisms such as E.coli and salmonella can be carried by people, animal or equipment & transmitted to food. To defend the skin from harmful microorganism and to avoid spreading of numerous contagious diseases, hand washing is extremely significant precaution. Historically, plants have provided a good source of anti infective agents. Plant extract have a potential as antimicrobial compounds against several pathogenic microorganisms which cause infections disease and resistance towards synthetic drug . The main advantage of using natural source is that they are easily available cheap & harm less compared to chemical products.

### 1.1 Steps and Duration<sup>4,5</sup>

The United States Centers for Disease Control and Prevention (CDC) recommends the following steps when washing one's hands for the prevention of transmission of disease:

1. Wet hands with warm or cold running water. Running water is recommended because standing basins may be contaminated, while the temperature of the water does not seem to make a difference, however some experts suggest warm, tepid water may be superior.
2. Lather hands by rubbing them with a generous amount of soap, including the backs of hands, between fingers, and under nails. Soap lifts pathogens from the skin, and studies show that people tend to wash their hands more thoroughly when soap is used rather than water alone.
3. Scrub for at least 20 seconds. Scrubbing creates friction, which helps remove pathogens from skin, and scrubbing for longer periods removes more pathogens.
4. Rinse well under running water. Rinsing in a basin can recontaminate hands.
5. Dry with a clean towel or allow to air dry. Wet and moist hands are more easily recontaminated.

The most commonly missed areas are the thumb, the wrist, the areas between the fingers, and under fingernails. Artificial nails and chipped nail polish may harbor microorganisms.

#### ➤ Why is it important to wash your hands?

People often touch their eyes, nose, and mouth without even noticing it. The trouble is the germs that make us sick use the eyes, nose and mouth as a way to get into our bodies. So, keep your hands germ protected by washing them as often as possible. Just remember, for handwashing to be truly effective, soaps, disinfectants, wipes, gels and creams are the best tools.

## 2. REVIEW OF LITERATURE<sup>6,10</sup>

### 2.1 HIBISCUS<sup>1</sup>

#### 2.1.1 Introduction

- **B.S** : Native to warm temperatures, sub tropical, tropic regions.
- **Synonym**: Shoe flower, Jasvandi, Gudhal flower, Rose mallow.
- **Family** : Malvaceae
- **Common Names**:

China rose, China rose plant, Dasani, Gudhal, Gurhal, Jaba, Joba, Mandaar, Sadaphool, Senicikobia, Japaphool, Japa, Japakusam, Jasum, Jasunt, Jaswand, Jia pushpa, Kante, Mandasa, Sambathoo Chedi, Senitoa Yaloyal.

- **Description**:

The herb *Hibiscus rosa sinensis* L. (Malvaceae) is native to China. Many species of *Hibiscus* are grown for their showy flowers. It is a shrub widely cultivated in the tropics as an ornamental plant and has several forms with varying colours of flowers. *Hibiscus* has also medicinal properties and takes part as a primary ingredient in many herbal teas. The red flowered variety is preferred in medicine. There was various studies reported that variety of *Hibiscus* plants have different medicinal properties. This review mainly focused on the therapeutic potential of the *Hibiscus rosa sinensis* plant and its applications.

#### 2.1.2 Classification

Kingdom	:	Plantae- Plants
Subkingdom	:	Tracheobionta-Vascular plants
Division	:	Magnoliophyta-Flowering plants
Class	:	Magnoliopsida-Dicotyledons
Subclass	:	Dilleniidae
Order	:	Malvales
Family	:	Malvaceae-Mallow family
Genus	:	<i>Hibiscus</i> L.-Rosemallow
Species	:	<i>Hibiscus rosa sinensis</i>



#### 2.1.3 Traditional Uses

In India, *Hibiscus* flowers and leaves are used for the abortion, antifertility, contraceptive, Diuretic, Menorrhagia, Bronchitis, Emmenagogue, Demulcent, Cough (Jadhav et al. [6]). In Africa and neighbouring tropical countries has lengthy history, *Hibiscus* flowers have been used in sachets and perfumes. In areas of Northern Nigeria, *Hibiscus* has been used to treat constipation. The fleshy red calyx is used in the preparation of jam, jellies and cold and warm teas and drinks. The leaves have been used like spinach. The leaves are used in traditional medicines as emollients and aperients to treat burning sensations, skin disease, and constipation 3 (Kirtikar and Basu [17]). In Egypt, the plant used for the treatment of cardiac and nerve diseases and has been described as diuretic. In Japan, *Hibiscus* leaves are used as antidiarrheal. Iran, sour tea used for the treatment of hypertension. In western countries, *Hibiscus* flowers often are found as component of herbal tea mixture. In Thailand, people consume Roselle juice to quench thirst.

