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## FORMULATION AND EVALUATION OF POLYHERBAL HAND WASH (GEL)

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**ABSTRACT:** The primary objective of developing the Polyherbal Hand Wash Gel is to promote hand hygiene. Herbal medicines play a crucial role in global healthcare, being widely recognized as effective remedies for prevention and various health conditions. Consequently, Herbal Medication is also referred to as Botanical treatment or Phyto-medicine. Although several hand wash products are available in the market, some of them may have adverse effects such as itching, dermatitis, and irritation. To mitigate these issues, an attempt has been made to formulate a polyherbal hand wash using Kambarmodi extract (known for its antimicrobial activity) and Tulsi (known for its purifying properties) against disease-causing bacteria, while also ensuring skin protection. Alongside Kambarmodi and Tulsi, other herbal drugs or herbs that play an important role have been included in the formulation. The evaluation of the herbal hand wash encompassed parameters such as color, fragrance, grittiness, pH, viscosity, spreadability, foam height, foam retention, skin irritation test, cleaning action, dirt dispersion test, and antimicrobial activity. The efficacy of the polyherbal hand wash was compared with commercially available hand wash products, and the results fell within acceptable limits with minimal or no side effects. The present study aimed to formulate a Polyherbal Hand Wash Gel containing herbal extracts, not only for hand cleansing but also for the prevention of bacterial growth. Its composition was designed to be gentle on the skin, minimizing the risk of irritation. Therefore, it can be concluded that Polyherbal Hand Wash Gel is superior to plain soaps and existing synthetic hand wash products in terms of its ingredients and effectiveness on our hands' skin, while also being suitable for all skin types.

**Keywords:** Polyherbal Hand Wash, Adverse Effect, Hygiene, Cleaning, Foam.

### INTRODUCTION

Most health problems are directly or indirectly associated with environmental sanitation. Most illnesses could be associated with personal hygiene and sanitation of the pupils(1). One of the things that has become a health problem in almost all places is infectious diseases, high population density, inadequate environment, low public awareness of hygiene and sanitation measures, one of which is the habit of washing hands(2). Hands are primary mode of transmission of microbes and infections. To prevent the spreading of contagious diseases hand washing is absolutely important precaution. Hand washing is critical in food service and food production operations. It is also important in homes and day care operations (3). Many marketed hand washes are chemical

based so there frequent use can lead to skin irritation and also resistant among pathogen (4). Plant extracts and products have been used for centuries in traditional medicine, functional food etc.,. The main advantage of using natural source is that they are easilyavailable, cheap and harmless compared to chemical products. Therefore research has been increased tremendously towards making natural products with improved quality yet less expensive and no side effects overchemical product (5). The main aim for the Preparation of Polyherbal Hand wash is for Hand Hygiene. Herbal medicines are significant part of healthcare throughout the world. Herbal medicines have been extensively utilized as effectual remedies for prevention and multiple health conditions. Hence, Herbal Medication is additionally known as Botanical treatment or Phyto - medicine(6). Hand wash is very effective in preventing diseases and their spread from person to person. It prevents diseases like diarrhea and other respiratory ailments like influenza and pneumonia. In developing countries, pneumonia takes the lives of around 1.8 million children, below the age of 5 years. Both pneumonia and diarrhea account for the death of over 3 million children globally every year. Studies have shown that in societies or families where hand wash is regularly practiced, the chances of infant mortality are reduced by around 50%. Hand washing also prevents the occurrence of several bacterial diseases that spreadthrough human to human contact(6).

