FORMULATION AND COMPARATIVE EVALUATION OF NATURAL AND CHEMICAL HANDWASH

[1]Pooja Verma, [1]Vandana Maurya, [1]Payal Gupta, [1]Anjali, [1]Radha Verma, [2] Dr. Pushpa Yadav*, [2] Dr. Koshy M. Kymonil

[1]Students Nova College of Pharmacy, Lucknow, U. P. India

[2]Associate Professor Nova College of Pharmacy, Lucknow, U. P. India

[2]Director Nova College of Pharmacy, Lucknow, U. P. India

Corresponding Author- Dr. Pushpa Yadav

Associate Professor Nova College of Pharmacy, Lucknow, U. P. India

Email-pushpanova1991@gmail.com

ABSTRACT

The formulation and comparison of a herbal hand wash with essential oils. Commercial chemical-based hand washes work well against infections, although they frequently include surfactants like sodium lauryl sulphate (SLS). In order to provide a sustainable, safe, and environmentally friendly substitute, this study focuses on the creation and comparison of a natural and chemical hand wash utilizing extracts of aloe vera, reetha, shikakai, and lemon mixed with glycerine. In comparison to a synthetic reference hand wash, the herbal composition was evaluated for physical characteristics (colour, odour, and viscosity), foaming ability, and skin compatibility. The herbal hand wash proved a good and safe alternative to chemical antiseptics because of its strong antibacterial activity, skin-friendly pH, and notable lack of irritation.

Keywords- Natural & Chemical Hand wash, Reetha, Sikakae, Aloe vera, SLS, Citric acid, Glycerine.

1. INTRODUCTION

Since hands are the main way that bacteria and infections travel, practicing good hand hygiene is the most important thing you can do to prevent the spread of deadly germs and diseases. Hand cleaning using water, soap, or another liquid is generally referred to as hand hygiene. Hand washing has the advantage of removing harmful substances (viruses and germs) and illnesses. Hand hygiene should be practiced by those who work in the medical field, in restaurants, or who prepare and serve food to the general public. It's common knowledge that practicing proper hand hygiene can stop the transmission of germs and cold viruses. Hand washing is the best way to maintain personal hygiene and protect oneself from illnesses.

Hand washing is the process of sanitizing your hands to prevent the spread of transitory microorganisms and to get rid of dirt, filth, and dangerous bacteria [1]. Hand washing not only removes obvious filth from hands but also reduces the quantity of dangerous bacteria like salmonella and E. coli that can be carried by people, animals, or equipment and transferred to food. Hand washing is an essential safety precaution to prevent the spread of numerous infectious diseases and shield the skin from dangerous microbes.

2. OBJECTIVE OF NATURAL HANDWASH [2]

- Wash your hands with herbal or plant-based products to eliminate pollutants, dirt, and mild microorganisms without using harsh chemicals.
- To keep skin hydrated and avoid dryness.
- To offer mild cleaning appropriate for delicate skin
- To reduce irritation and allergic responses.
- To advertise biodegradable and environmentally friendly hygiene products.
- Can provide further advantages like antifungal, antibacterial, and calming properties from herbs (like aloe vera).

3. OBJECTIVE OF CHEMICAL HANDWASH [3]

- To effectively eradicate viruses and germs.
- To guarantee quick antibacterial activity.
- To effectively remove heavy dirt, oil, and grease.
- To preserve a longer shelf life and a constant formulation.
- To provide foam and better cleaning results.
- To incorporate preservatives that shield the product from microbial infection.
- To offer aesthetic appeal and smell.

4. STEPS FOR HANDWASHING

Use clean running water, either warm or cold, to moisten your hands. Use enough soap to cover every area of your hands. To create lather, rub your palms together. Using the opposite palm, massage the back of each hand. Clean in between your interlaced fingers. Rub the back of your fingers on the palms on the other side. Rotate each thumb in the opposing palm to clean your thumbs. To get rid of filth, rub your fingertips and nails on your hand. Make sure your wrists are clean. Give your hands a thorough rinse under running water. Use a fresh towel or the air to dry your hands. To avoid this, switch off the tap with a towel [4-7].