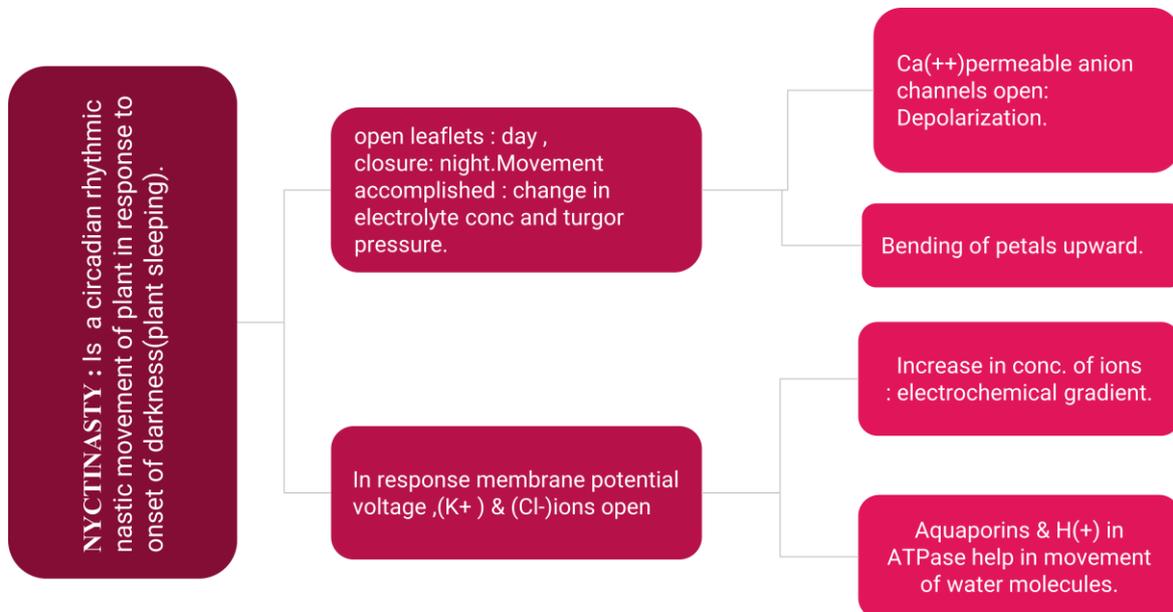
### 2.1.4 Chemical constituents<sup>11</sup> :

Leaves contain protein(3.3g) , fat(2.3), carbohydrate(9.2g) ,minerals (phosphorus-21g ,iron-4.8g thiamine 0.45g beta-carotene- 4.35g, riboflavin-0.45mg and ascorbic acid-54mg).

### 2.1.5 Properties :

- Lowers B.P. and cholesterol.
- Anti-oxidant due to presence of Vit.C,beta-carotene,anthocyanin: Protects free radicals within body.The radicals cause damage to cells that contribute to diseases as heart disease,cancer and diabestes.
- Fights bacteria.
- Supports liver health.
- Boost Immune system and prevent cell damage.
- Anti-inflammatory - inflammation plays role in development of many illness as Alzheimer’s disease,asthma and rheumatoid arthritis.

### 1.1.6 Mechanism of Hibiscus Flower :



## 2.2 JASMINE<sup>17</sup>



### 2.2.1 Introduction

- **Name:** Jasminum Sambac
- **Biological Source:** Native to tropical Asia { monsoon }.
- **Synonym:** Mogra,Sampaguita,Melati-putin
- **Family:** Oleaceae

### 2.2.2 Description:

Scandent or suberect shrub; 1-3 m tall, branchlets pubescent. Leaves opposite or in whorls of three, entire, elliptic or broad elliptic to sub-orbicular, obtuse or acute, very variable in size, up to 9 cm long and 6 cm broad, glabrous, shining above; nerves prominent beneath; petiole short, pubescent. Flowers fragrant, in few-flowered terminal cymes, pedicels up to 6 mm; bracts linear, up to 6 mm long. Berry simple or didymous, globose, 6 mm in diameter, black when ripe, surrounded by the suberect subulate calyx teeth. Pubescent climbers with angular branchlets, simple elliptic to ovate leaves up to 10 cm long, acute or obtuse, base rounded or cuneate, nearly glabrous, with evident veins.