### Importance:

1. Hand wash important in homes and day care operations.
2. Hand washing is a simple act that saves lives from many life-threateningdiseases.
3. Hand wash prevent germs from entering into our body.
4. Hand wash prevents us from diseases like diarrhea and influenza.
5. Hand wash prevents from communicable diseases and bacterial infections.
6. It also reduces infant mortality rate around 50% in developing country.
7. It is very helpful in preventing people from weakened immune systemfrom getting infected.
8. Hand wash prevents transmission of microbes and infections.
9. Polyherbal Hand wash is mainly important for Hand Hygiene



### Literature Review:

Niraj Terkar. et al (2021). The main aim for the Preparation of Polyherbal Hand wash Gel is for Hand Hygiene. There are numerous hand wash are available in the market which have some adverse effects, to avoid these adverse effects like itching, dermatitis, irritation etc. the synthetic hand wash formulation an attempt has been made to formulate a polyherbal hand wash using Kambarodi extract (gives antimicrobial activity) and Tulsi (gives purifying activity) against the microbes or disease - causing bacteria and safeguards your skin. In the polyherbal hand wash formulation, along with this Kambarodi and Tulsi, also added some other herbal drugs or herbs which plays subsequently important role. Herbal hand wash evaluated by Parameters such as color, fragrance, grittiness, pH, viscosity, spread ability, foam height, foam retention, skin irritation test, cleaning action, dirt dispersion test, antimicrobial activity etc. Its efficacy was checked and compared with the Marketed Hand wash Revealed results were within the acceptable limits with less or no side effects The present study was carried out to formulate Polyherbal Hand wash Gel containing herbal extract which is used not only for the purpose of cleaning hands but also for the prevention of bacterial growth. Its composition was prepared according to delicateness of skin so that it cannot cause any type of irritation. Hence, it can be concluded that the Polyherbal Hand wash Gel are much better than plain soaps or existing marketed synthetic hand wash due to their ingredients and effectiveness on our skin of hands and as well as suitable for all type of skin. Fartade S J. et al (2020). Herbal formulation had a growing demand in world market. Formulations like face wash and hand wash are prepared separately. We try to formulate a single skin cleanser having a dual action for hand washing and as a face wash due to the ingredients used in it and optimized pH of formulation. It is inferred from result formulation have good appearance, homogeneity and spreadability. The results of antimicrobial activity show gel F2 having a better zone of inhibition. And the optimized formulation after stability study is formulation F2. After all evaluations it is concluded that F2 formulation having good effect like marketed formulation neither show any side effect on skin like skin irritation.

Prabir B P et al (2020). chemical parameters of hand wash gel and their observed findings were shown in table 1. We observed that the gel was shown green in color with a bitter smelly light lemony fragrant. The pH of

this gel was ranged between 5.92-6.04 that's mean moderately acidic. The viscosity of this liquid was recorded 60 Centipoises Pascal seconds (CPS) Ghurghure S M. et al (2019). All the observations and results obtained from our research work, here by new conclude that the Ursolic acid extracted from the leaves of the plant *Nerium oleander* has the good antibacterial, antifungal, anti-microbial activity. The use of Ursolic acid in the preparation in order to prepare a herbal hand wash gel with a good antimicrobial activity to prevent the bacterial infection causes due to the improper cleansing of hands. The safety, efficacy and Antibacterial effect of the final formulation is tested and the results obtained were compared with a marketed product and it was observed that our formulation and the marketed product has comparatively similar activity.

Tiwari R K. et al (2018). Formulated mint containing herbal hand wash is safe, effective and with no adverse skin reactions to humans. The formulated hand wash has good antibacterial effect against *Staphylococcus aureus* and *Escherichia coli* on surface of hands. Extracts of mint and Kambarodi in this study demonstrated a broad-spectrum activity due to the identified alkaloids; diterpenoids, flavonoids and tannins further confirm its use as a health remedy in popular medicine. With reference to all findings done the

2.5 % concentration of the herbal hand wash shown better antimicrobial activity due to combined activity of phytoconstituents present in the extracts with no side effects on human tissue and proven for the sake of hygiene.