Img:01

5. MATERIALS / CHEMICAL REQUIREMENTS

For Chemical hand wash (Table:-1)

Sr. No	Ingredients Name	Quantity	Uses
1	Sodium lauryl sulphate	3.0 gm	Generating foam and removing dirt
2	Glycerine	1.0 gm	Glycerin As a humectant
3	Citric acid	0.75 gm	PH adjuster
4	Sodium chloride	q.s	Thickening agent
5	Distilled water	q. s	As a solvent
6	Colouring agent	q. s	Coloring agent
7	Fragrance	q. s	Provide Fragrance

Img:02

6. PROCEDURE FOR CHEMICAL HANDWASH

Fill a clean beaker with 70–80 milliliters of distilled water. Add sodium lauryl sulphate gradually while swirling gently to prevent too much foam from forming. Mix thoroughly after adding the glycerin, which serves as a moisturizer. To correct the pH, dissolve the citric acid in a tiny amount of water and add it to the mixture. Gradually add sodium chloride until the required thickness is achieved. For color, add one drop of either methylene blue or safranin. For scent, add one or two drops of rose oil. Use distilled water to bring the final volume up to 100 ml. To prevent the production of froth, carefully mix. Pour the ready-made hand wash into a sterile bottle or container.

Img:03

For Herbal hand wash (Table:-2)

Sr. No	Ingredients Name	Quantity	Uses
1	Aloe Vera gel	15 ml	Moisturizer and healing agent
2	Reetha powder	15 gm	Natural foaming agent
3	Lemon juice	5 ml	Natural cleanser and preservative / Anti septic agent
4	Glycerine	5 ml	Glycerin As a humectant
5	Shikakai	10 gm	Cleansing agent
6	Peppermint oil	2ml	natural cooling agent, antimicrobial agent
7	Fragrance	q. s	Provide Fragrance
8	Distilled water	q. s	As a solvent

Img:04

7. PROCEDURE FOR HERBAL HANDWASH

Pour 20 milliliters of distilled water into the empty beaker. Heat 20 milliliters of distilled water for 20 minutes. Add the 15g of Aretha powder after heating. Combine the Aretha powder and boil for 20 minutes. Add the 15 ml of aloe vera gel after it has boiled. Combine the aloe vera gel and bring to a boil for ten minutes. Prepare the cool liquid and run the paper through the filter. After filtering, add two milliliters of peppermint oil, five milliliters of lemon juice, and five milliliters of glycerin. Once the solution has been mixed, change the clean container.

Img:05

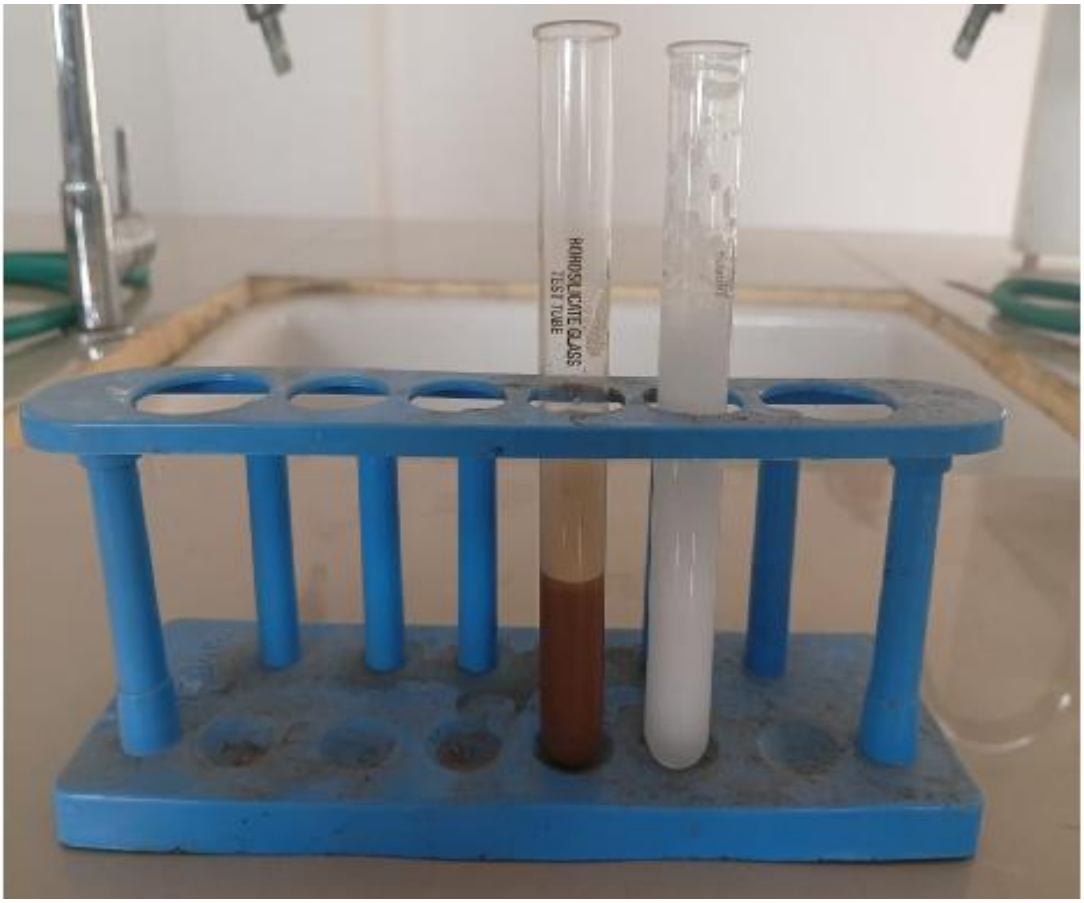
8. EVALUTION OF NATURAL AND CHEMICAL HANDWASH PHYSICAL PARAMETER [8-9]

