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Formulation and evaluation of herbal handwash using neem and reetha extract

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Abstract

Background: Currently market is flooded with many synthetic handwash which contains heavy metals like lead, nickel, copper, chromium, arsenic and cobalt and while applying these, some of those toxic substances are absorbed by hands. Herbal based product are very much familiar now-a-days. This manuscript based on the formulation and characterization of handwash.

AIM: To prepare herbal handwash and compare the quality with marketed herbal handwash available in Indian market.

Methods: Leaves of *Azadirachta indica* and aloe vera and fruit Gandhraj lemon and *Sapindus mukorossi* were used for the preparation. After formulation, it was evaluated and various parameter such as pH, colour, odor, foam height, foam retention and antimicrobial study were determined and reported.

Result: Results showed that, different evaluation parameter of prepared herbal handwash were resembled with standard values and with marketed formulation.

Conclusion: Consumers always search for natural-based cosmetics to avoid allergic reactions and any sort of side effects. Further research is appreciated for formulating the handwash with some other additional advantages of skin benefits.

Keywords: *Azadirachta indica*, herbal handwash, aloe vera, gandhraj lemon

Introduction

Hand hygiene is the most crucial step to take in order to stop the spread of dangerous germs and diseases because hands are the primary means of transmission for bacteria and infections [1].

Generally speaking, hand hygiene refers to the practice of washing hands with water, soap, or another liquid. The benefit of washing hands is that it rids them of infections and dangerous substances (bacteria and virus). People who work in the medical industry, restaurants, or who prepare and serve food to the general public should practice good hand hygiene. It is well known that good hand hygiene can reduce the spread of cold viruses and other germs. The greatest technique to maintain personal hygiene and safeguard oneself against infections is to wash one's hands frequently [2].

In order to avoid the spread of transitory microorganisms and remove soil, grime, and harmful germs, hand washing is the act of cleaning your hands. The number of hazardous microorganisms like *E. coli* and salmonella that can be carried by people, animals, or equipment and transferred to food is decreased by hand washing, which also removes visible dirt from hands. Hand washing is a vital safety measure to protect the skin from harmful microorganisms and to stop the spread of many contagious diseases [3].

Early in the 19th century is when the idea of washing hands with an antiseptic chemical presumably first came about. A French pharmacist proved in 1822 that solutions containing lime or soda chlorides might get rid of the unpleasant smells associated with human corpses and may be used as disinfectants and disinfectants. This pharmacist recommended that medical professionals and other people caring for patients with contagious disorders soak their hands with a liquid chloride solution in a paper that was published in 1825 [1].

Hand Washing

It means washing your hands with either regular or antibacterial soap or water. In actuality, it can range greatly from a quick hand rinse to a thorough scrub. In a medical context, hand washing is done to get rid of germs and prevent the spread of pathogenic bacteria. According to reports, most hospital settings still have unsatisfactory levels of hand hygiene, with many doctors and nurses frequently forgetting to wash their hands before coming in contact with patients. According to one study, regular hand washing and other straightforward practices can cut the prevalence of catheter-related bloodstream infections by 66%.

One of the body's most exposed parts, the skin, needs to be protected from viruses. Hand washing is unquestionably a crucial precaution to take in order to protect the skin from harmful bacteria and to stop the development of numerous contagious diseases.

Hand washing helps to lower the number of dangerous bacteria on hands and removes visible filth. Salmonella and E. Coli are two harmful bacteria and viruses that can be carried by people, animals, or equipment and transferred to food.

The bulk of bodily activities are carried out by the hands, which are also exposed to a variety of substances, such as soil when farming, food while cooking, touching raw and contaminated food, and personal hygiene products. Hand washing is frequently stressed as the single most critical step in any infection control programme for preventing the cross-transmission of microorganisms between patients because clean hands stop the spread of germs [2].