Katakam R S. et al (2017). Hand hygiene is vital principle and exercise in the prevention, control and reduction of health care acquired infections. To avoid the adverse effects like itching, irritation, dermatitis etc., of the synthetic hand wash formulations an attempt has been made to formulate a polyherbal hand wash by using herbs which have antimicrobial property. The ethanolic extracts of leaves of *Mimosa pudica* (touch me not), *Azadirachta indica* (Kambarodi) and fruits of *Sapindus mukorossi* (reetha). The antimicrobial activity of prepared hand wash formulations was checked against skin pathogens *Bacillus subtilis*, *Escherichia coli* by cup plate method. Two herbal formulations showed significant antimicrobial activity than the commercially available standard hand wash (synthetic-dettol, herbal-pathanjali) So these plants materials can be used in the preparation of herbal hand wash on commercial scale.

A Mounika. et al (2017). Natural remedies are more acceptable in the belief as they are safer with fewer side effects than the synthetic ones. Herbal formulations have emergent demand in the global market. An attempt was made to formulate the herbal gel using cinnamon and geranium containing various concentrations. Formulated gels were transparent light yellow color in appearance. Results on human volunteers showed considerable reduction in growth of microbial colonies after hand wash. Hence it can be concluded that this herbal gel hand wash provides an effective and safe alternative to existing marketed hand wash gels. Wagh A. et al (2017) Polymeric Surfactant, based on Sugar, Polyethylene Glycol 400 and organic acids has been synthesized. The Polymers have been analyzed systematically and selected polymer has been used to the extent of 25 to 35% in Hand wash compositions. The Hand wash gives excellent foaming, viscosity and surface tension reductions characteristics. The characteristics are comparable to commercial Hand wash in the market.

### Objective:

1. To formulate and evaluate Hand Wash.
2. Describe the relevance of hand hygiene for infection prevention.
3. Discuss strategies to improve hand hygiene compliance.
4. Compare product available for hand hygiene.
5. Explain current recommendations on hand hygiene practice.



### Advantages Of Polyherbal Hand Wash

Popularity of polyherbal formulation is due to their high effectiveness in a vast number of diseases. They have wide therapeutic range (effective at low dose and safe at high dose), fewer side effects, eco-friendly, cheaper and readily available polyherbal formulation are not always safe.

### Disadvantages Of Polyherbal Hand Wash

The problems of polyherbal formulation occur due to sources and manufacturing process, patients, Ayurvedic practitioners, drug-herb interaction, clinical reproducibility, toxicity due to improper manufacturing and irrational prescribing of polyherbal formulation as well as law and regulations.

**Plant Summary:**

| Sr.No | Common Name    | Scientific Name    | Category            | Image   |
|-------|----------------|--------------------|---------------------|---|
| 1     | Kambarmodi     | Tridax Procumbens  | Antimicrobial agent |    |
| 2     | Tulsi          | Ocium Tenuiflorum  | Purifying agent     |    |
| 3     | Ritha          | Sapindus Mukorossi | Foming Agent        |   |
| 4     | Eucalyptus Oil | Eucalpts           | Antibacterial       |  |
| 5     | Beat root      | Beta Vulgaris      | colorant            |  |

**Materials and method Collection of plant material:**

The plants Kambarmodi [*Tridax procumbens*] & Peppermint [*Mentha piperita*] leaves were collected from Aditya Institute of Pharmacy College Campus, Beed. To remove sand particles from sample, wash it thoroughly with fresh water. The plant material dried under sunlight for 4 to five days. Then the dried plant material where crushed, sieved to get nearly fine amorphous powder. Powdered material was extracted with a suitable solvent. [8], [9]. Ritha powder, turmeric powder, Eucalyptus oil and Tulsi oil were collected from the local market of Beed. Soil extract were chosen for antibacterial activity.

**Extraction of plant material:**

10 grams of each dry plant material Kambarmodi, Peppermint powder and 5gm of Ritha powder were added in water. The mixture was heated on waterbath at 600 C for 1 hour, and then filtered through Whatman Filter Paper to get the Particle free Extract.

