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FORMULATION AND EVALUATION OF HERBAL HAND WASH

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Abstract:

Hand hygiene plays a key role in stopping the spread of bad germs and keeping people healthy. This study looked into creating and testing a natural hand wash from extracts of Neem (Azadirachta indica) and Periwinkle (Catharanthus roseus) leaves. These plants are known for their ability to fight bacteria and being gentle on the skin. The leaf extracts were made using a decoction method and then combined with other common ingredients like a surfactant, thickener, preservative, moisturizer, fragrance, and water to form three different versions, labeled F1, F2, and F3. Each version was tested for its look, smell, pH level, thickness, ability to create foam, how it affects the skin, and its effectiveness against bacteria. All three versions performed well, showing good stability a comfortable pH for the skin, and no signs of irritation. They also worked well at killing germs, with F3 being the most effective. The study found that this herbal hand wash is safe, works well, is better for the environment, and can be used regularly as a natural alternative to traditional chemical-based cleaners.

Keywords: *Herbal hand wash, Neem, Periwinkle, Antibacterial activity, Herbal formulation, Hand hygiene*

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INTRODUCTION:

1.1 What is Hand Wash

Hand wash is a liquid product used to clean your hands by removing dirt, oil, and harmful germs.

It helps keep you clean and stop infections from spreading. Most hand washes include surfactants to clean your hands, antimicrobial ingredients to kill germs, moisturizers to protect your skin, fragrances for a nice smell, and water as the main base.[1,3]

1.2 Periwinkle (Catharanthus roseus)

Periwinkle, also known as Catharanthus roseus, is a plant from the Apocynaceae family.

It is widely used in traditional Ayurvedic and Unani medicine. This plant contains important compounds like alkaloids, flavonoids, tannins, phenolics, and glycosides, which have antibacterial, antimicrobial, antioxidant, and anti-inflammatory properties. Some important alkaloids, such as vincristine and vinblastine, are used in modern medicine. The leaves of this plant have strong antimicrobial properties, making them suitable for making natural hand wash. Periwinkle extracts can help fight harmful germs and are useful in creating natural antimicrobial products instead of using synthetic chemicals.[4,5]

1.3 Neem (Azadirachta indica)

Neem, or Azadirachta indica, is a well-known medicinal plant found in tropical areas, especially in India.

The leaves of neem contain active compounds like nimbin, nimbidin, azadirachtin, flavonoids, and tannins, which offer antibacterial, antifungal, antiviral, and anti- inflammatory benefits. Neem extracts are effective against both Gram-positive and Gram-negative bacteria and are commonly used in herbal products. A neem-based herbal hand wash is designed to clean hands effectively, remove microbes, be gentle on the skin, and avoid the irritation that can come from chemical-based products.[6]

Importance of Hand Hygiene

Keeping your hands clean is one of the most effective and easy ways to prevent the spread of infectious diseases.

Herbal hand washes are becoming more popular because they are safe, biodegradable, environmentally friendly, and less harsh on the skin compared to chemical-based alternatives.[7,8]

Diseases Caused by Poor Hand Hygiene

Not washing your hands properly can spread many infections, including: **Gastrointestinal infections:** diarrhea, gastroenteritis, food poisoning **Respiratory infections:** cold, flu, pneumonia

Skin infections: impetigo, boils, cellulitis

Eye infections: conjunctivitis

Fecal-oral diseases: hepatitis A, typhoid, cholera

Viral infections: norovirus, COVID-19

Bacterial infections: Staphylococcus aureus and MRSA

Fungal infections: ringworm

Childhood infections: hand-foot-mouth disease

Regular hand washing helps stop the spread of these diseases and improves overall public health.[9,10]

2. MATERIAL AND EQUIPMENT:

Table 1: Ingredients and Their Roles in Formulation

Sr. No.	Ingredients	Roles
1	Neem extract	Antibacterial, antiviral, and anti-inflammatory agent
2	Periwinkle extract	Antibacterial, antimicrobial, antiviral, and anti-inflammatory agent
3	Carbopol (HPMC substitute)	Thickening agent and gelling agent
4	Sodium lauryl sulphate	Foaming agent
5	Methyl paraben	Preservative
6	Glycerine	Moisturizing and humectant agent
7	Rose water and orange oil	Fragrance and flavoring agents
8	Distilled water	Vehicle (q.s. to required volume)

MATERIAL

❖ **Equipment**

1. Magnetic Stirrer

The magnetic stirrer is used to mix and blend the ingredients evenly.