Benefits of using herbal hand wash

1. Herbs are readily available in both urban and rural settings, making it simple for everyone to use them.
2. Affordable: Herbal plants are less expensive than the chemical components found in synthetic hand wipes.
3. Enhanced effectiveness: Herbal hand soaps work better to encourage good hand hygiene.
4. Less adverse effect: Compared to other hand washes, herbal hand washes have fewer side effects -.

Materials and Methods

Materials

Methanol, lavender oil, methyl paraben, glycerine, leaves of neem, aloe vera and fruit of reetha and lemon juice

Methods

Extraction of *Azadirachta indica*

1. Fresh neem leaves are collected and shed dried for 15 days.
2. The dried leaves then powered using mortar and pestle.
3. The powered neem leaves are weighed 25gm and macerated in a beaker using 100ml of methanol.
4. The prepared mixture is kept covered with aluminium foil and kept for 3 days for maceration while stirring in between, and then the mixture was filtered using a filter paper.
5. The excess solvent is evaporated using a Rotary evaporator and then the remaining mixture was dried on a hot water bath.
6. The dried extract was collected and kept in desiccator for cooling.
7. The prepared extract is weighed.

Extraction of *Sapindus mukorossi*

1. Fresh reetha fruit is collected; seed is removed and chopped finely using a clean knife.
2. The chopped fruit is shed dried for 3 weeks.
3. The dried fruit is then powdered using a mixer grinder; the prepared powder is sieved so as to remove any large pieces of the fruit.
4. The fine powder is then weighed 8.6gm.
5. Macerated in 100 ml of methanol in a beaker.
6. Stir the mixture and cover it with an aluminium foil and macerate it for 3 days.
7. After that the macerated mixture is filtered using a filter paper and the filtrate is then kept on hot water bath for drying.

8. The completely dried extract is then collected and kept in desiccator for cooling.
9. The cool extract is then weighed on a digital weighing machine.

Formulation of herbal handwash

Procedure

1. Methanolic extract of neem leaves is mixed with 4ml of lemon juice in 20ml of water.
2. Then add aloe vera juice twice.
3. Add reetha extract to produce sufficient foaming capacity.
4. Then add desired quantity of glycerine and lavender oil with moderate stirring.
5. At the end add methyl paraben as preservative in sufficient quantity.

The solution is mixed, made homogenous under room and further utilized for screening of the activity.

Evaluation of herbal handwash

To evaluate the prepared formulation, quality control test including visual assessment and physico-chemical controls such as pH, density, viscosity, surface tension, foam volume, foam stability and wetting time was performed using standard protocol.

1. Physical Appearance

The formulation prepared was evaluated for the clarity, colour, odour and foam producing ability and fluidity.

2. pH

The pH metre needs to be calibrated before each and every pH measurement as well as before any number of uses. Rinse the electrode after calibration, then immerse it in the test substance. Read the outcome and record it in a table.

3. Viscosity

A computerised Brookfield viscometer was used to measure the viscosity of hand soap. The viscosity of the measured amount of herbal hand wash was measured in triplicate by dipping the tip of the viscometer into the hand wash gel.

4. Stability

The stability investigations involved storing the sample for a week at various temperatures, including 40°C, 25°C, and 37°C. The colour was visually examined.

5. Foam Height

Poly Herbal Gel Based Hand Wash Sample, 1gm, was taken and diluted in 50 ml purified water the volume was then put into a 500 ml stoppered measuring cylinder. 100 ml can be made by adding water. 25 strokes were administered, and after the aqueous volume reached 100 ml, the height of the foam above the aqueous volume was measured.

6. Foam Retention

A 250 ml graduated cylinder was filled with 50 ml of the Poly Herbal Gel Based hand wash and ten times shook. Foam volume was measured for 4 minutes at 1-minute intervals. For at least 5 minutes, foam retention must be stable.