**Method of Preparation**

- 1) Polyherbal Hand wash Gel was prepared using Carbopol 940 as Gelling agent which is soaked in 15ml distilled water overnight.
- 2) Kambarmodi and Peppermint extracts, Ritha Powder along with Tulsi and Eucalyptus oil were measured accurately and dissolved by gentle heating.
- 3) After heating, keep the solution aside for sometimes.
- 4) The required quantity of Sodium lauryl Sulphate dissolved in 10ml distilled water along with Glycerine were mixed in above aqueous phase with continuous stirring.
- 5) The methyl paraben was dissolved in remaining quantity of purified water and dispersed into the extract.
- 6) The swelled polymer (Carbopol 940) was stirred using a mechanical stirrer to ensure the uniform dispersion of polymer and finally added into the above mixture to form a Homogenous Gel and then the required quantity of Rose oil was added for Fragrance.
- 7) Lastly, it was stored in well closed container and labelled suitably for further analysis

**Table 1:** Formulation Table

| Sr. No. | Ingredients     | Quantity (gm/ml) | Uses                |
|---------|-----------------|------------------|---------------------|
| 1       | Kambarmodi      | 10               | Antimicrobial Agent |
| 2       | Tulsi           | 10               | Purifying Agent     |
| 3       | Eucalyptus oil  | 0.50             | Antibacterial Agent |
| 4       | Ritha           | 5                | Foaming Agent       |
| 5       | Carbopol 940    | 5                | Gelling Agent       |
| 6       | Methyl Paraben  | 0.50             | Preservative        |
| 7       | Glycerin        | 2.5              | Softening Agent     |
| 8       | Rose Oil        | Q. S.            | Perfume             |
| 9       | Distilled Water | Up to 100ml      | Vehicle             |
| 10      | Beat Root       | Q. S.            | Colorant            |

Prepared formulation of Polyherbal Hand wash Gel was subjected to following evaluation parameters:

**Organoleptic Evaluation**

Parameters like colour, odour, texture was carried out Colour and texture were evaluated by visual and touch sensation respectively. The Odour was inspected by sensing the formulation.

**Appearance and Homogeneity:**

Appearance and Homogeneity was evaluated by visual inspection.

**Grittiness:**

1ml of Gel was taken on finger tips and rubbed between two fingertips, then the formulation was evaluated.

**Skin Irritation Test:**

Skin Irritation Test was evaluated by applying Polyherbal Hand wash Gel on skin and left for 30 min, after 30 minutes of washing observe any itching, rashes or redness on skin by sensory and visual inspection.

**PH:**

1gm of Sample of Polyherbal Hand wash Gel was taken and dissolved it into 100ml distilled water. The pH solution was measured by standardized digital pH meter.

**Spread ability:**

0.5 gm of Sample of Polyherbal Hand wash Gel was pressed between two slides and left for about 5 minutes where no more spreading was expected. Diameter of spreaded circle was measured in cm and was taken as comparative values for spread ability.

**Viscosity:**

The viscosity of Polyherbal Hand wash Gel was determined by using Ostwald viscometer. [9], [12], [14], [17], [18]

**Foam Height:**

One gram of sample of Polyherbal Hand wash Gel was taken and dispersed in 50ml distilled water. Dispersion was transferred into measuring cylinder. Volume was made up to 100ml with water. This solution is taken in 10 test tubes in a series of successive portion of 1, 2, 3, . . . 10ml and remaining volume is made up with water to 10ml. Then the test tubes were shaken for 15 seconds. Then the test tube is allowed to stand for 5 minutes. And the Height of foam was measured. [9], [13], [15]

**Foam Retention:**

25ml of Polyherbal Hand wash Gel was taken into 100ml measuring cylinder and shaken 10 times. The volume of foam at 1 - minute intervals for 4 minutes was recorded Foam retention should remain stable for at least 5 minutes. [9], [13], [15]

**Stability:**

The Stability studies were carried out for Polyherbal Hand wash Gel formulation by storing at different temperature conditions like 40°C, 25°C, and 37°C for 1 week. During the stability studies no change in colour and no phase separation were observed in the formulated hand wash. [15] **Cleaning Action:**