➢ **Physical Parameter**

- Using both visual inspection and manual checking, appearance evaluation of hand wash include evaluating physical attributes such as color, odor, consistency, and homogeneity.

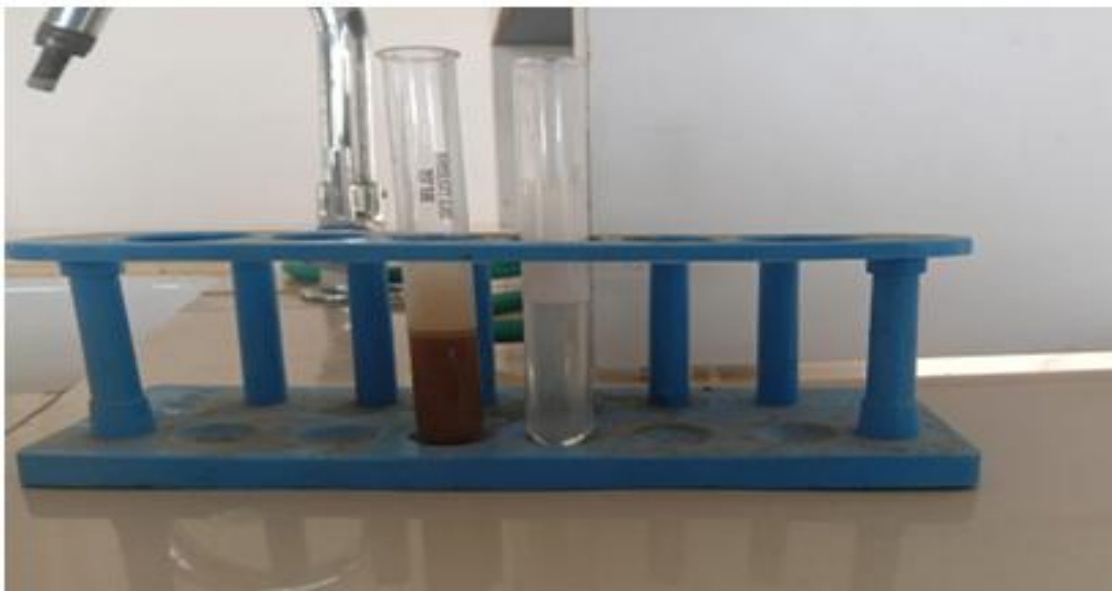
➢ **Chemical Parameter**

- **Viscosity-** To check the viscosity use Brookfield viscometer Apparatus.
- **Foam retention-** Fill each of the two test tubes with five milliliters of hand wash (both chemical and herbal). Afterward, shake for ten to fifteen minutes after washing your hands. Next, place the test tube on a level surface. to periodically assess the foam retention.



Img:06

- **Foam height-** Consider the two distinct test tube. The chemical formulation is filled into one test tube, while the herbal formulation is filled into another. Additionally, both formulations shake ten to twelve times. Finally, measure the height of the foam.



Img:07

- **Anti-microbial test-** Cup plate method used to determine anti-microbial activity of formulation.
- **(Table:-3)**

Sr. No	Ingredients Name	Quantity	Uses
1	Nutrient agar	2 gm	Solidifying agent
2	Bacteriological peptone	1 gm	Organic nitrogen source
3	Meat extract	0.5 gm	Essential growth factors
4	NaCl	1.5 gm	Maintains osmotic balance and cellular integrity
5	Dist. water	100ml	Solvent system
6	pH	7.2-7.6	Regulates nutrient availability, enzyme activity, membrane potential, and protein stability

Procedure

Weigh each of the necessary ingredients (agar, meat extract, NaCl, distilled water, and bacteriological peptone) beforehand. Pour distilled water into the beaker to dissolve it. Gently heat until all of the ingredients, including the agar, are completely melted. Pour the agar and let it solidify at room temperature. Creating wells in agar by punching wells with a test tube. Carefully remove the agar plugs. Fill each well with a determined amount of test sample (between 50 and 100 microliters). For seventy-two hours, leave the plate at room temperature. Next, look for clear areas surrounding the wells. Using a ruler, determine the zone of inhibition in millimetres [10-13].