7. Antimicrobial Studies

The conventional protocol was followed while testing the extract's anti-microbial efficacy on microorganisms using the

dip well method. To test the extract's antibacterial efficacy against *Staphylococcus aureus*, Petri plates were used. After adding Nutrient agar solution, the plates were let to solidify. After solidification, three discs were infected with extract, antibiotic medication, and formulation sample, respectively, and the microorganisms from the subculture were added to the nutrient agar media. Overnight, the plates were incubated at 37°C. The plates were examined for the zone of inhibition after 24 hours of incubation.

Result

1. Appearance

The prepared two formulation of hand wash appear as
 Standard appear as: Light orange
 Sample appear as: greenish yellow

2. Odour

Standard: Aromatic
 Sample: Aromatic

3. pH

The pH of formulation was measured by digital pH meter.
 The pH of standard formulation was found to be:- 8.6
 The pH of sample formulation was found to be :- 5.1

4. Viscosity

The viscosity of hand wash was determined by using Ostwald viscometer 5ml of herbal hand wash is taken into 25 ml of beaker and the herbal handwash was poured into the Oswald viscometer was measure.

The viscosity was found to be :-

For Standard:

F1 = 20 second
 F2 = 22 second
 F3 = 20 second
 Average = 20.66

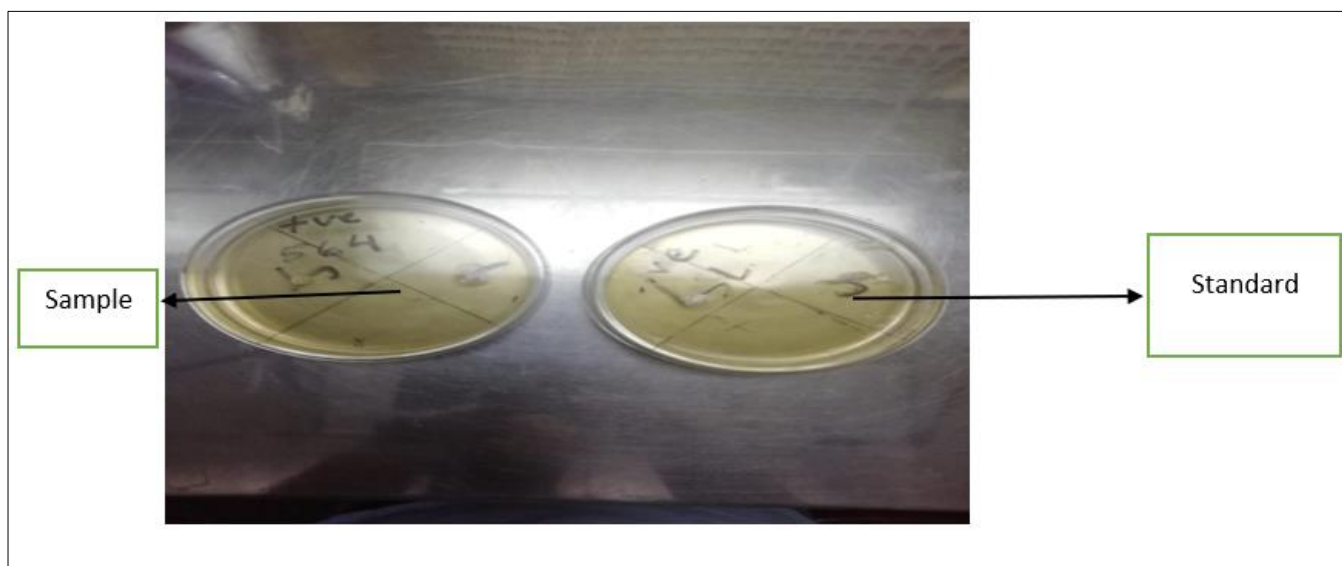
For sample :-

F1 = 12 second
 F2 = 14 second
 F3 = 12 second
 Average = 12.66

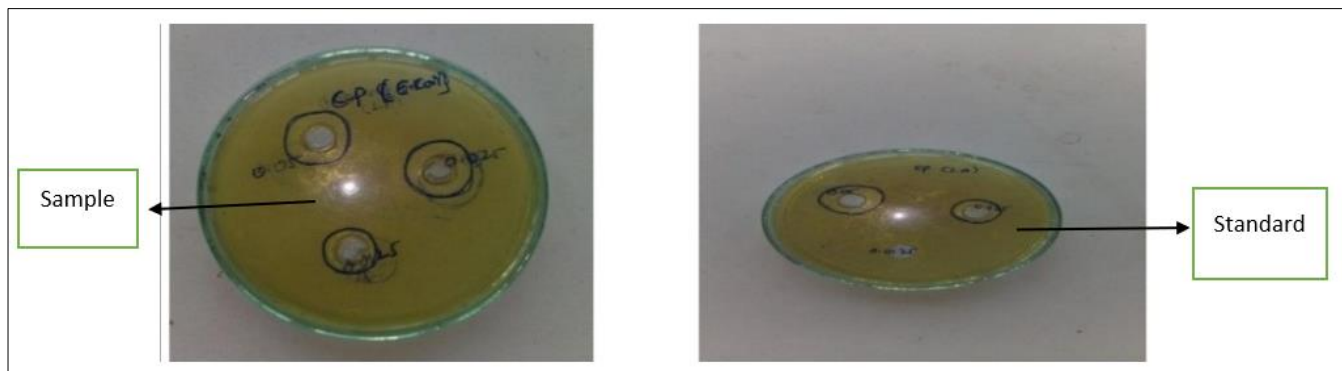
5. Antimicrobial activity

The antimicrobial efficacy of the formulations of herbal handwash was tested on *E. Coli* gram positive and gram positive. The results of zone of inhibition showed that the handwash prepared from methanolic extract of the combined plant materials shown significant antimicrobial activity

Before Incubation



After Incubation



The data of zone of inhibition of formulations is shown in below table: -

1. For Sample

	Positive	Negative
Before Incubation	1.1	1.0
After Incubation	0.7	0.9