5gm wool was taken and placed in grease; the same was then placed in a 200ml of water containing 1gm of Polyherbal Hand wash Gel in a beaker and was shaken for 4 minutes. The solution was removed and sample was taken out, dried and weighed. The amount of grease removed was calculated using the formula. [19]

Formula: -  $DP = 100 (1 - T/C)$

Where, DP = Percentage of Detergency power  
 T = Weight of Formulated Preparation

C = Weight of Marketed Preparation  
 Calculation:

Wool Weight of formulated preparation = 13.98  
 Wool Weight of marketed preparation = 19.5  
 $DP = 100 (1 - T/C)$

$DP = 100 (1 - 13.98/19.5)$

$DP = 100 (1 - 0.71)$

$DP = 100 \times 0.29$   
 $DP = 29 \%$

**Dirt dispersion test:**

1ml of Polyherbal Hand wash Gel was added in a test tube containing 10ml of distilled water. A drop of Indian ink was added; the test tube was stoppered and shaken. The amount of ink in the foam was estimated as none, light, moderate, or heavy. [20]

**Antimicrobial Study of Polyherbal Hand wash Gel:**

The Screening of anti - microbial efficacy of the formulated Polyherbal Handwash Gel was performed on Soil Microbes by using agar plate method as per standard procedure. Two Sterile petri plates were taken for testing the antimicrobial activity against Soil Microbes. The plates were filled with nutrient agar solution and allowed for solidification. After solidification the soil extract from the subculture were poured into the nutrient agar media by Pour Plate Method and inoculated for 24 hours. After 24 hours of inoculation, two cavities were made in it by Cup Plate Method. The First cavity is filled with Marketed Herbal Hand wash Second one with

Formulated Polyherbal Hand wash Gel. It was taken care that sample should

| Sr. No. | Evaluation Parameters      | Formulated Polyherbal Hand wash Gel | Marketed Herbal Hand wash (Patanjali) |
|---------|----------------------------|-------------------------------------|---------------------------------------|
| 1       | Colour                     | Light Yellow                        | Light Orange                          |
| 2       | Odour                      | Rose like                           | Pleasant                              |
| 3       | Texture                    | Smooth                              | Smooth                                |
| 4       | Appearance and Homogeneity | Translucent                         | Translucent                           |



|    |                              |               |                        |
|----|------------------------------|---------------|------------------------|
| 5  | Grittiness                   | Non - Gritty  | Non - Gritty           |
| 6  | Skin Irritation test<br>8.11 | No irritation | No Irritation7 pH 7.92 |
| 8  | Foam Retention               | 15ml          | 18ml                   |
| 9  | Stability                    | Stable        | Stable                 |
| 10 | Cleaning Action              | 29%           | 29%                    |
| 11 | Dirt dispersion              | Light         | Light                  |

be placed at the level of cavity. The Plates are placed in incubator at 37°C to test the activity. After 48 hours the plates were observed for the formulation of Zone of Inhibition. From the Zone of Inhibition, the antimicrobial activity of formulation is estimated. Efficiency of Polyherbal Hand wash Gel was determined by measuring the diameter of zone of inhibition.