### 2.2.3 Traditional uses

- The flowers of *Jasminum sambac* were used in the preparation of an essential oil and for making jasmine tea. The flowers are bitter, pungent, cooling, braintonic, purgative, cure tridosha, biliousness, itching sensation, fever.
- The flowers were also used for the treatment of diarrhea, abdominal pain, conjunctivitis, asthma, cancer, wound healing, toothache and dermatitis. The leaves were used to heal the wounds. The flowers and leaf were also used in folk medicine to prevent and treat breast cancer.
- The flowers were used by the women when brewed as a tonic as it aids in preventing breast cancer and stopping uterine bleeding. The plant was included in herbal preparations for the treatment of insanity and epilepsy. In Malaya, women used the soaked flowers to wash the face.
- The leaves and roots of the plant were used traditionally in the treatment of inflammation, fever and pain. Jasmine oil has a wide range of medicinal applications and was used in perfumery, soaps, flavorings and the cosmetic industry. Medicinally, it was used for the treatment of dry, greasy, irritated and sensitive skin, irritating coughs, alleviating muscular pain and treating sprains, antidepressant, antiseptic, antispasmodic, sedative and uterine tonic.

### 2.2.4 Chemical constituents<sup>17,18</sup>:

Oleanolic acid, hesperidine, jasminoids A,B,C,D. Leaves contain flavonoids as rutin, isoquertin, alpha-amyrin and beta-sitosterol.

### 2.2.5 Cause Of Aroma :

Methyl benzoate, N-acetyl methyl anthranaline.

### 2.2.6 Properties :

- Neutral and purifies air.
- Relaxation and relief stress.
- Anti-septic property (benzyl benzoate, benzoic acid, benzaldehyde)
- Great for skin (ess oil, ketone).
- Natural Anti-spasmodic.
- Offer hair benefits.
- Best wound healer.
- Amazing fragrance.

### 2.2.7 Therapeutic Uses:

Mental alertness. There is conflicting evidence about the effects of jasmine on mental alertness. Some early research suggests that inhaling fragrance from a small amount of jasmine absolute ether improves mental alertness. However, inhaling a larger amount of fragrance from jasmine absolute ether seems to have a relaxing effect. Other research suggests that jasmine odor does not affect concentration.

- Liver problems such as hepatitis and cirrhosis.
- Stomach pain due to severe diarrhea (dysentery).
- Increasing sexual desire (as an aphrodisiac).
- Cancer treatment.
- To cause relaxation (as a sedative).
- Other conditions.

## 2. PLAN OF WORK<sup>19</sup>

- Collection and Authentication of Plant Material.
- Organoleptic evaluation
- Physical evaluation for parameters like grittiness, PH, foaming ability, spreadability.
- Pharmacological screening: In-vitro, anti-microbial activity using gram+(**Staphylococcus Aureus**), gram- bacteria(**Escherechia.coli**) The 2 strains were collected from SUMANDEEP UNIVERSITY,BARODA.

## 3. MATERIALS & METHODS<sup>17,20</sup>

### 3.1 COLLECTION OF PLANT MATERIAL

**HIBISCUS FLOWER** : Hibiscus flower were collected from the herbal garden of B. Pharmacy College, Rampura and authenticated by Dr. Pradip Tidke, M.D Ayurved, Jay Jalaram Ayurvedic Medical College, Shivpuri.

**JASMINE FLOWER** : Jasmine flower were collected from the herbal garden of B. Pharmacy College, Rampura and authenticated by Dr. Pradip Tidke, M.D Ayurved, Jay Jalaram Ayurvedic Medical College, Shivpuri.

### 4.2 METHODOLOGY

#### Chemicals Used :

Bacterial Sample, Gram + (Staphylococcus Aureus), Gram - (E.Coli)