It helps in dissolving substances like Carbopol, surfactants, and extracts smoothly, preventing the formation of lumps.[11,12]

2. PH Meter

A pH meter is used to check and adjust the pH level of the herbal hand wash.

Keeping the pH within a skin-friendly range (around 5.5 to 7) helps prevent skin irritation and ensures the product remains stable over time.[13,15]

3. Viscometer

The viscometer measures the thickness or viscosity of the hand wash.

This helps ensure the product has the right consistency for easy flow, application, and user satisfaction.[16]

4. Weighing Balance

A weighing balance is used to accurately measure raw materials such as Carbopol, preservatives, and plant extracts.

This ensures the formulation is made correctly and consistently.[17,18]

5. Laminar Air Flow

Laminar air flow provides a clean, sterile environment by delivering filtered air.

It helps reduce the risk of microbial contamination during the formulation and filling processes of the herbal hand wash.[19]

MATERIALS AND METHODS:

❖ **Method**

1. Prepration of periwinkle leaf and Neem leaf extract

- **Procedure**
- Collection of Leaves Gather fresh and healthy Neem leaves.Cleaning Wash the leaves carefully with tap water and then with distilled water to get rid of dust and other unwanted particles.[17]
- **Boiling (Decoction Process)** Take 25 grams of Neem leaves .Add 250 milliliters of distilled water, Heat the mixture and let it boil for 20 to 30 minutes at a temperature 60°C to 80°C.
- **Cooling:** Let the decoction cool down to room temperature 23°C to 30°C.
- **Filtration:**Use muslin cloth or Whatman filter paper to filter the mixture.
- **Collection & Storage:**Collect the liquid that comes out after filtering and put it in an airtight container.[19]
- Store it in the refrigerator at 4 degrees Celsius until you need to use it.

2. Periwinkle Leaf Extract (Boiling Method)

- **Procedure**
- **Collection**: fresh Periwinkle leaves.Washing Wash the leaves thoroughly with clean water and then with distilled water.[21]
- **Boiling (Decoction Process)**
- Take 25 grams of Periwinkle leaves.Add 250 milliliters of distilled water.Boil the mixture for 20 to 30 minutes at a moderate temperature in 60 to 80°C.
- **Cooling:** Let the decoction cool down to room temperature 23°C to 30°C.
- **Filtration:** Use muslin cloth or filter paper to filter the liquid.
- **Storage:** Put the filtered liquid into a clean, airtight bottle and store it in the refrigerator until you are ready to use it.[20]



Fig No .1 Filtration process of extract

Formulation of herbal hand wash.

- Take a clear apparatus
- And add a 10 ml periwinkle extract and 10 ml Neem extract
- Then add a 2 ml ethanol dissolve in 0.2 gm methyl paraben then this mixture add slowly slowly in this extract.
- Add a sodium lauryl sulphate in 3 gm.and 2 gm of HPMC (substitute of carbopol 934),20 ml of glycerine,and rose water added.[20]



Fig No .2 Formulation of herbal hand wash

Table No. 2: Formulation Composition of F1, F2, and F3

Sr. No.	Ingredients	F1	F2	F3
1	Neem extract	10 mL	10 mL	10 mL
2	Periwinkle extract	10 mL	10 mL	10 mL
3	Carbopol / HPMC	2 g	2 g	2 g
4	Sodium lauryl sulphate	3 g	3 g	3 g
5	Methyl paraben	0.2 g	0.2 g	0.2 g
6	Glycerine	20 mL	20 mL	20 mL
7	Orange oil	1 mL	1 mL	1 mL
8	Rose water	1 mL	1 mL	1 mL
9	Distilled water	q.s.	q.s.	q.s.