Table 2: Result and discussion

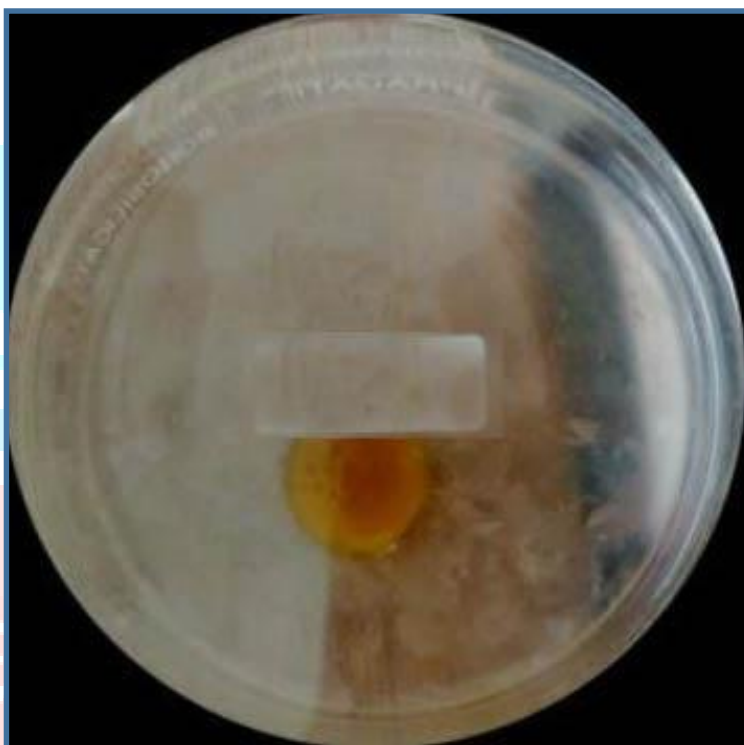
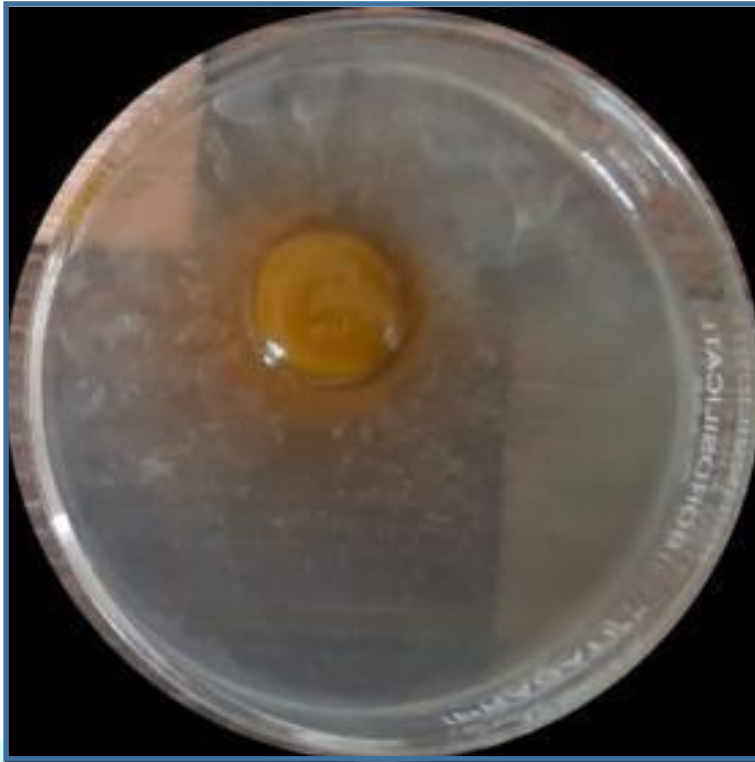
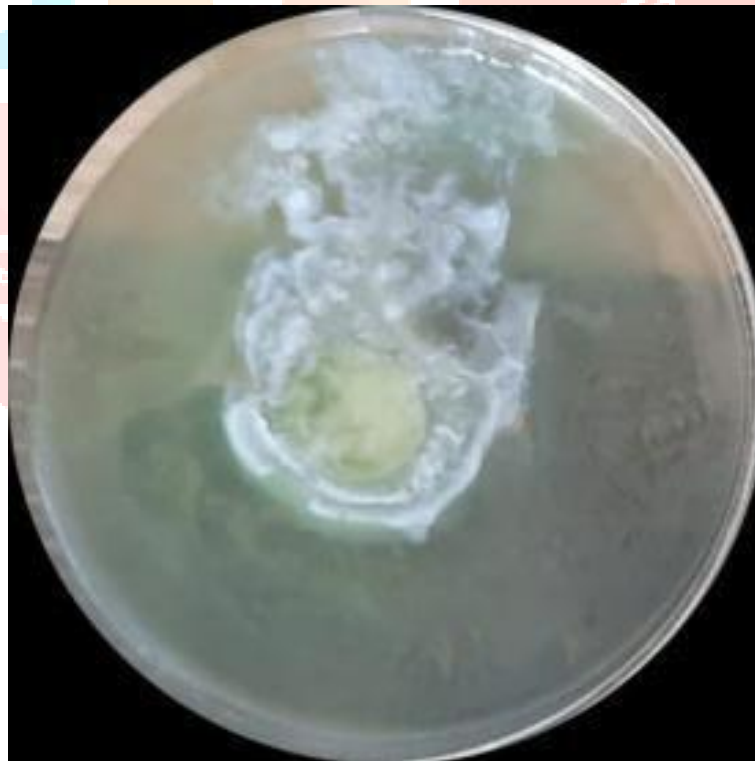