Cinnamon oil

HPMC E-50

Glycerine

SLS

Methyl paraben

Decoction Of Plants

**Table 1: Formulation of herbal hand wash**

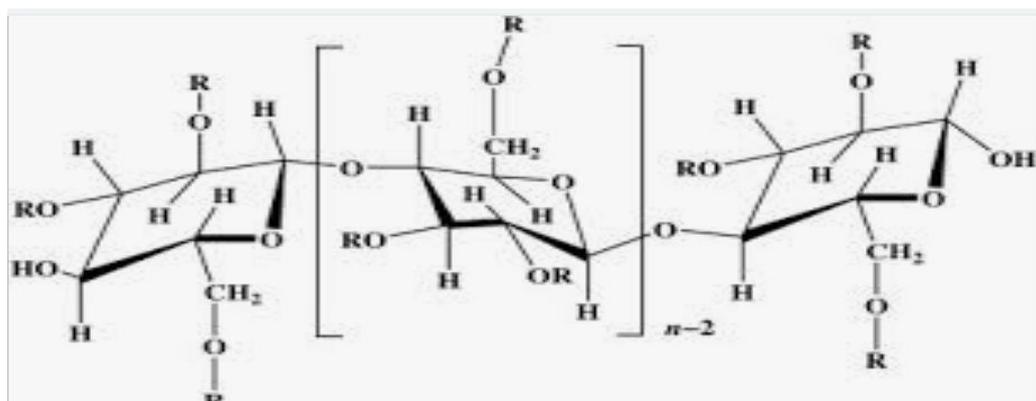
Sr.No.	Name of Ingredient	F1	F2
1	Cinnamon oil	1.25 ml	1.25 ml
2	HPMC E-50	2 ml	3ml
3	Glycerin	1 ml	1 ml
4	Sodium Lauryl Sulphate	1 gm	1 gm
5	Methyl Paraben	0.3 gm	0.3 gm
6	Decoction of flowers	Upto 100 ml	Upto 100 ml

### 1. Cinnamon Oil<sup>22</sup>

- Obtained by steam distillation of leaves from genus Cinnamomum.
  - a type of essential oil with strong scent and used as dilution.
  - main chemical compound: eugenol (65-92%), cinnamaldehyde, cinnamic acid.
- **Uses:**
- flavoring food products as cakes and confectionaries for preparation of synthetic vanillin.
  - formulation of health and beauty aid, very distinct scent of c. leaf is more medicinal than bark.

### 2. HPMC E-50 (Hydroxypropyl methyl cellulose)<sup>18</sup>

- Belong to group of medicines known as “artificial tears”.
- Obtained by treating alkali cellulose with chloromethane and propylene oxide.
- Odorless, tasteless granules or fibrous powder i.e. creamy/white in color.
- Production is available in gel/jelly/solution form.
- Used to relieve dryness and irritation.
- Helps to prevent damage to eyes and moisten hard contact lens.
- Is methylated o-(2-hydroxypropylated) cellulose.



### 3. Glycerine/Monoctanoic Compound<sup>19</sup>

Formula : C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>

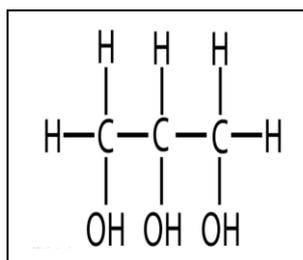
Density : 1.26g/cm cube.

Molar Mass : 92.09382 g/mol.

IUPAC : propane-1,2,3-triol

Boiling Point : 290 degrees centigrade.

Classification : Alcohol ,Polyol

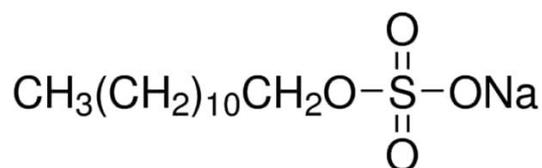


- Colorless, odorless, viscous liquid -small , organic mol with 3-OH groups while fatty acid consists of long HC chains attached to carboxyl group.

- Substitute : propylene glycol

Used in cosmetic and toiletries products as it is cheaper.

### 4. Sodium Lauryl Sulphate (SLS)/ Sodium Dodecyl Sulphate<sup>20</sup>



- An anionic detergent and surfactant, derived : palm kernel /coconut oil.
- Mostly found in personal care products (soaps,shampoo,toothpaste,etc).
- IUPAC Name: alpha-sulfo-W-(dodecyloxy)-poly(oxyethane-1alpha-2-diyl)sodium salt.
- Mol Mass: 421g/mol.

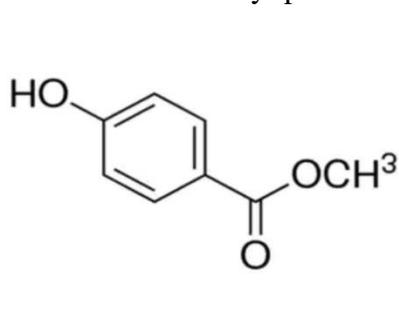
➤ **USES :**

- As in herbicide
- Emulsifying agent in household cleaning products (laundry detergents,spray cleansers and dishwasher detergents).
- In shampoo [sulphates create lathering effect: removes oil and dirt].
- Effect on plant's morphology (browning shoots, fragmentation ,leaf shedding chlorophyll & protein content.)