2. For standard:

	Positive	Negative
Before Incubation	1.5	0.8
After Incubation	1.5	0.7

6. Foam Height

1 ml of sample of handwash was taken and dispersed in 50 ml distilled water.

Dispersion was transferred to 500ml measuring cylinder volume was made up to 100ml with water 25 strokes was given and aside.

The foam height above the aqueous volume:

Standard = 7cm

Sample = 3.3cm

7. Foam Retention

Both the standard and sample are stable.

8. Skin Test

When sample is taken it is easily usable. It does not form any skin irritation when applied.

Conclusion

Hands are the primary source of disease related to skin, respiratory, gastrointest intestinal. Due to various disease and germ, the bar soap gets contaminated which may lead to spread of germs. In this sophisticated world liquid hand washes are used much more frequently than the bar soap, the additional advantages is the soap in the liquid hand wash is untouched leading uncontaminated. hand wash with every new pump in market, there are various type of hand washes are available, claiming that they will kills the harmful germs at considerable rate at minimum time. To determine this, it is necessary to determine the efficiency of handwash. Average percentage reduction and log reduction of the organisms determine for hand wash performing viable count.

Author's contribution

Sanjana Kumari Sinha . Saraswati Poudyal, Sasita Khatiwada, Shakir Ahmed, Arpita Chatterjee J. P. Mohanty and Rajat Das conceived and planned the experiments. Sanjana Kumari Sinha, Saraswati Poudyal, Sasita Khatiwada, Shakir Ahmed, Arpita Chatterjee carried out the experiments. All the authors contributed to sample preparation. Saraswati Poudyal and Shakir Ahmed contributed to the interpretation of the results. Sanjana Kumari Sinha , Sasita Khatiwada and Arpita Chatterjee took the lead in the writing the manuscript. All authors provided critical feedback and helped shape the research, analysis and manuscript.

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