Figure 1 a) before incubation of formulated polyherbal hand wash



**Figure 2 (a):** after incubation of formulated polyherbal hand wash



**Figure 2 (b):** after incubation of marketed hand wash

The results of visual inspection of the formulation are, light yellow in color, the odor of the formulation is rose like and smooth in texture. The formulation is translucent in appearance and homogeneous. As we talk about the grittiness, the formulation was found to be non-gritty. Accurate pH of the formulation is important for minimizing irritation to the skin. The formulation has pH 7.9 which is suitable and non-irritating for the skin. The cleaning action was tested on Wool Yarn dipped in Greece. Cleaning action is the primary aim of any hand wash preparation, so the results obtained after evaluation of the formulation showed 29% Detergency Power, which is good against dirt and grease like materials. For dirt dispersion test the formulation that causes the ink

to concentrate in the foam is considered to be of poor quality, the dirt should stay in water, dirt that stays in the foam will be difficult to rinse away. Hence after the evaluation of the formulation the results showed no presence of dirt in the foam.

Foam retention was checked for formulation and it was found to be stable after 5 minutes, viscosity was measured by using Ostwald viscometer. The readings of viscosity was based on time interval of 1 min for formulation to reach upper marking to the lower marking of Ostwald viscometer. If the formulation takes more time then the formulation is considered viscous and if it takes less time then the viscosity of formulation is considered less than the requirement. The spreading ability of the formulation was studied by taking 0.5 gram of sample and passing between the two slides and kept for about 5 minutes. The parameter set for taking readings was the reported time required by the formulation to cover the distance which was measured in centimeter by using measuring scale. The spreading ability of the formulation was found to be good.

To study the zone of inhibition the resulting formulation was studied against soil culture. The results showed that the formulation produced zone of inhibition against soil culture. Before incubation the observed diameter was noted as 1.8 centimeter and after incubation the zone of inhibition diameter spreads up to 3.4 centimeter. Hence it can be concluded that the formulation has good antibacterial activity.

ulation contained a broad spectrum of antibacterial agents. From the investigation it was clear that

## Conclusion

Like Cosmetics, Cosmeceuticals (A cosmetic that has or is claimed to have medicinal properties) are topically applied but they contain ingredients that influence the biological functions of skin. The WHO estimates that 80% of the population of Asian country presently use herbal medicine for primary health care and for the purpose of hand hygiene includes preparation of Hand wash. The present study was carried out to formulate Polyherbal Hand wash Gel containing herbal extract which is used not only for the purpose of cleaning hands but also for the prevention of bacterial growth. Its composition was prepared according to delicateness of skin so that it cannot cause any type of irritation. Hence, it can be concluded that the Polyherbal Hand wash Gel are much better than plain soaps or existing marketed synthetic hand wash due to their ingredients and effectiveness on our skin of hands and as well as suitable for all type of skin.

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