❖ Evaluation

- **Physical Parameters**
- **Appearance:** Observed by looking at it.
- **Color:** Observed by looking at it.
- **Odor:** Detected by touching or smelling it.
- **Homogeneity:** Observed by looking at it.[22]
- **Fragrance:** Based on personal opinions about whether it was pleasant.
- Five people were asked if they found the fragrance acceptable, and their responses were recorded. The fragrance was assessed using the following standards.
- The fragrance was good, similar to the scent of the reference hand wash.
- The fragrance wasn't very good but was similar to the reference hand wash.[22]
- **Chemical parameters**
- **pH determination :** measure using pH meter.
- **Viscosity :** The viscosity measurement by using a Brookfield viscometer.
- **Foam hight :**25 ml hand wash transfer into stopperd measuring cylinder, volume was meckup to 50 ml water,25 strock was given and stand till aqueous volume measure up to 50 ml and measure the foam hight , above the aqueous volume.[23]
- **Skin irritation test:** To evaluate the safety of the herbal hand wash and check whether it causes irritation, redness, itching, or inflammation on skin.[24]
- **Antibacterial activity test:** The antibacterial effect of the herbal hand wash was tested using the culture media method against Lactobacillus bacteria. First, sterile agar plates were made and then filled with bacterial culture under clean conditions in a laminar flow hood. Small wells were made in the agar, and the hand wash sample was placed into these wells. The plates were then kept at 37°C for 24 hours. After that, the antibacterial activity was checked by looking at the clear area around the sample, which showed that the bacteria did not grow there.[24]

3. RESULT AND DISCUSSION:

RESULTS:

Table No. 3: Evaluation Results of Formulations (F1, F2, F3)

Sr. No.	Parameters	F1	F2	F3
1	Color	Amber (light brown)	Slightly yellowish brown	Light orange/amber
2	Odour	Pleasant	Mild	Characteristic
3	Appearance	Particles present	Smooth liquid	Clear viscous liquid
4	Fragrance	Acceptable	Mild pleasant	Good
5	pH	5.10	5.39	5.25
6	Viscosity	2100 cP	2650 cP	3200 cP
7	Foam Height	4.0 cm	4.5 cm	5.1 cm
8	Skin Irritation	No irritation observed	No redness or itching	Safe for skin
9	Antibacterial Activity Test	12 mm (zone of inhibition)	16 mm (zone of inhibition)	20 mm (zone of inhibition)

DISCUSSION:

This study involved the formulation and evaluation of a herbal hand wash prepared using Neem (Azadirachta indica) and Periwinkle (Catharanthus roseus) leaf extracts, selected for their antibacterial, antifungal, anti-inflammatory, and skin-friendly properties. Three formulations (F1, F2, and F3) were developed and assessed for parameters such as color, appearance, fragrance, pH, viscosity, foamability, skin irritation, and antimicrobial activity. The formulations showed acceptable physical characteristics with pleasant odor and proper mixing of plant extracts.

The pH range (5.25–5.39) was close to the natural skin pH, indicating suitability for regular use without irritation. All formulations produced stable foam and showed no signs of skin irritation.

Antimicrobial testing against Lactobacillus confirmed effective inhibition of microbial growth. Among the three, formulation F3 demonstrated better clarity, viscosity, fragrance, and foam stability, making it the optimized and most effective herbal hand wash formulation.

CONCLUSION:

The study successfully created and tested a herbal hand wash made from neem and periwinkle extracts.

The results showed that the product is safe, works well, remains stable, and is good for everyday use.

The herbal hand wash proved to be effective at cleaning, produced good foam, was gentle on the skin, and had strong antibacterial properties.

Using natural plant extracts makes the product better for the environment and lowers the chance of harmful effects linked to chemical-based hand washes.

So, a hand wash made from neem and periwinkle can be a great natural option compared to commercial antibacterial hand washes.

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