- **Skin test/Dryness test**- Wash and dry your hands normally using formulation and water & check manually.

9. RESULT & DISCUSSION

Physical Evaluation (Table:-4)

Sr. no.	Appearance	Natural	Chemical
1	Clarity	Clear, no gritty particle	Clear, no gritty particle
2	Colour	Brownish	Bluish ,pinkish, white
3	Odour / Fragrance	Peppermint	Rose fragrance
4	P^H	6.7	6.7

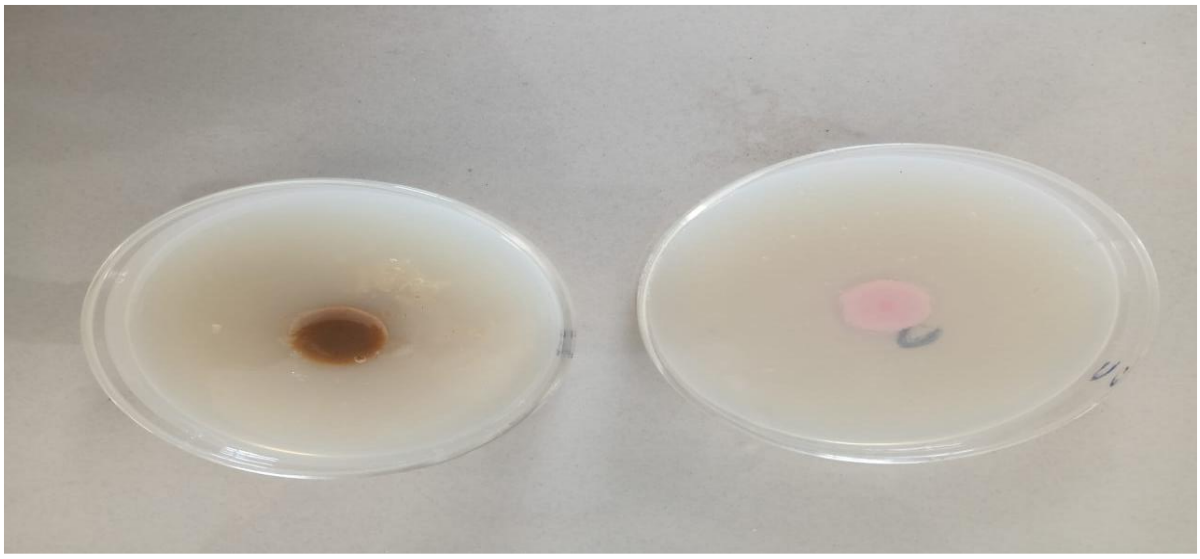
Foam retention (Table:-5)

Sr. no	Time	Herbal foam height (cm)	Chemical foam height (cm)
1	1 minute	3	4.5
2	2 minute	2.6	4.2
3	3 minute	2.6	4
4	4 minute	2.6	3.5
5	5 minute	2.3	3.4

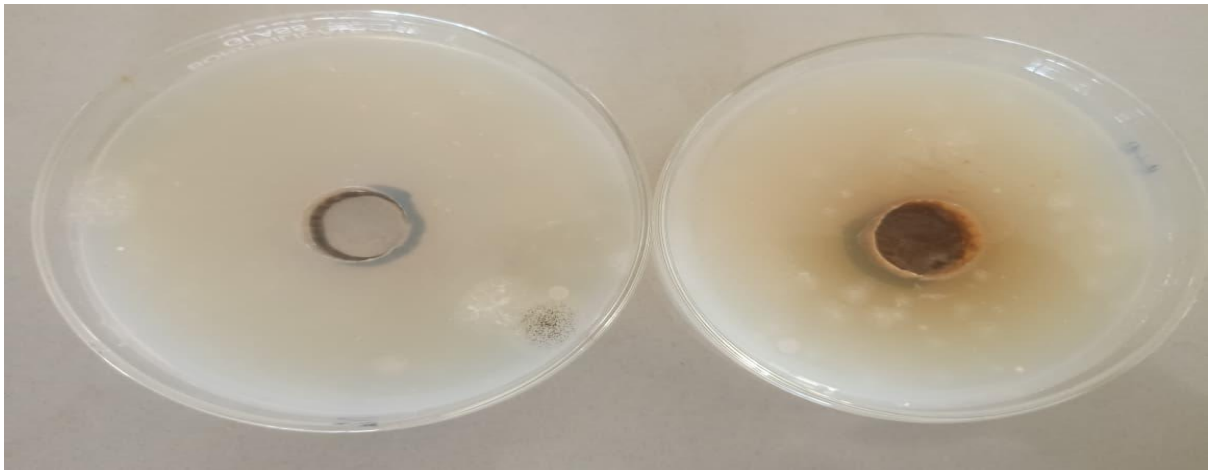
Foam height (Table:-6)