### 5. Methyl Paraben<sup>21</sup>

IUPAC	Methyl-4-hydroxybenzoate
Synonym	Nipagin-M, Tegospet; Methyl-p-hydroxybenzoate.
Density	1.209g/cm cube
Mol. Formula	C <sub>8</sub> H <sub>8</sub> O <sub>3</sub>
Appearance	White crystalline powder.
Properties	Anti-fungal ,food preservative.

Structure of methyl paraben

**Method** <sup>21-23</sup>

1. The two flowers were collected, washed and dried in sunlight.
2. Extract was boiled in water bath for 1hr at normal temperature and was then allowed to rest in a closet for 24 hours.
3. Formulation into 3 batches were carried out using gelling agent (HPMC E-50/Caarbopol).
4. Desired conc. of glycerine, SLS were measured accurately and dispersed in purified water with moderate stirring.
5. Required quantity of methyl paraben was dissolved by gentle heating, followed by addition of essence herbal oil.
6. Formulated hand wash gel was filed in collapsible tubes and stored at cool, dry place for further evaluation.

**EVALUATION:**➤ **Physical Evaluation:**

The Herbal Hand wash was subjected to Physical evaluation visually. The test parameters were Color, Odor and Texture.

➤ **Appearance and Homogeneity:**

The Herbal Hand wash were homogenous; Brown in color and translucent in nature.<sup>5</sup>

➤ **pH**

1 gm of sample of Herbal Based hand wash was taken and dissolved it into 100 ml distilled water. The pH of solution was taken in previously standardized digital pH meter.<sup>6</sup>

➤ **Viscosity**

The viscosity of Poly Herbal Gel Based hand wash was determined by using digital Brookfield viscometer.<sup>6</sup>

➤ **Grittiness :**

1 ml of gel -fingertips

➤ **Irritability Test**

By rubbing on skin.

➤ **Spread Ability:**

Sample of 0.5 gm was pressed bet slides and left for 5 mins until no further spreading. diameter calc.

➤ **Foam Height :**

1gm sample of gel taken and dispensed in 50 ml distilled water. Dispersion transferred to 500 ml measuring cylinder. Volume upto 100 ml with water. Strokes given and kept aside. Foam ht above aqueous vol was calculated.

➤ **Foam Retention :**

25 ml gel taken in 100 ml cylinder, was then covered with hand -shaken 10 times .Volume of foam at 1 min interval was recorded for 4 mins.

➤ **Anti-septic (*disc diffusion method*):**

The antibacterial activity of the herbal hand wash and extract were evaluated using Disc-diffusion method. A suspension of the tested microorganisms was uniformly swabbed on agar plates using sterile cotton swabs. Sterile blank discs were individually impregnated to the different concentrations of formulated hand wash (100, 250 and 500 mg/ml) and extracts (25,50 and 100mg/ml) were placed onto the inoculated agar plates. The plates will be inverted and incubated at 37°C for 24h for bacteria. The antibacterial activity was measured by measuring diameter of the resulting zone of inhibition against the tested organisms.

➤ **For anti- microbial property:**

- Nutrient Medium : Agar
- 1.4g broth in 250 ml conical flask was made upto 100 ml. Cottoonditions for sterilization~ autoclave (121degree C,15 mins)
- Distillation assembly usage -each plate 1-3rd of agar poured-solidification.
- Cup plate method carried out in laminar flow where extract to b tested is placed in cavity area ,made with help of lifter.
- Streak plate method - strains of bacteria -USE OF COTTON SWABS.
- Sterile petri dishes to be serially named and numbered.
- Use of micropipette , vol 100 microbe/l in cavity.
- Incubation at 37 degree centigrades for 24 hours-for presence /absence of microbial growth
- Plate showing clear “ZONE OF INHIBITION” was considered.

#### 4. RESULTS AND DISCUSSION

- Preliminary antimicrobial sensitivity screening tests findings shown. The handwash formulation proved to be beneficial and had excellent activities against all tested organisms.
- Concentration increase, Zone of inhibition increases and conclusion was more than half, so the formulated herbal handwash can be developed as anti-microbial formulation.



MICROBES	ZONE OF INHIBITION	ZONE Of INHIBITION (mm)
Staphylococcus Aureus	18	21
Escherechia Coli	20	16

### 5. CONCLUSION

- ❑ This preliminary in-vitro study demonstrated that Jasmine and Hibiscus herbal hand wash is effective against pathogenic bacteria. It is an attempt made to establish gel based handwash containing flower extracts.



- ❑ From the result, we could say gel formulations are good in appearance, stable and proved to be effective.
- ❑ **FINAL FORMULATED HANDWASH**



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