Sr. no.	Name	Volume (ml)	Foam height (cm)
1	Herbal	50ml	4.5cm
2	Chemical	100ml	15cm

Anti-microbial test:-



Before



After

Img:08

Zone of inhibition (Table:-7)

Sr. no	Name	Zone of inhibition
1	Herbal	20mm
2	Chemical	22mm

10. CONCLUSION

Skin, respiratory, and gastrointestinal disorders are mostly caused by the hands. The bar soap becomes contaminated due to different diseases and germs, which could cause germs to spread. Efficacy, safety, and sustainability are all balanced in the comparison of chemical and natural hand wash formulations. Chemical hand washes are very effective at lowering the microbial load because they often exhibit faster and stronger antibacterial activity. However, because they contain artificial surfactants and preservatives, they may also provide a danger of skin irritation, dryness, and long-term environmental effects.

Natural hand washes, which are made with plant-based extracts and essential oils, have minor antibacterial properties but have a lot to offer in terms of eco-friendliness, skin compatibility, and less side effects. They can be used frequently because of their mild action, especially for people with sensitive skin. Overall, natural formulations offer a promising substitute for everyday personal hygiene, combining appropriate antibacterial activity with improved dermatological safety and sustainability, whereas chemical hand washes continue to be the norm for clinical and high-risk settings. The study emphasizes how natural formulations must be further optimized to increase their antibacterial efficacy while maintaining their intrinsic advantages.

REFERENCE:-

1. Megha Bahuguna and Shilpi Kashyap. “Formulation and evaluation of hand wash”. World Journal of Pharmaceutical Research. 2016; 5(7):1559-1577.
2. kokate CK, Purohit AP, Gokhale SB. Pharmacognosy. 56th ed. and others, editor. Nirali prakashan; 2019. p. 19.
3. Aiello AE and Elaine BL: Antibacterial cleaning and hygiene products as an emerging risk factor for antibiotic resistance in the community. The Lancet Infectious Diseases 2003; 3(8): 501.
4. Minakshi G Joshi, D.V Kamath and S.D Kamath. “Evaluation of herbal hand wash formulation”, Natural Product Radiance, 2008; 7(5): 413-415.
5. Jyoti MJ, AV Praveen Kumar AV, Mohanalakshmi S, Prathyusha S. Formulation and evaluation of polyherbal hand wash. Int. J Pharm. 2012; 2(2):39-43.
6. Luby SP, Agboatalla M, Feikin DR, Painter J, Billhimmer W, Atref A, Hoekstra RM, "Effect of hand-washing on child health: a randomized control trial", The Lancet Infectious Diseases, 2005; 366(9481): 225–33.
7. Sandra TJ, Shih MC, Goldman DA, “Epidemiology and Risk factors for Clostridium difficult infection in children”, American Journal of Infection Control, 2008; 121: 1555-1562.
8. World Health Organization. WHO Guidelines on Health Hygiene in Health Care. Geneva, Switzerland: World Health Organization, 2009.
9. Millard, J. Y., “Antimicrobial biocides in the healthcare environment: efficacy, usage, policies, and perceived problems, Clinical Microbiology”, International Journal of Pharm World Research, 2005; 147–179.
10. Snyder OP, Paul St. Safe Hand Washing, Hospitality Institute of Technology and Management, American Journal of Infection Control, 1988; 1-3.
11. Ulrich J. A. “Techniques of skin sampling for microbial contaminants”, Journal of Investigative Microbiology, 1965; 4(3): 121-123.
12. Das K, Tiwari RKS, Srivastava DK, “Techniques for evaluation of medicinal plant products as antimicrobial agent: Current methods and future trends”, Journal of Medicinal Plants, 2010; 4(2): 104-111.
13. Scott E., “Microbial Risk Reduction: The Benefits of Effective Cleaning In Preparation”, American Journal of Infection Control, 2010; 4: 435-436.