



ROLE OF HERBS USED IN POLY HERBAL HANDWASH- AN UPDATED REVIEW

¹Sanjeeva Kumar A, ²Udaya Sree B, ³Bhavana P, ⁴Harshitha S, ⁵Rajesh P, ⁶Vijay Bhaskar Reddy SK,
⁷Chandra Sekhar R, ⁸Niranjan Babu M

¹Associate Professor, Department of Pharmacognosy and Phytochemistry, Seven Hills College of Pharmacy (Autonomous), Tirupati, Andhra Pradesh, India-51756

²Under graduate Research Scholar, Department of Pharmacognosy and Phytochemistry, Seven Hills College of Pharmacy (Autonomous), Tirupati, Andhra Pradesh, India-51756

³Under graduate Research Scholar, Department of Pharmacognosy and Phytochemistry, Seven Hills College of Pharmacy (Autonomous), Tirupati, Andhra Pradesh, India-51756

⁴Under graduate Research Scholar, Department of Pharmacognosy and Phytochemistry, Seven Hills College of Pharmacy (Autonomous), Tirupati, Andhra Pradesh, India-51756

⁵Under graduate Research Scholar, Department of Pharmacognosy and Phytochemistry, Seven Hills College of Pharmacy (Autonomous), Tirupati, Andhra Pradesh, India-51756

⁶Under graduate Research Scholar, Department of Pharmacognosy and Phytochemistry, Seven Hills College of Pharmacy (Autonomous), Tirupati, Andhra Pradesh, India-51756

⁷Associate Professor, Department of Pharmacognosy and Phytochemistry, Seven Hills College of Pharmacy (Autonomous), Tirupati, Andhra Pradesh, India-51756

⁸Principal & Professor, Department of Pharmacognosy and Phytochemistry, Seven Hills College of Pharmacy (Autonomous), Tirupati, Andhra Pradesh, India-51756

Abstract: Hand washing or hand hygiene is the act of cleaning one's hands with or without the use of water or another liquid or with the use of hand wash for the purpose of removing soil, dirt, and or microorganisms. Hands are the primary mode of germ and infection transmission. Hand hygiene is thus the most important measure to avoid the spread of harmful germs and the spread of healthcare associated infections. Hand washing is the act of cleaning one's hand to remove dirt and pathogenic microorganisms and to prevent the transmission of transient microorganisms. And hand washing is the most efficient way to prevent the transmission of bacteria that cause diarrhoea, influenza, and common cold. It is the easiest, most significant, and least expensive technique to promote hand cleanliness in health care and aid in the prevention of infectious disease. Hand washing with poly herbal hand washes and water is 25% more effective than washing with water alone in removing bacteria. According to studies, only about 40% of healthcare workers, homeowners, and officers follow hand washing procedures. Microbial infections impact the skin, which is one of the most vital areas of the body. Hand washing is essential for protecting the skin from harmful germs and preventing the spread of communicable diseases. The world has witnessed an unprecedented emphasis on hygiene and sanitation due to the global health crisis caused by the COVID-19 pandemic.

Index Terms- Hygiene, Pathogens, Diarrhoea, Influenza and Communicable diseases

I. INTRODUCTION

UNDERSTANDING IMPORTANCE OF HAND HYGIENE: The skin is the largest organ of the body, accounting for about 15% of total adult body weight. It performs many vital functions including protection against external, physical, chemical and biological assailants, as well as prevention of excess water loss from the body and role in thermoregulation.^[1] Hands are the major route of microbe and illness transfer; hand hygiene is the most efficient way to prevent the spread of hazardous germs and diseases. In healthcare, hand cleanliness is the best and most effective, simplest, and affordable technique to prevent nosocomial infections. Contaminated hands can function as vectors for the spread of germs. Outbreaks are conveyed from one human to another when a food handler contaminates his or her hands and then transfers these bacteria to customers via hand contact with food or drinks. The user is exposed after ingesting these germs, which might cause gastrointestinal disease. Microorganisms infiltrate the food supply when people handle ready-to eat foods.

The hands of healthcare providers are the main cause of the spread of multidrug-resistant bacteria and sickness to patients. As an outcome, it presents the issue of hygiene hand cleaning. Various antimicrobial compounds are now accessible as alcohol-based hand wash, and other items on the market. These solutions aid in the prevention of health care associated microbiological contamination, although they come with certain adverse reactions. Their usage on a regular basis might promote skin irritation

and infectious resistance. Infections grow disconcertingly and are becoming critical epidemic in hospitals. An opportunistic microbe leads to nosocomial infections, which are commonly infected with multi-drug-resistant bacteria and is difficult to heal. In disease transmission, bacteria are transmitted from palms to foods, artifacts, or humans. The major mode of dissemination of these viruses and diseases to clinicians is palms of healthcare staff. A easy and easiest way to avoid medical diseases that are directly obtained from airborne particles can be accomplished by means of hand grooming.^[2]

EVOLUTION OF HAND WASH: The concept of cleansing hands with an antiseptic agent probably emerged in the early 19th century. As early as 1822, a French pharmacist demonstrated that solutions containing chlorides of lime or soda could eradicate the foul odours associated with human corpses and that such solutions could be used as disinfectants and antiseptics. In a paper published in 1825, this pharmacist stated that physicians and other persons attending with contagious diseases would benefit from moistening their hands with a liquid chloride solution. Earlier in India liquid hand wash not popular. Though people wash hands but they do not prefer liquid hand wash FMCG company create awareness for changing hand washing habit. They try to make people health conscious in respect to washing hands. In FMCG segment liquid hand wash is a growing product category.^[3]

TYPES OF HAND WASHING: There are three recommended levels of Hand Hygiene to ensure that the hand hygiene performed is suitable for the task being undertaken. The efficacy of hand hygiene will depend on application of an adequate volume of a suitable hand hygiene agent with good technique for the correct duration of time, and finally ensuring that hands are dried properly.

1. SOCIAL HAND HYGIENE-ROUTINE HAND WASHING:

The aim of social (routine) hand washing with soap and warm water is to remove dirt and organic material, dead skin and most transient organisms. On visibly clean hands it can be undertaken using an alcohol hand rub, and this will remove transient organisms.

2. ANTISEPTIC HAND HYGIENE:

The aim of social (routine) hand washing with soap and warm water is to remove dirt and organic material, dead skin and most transient organisms. On visibly clean hands it can be undertaken using an alcohol hand rub, and this will remove transient organisms.

- During outbreaks of infection where contact with blood/body fluids or situations where microbial contamination is likely to occur
- In “high” risk areas e.g. isolation, ICU etc
- Before/after performing an invasive procedure
- Before/after wound care, urethral or IV catheters etc

3. SURGICAL HAND HYGIENE:

Surgical hand washing requires the removal and killing of transient micro-organisms and substantial reduction and suppression of the resident flora of the surgical team for the duration of the operation, in case a surgical glove is punctured / torn. Ensure that fingernails are kept short and clean. Wrist watches and jewelers must be removed before surgical hand disinfection.^[4]

ADVANTAGES OF POLYHERBAL HAND WASH:

1. **NATURAL PRODUCTS:** The herbal cosmetics are natural and free from all the harmful synthetic chemicals which generally may turn out to be lethal to skin.
2. **SAFE TO USE:** Natural cosmetics are protected to utilize. These are hypo allergic and proven by dermatologists to be safe to use anytime.
3. **COMPATIBLE WITH ALL SKIN:** No matter if skin is dark or fair, will find natural cosmetics like foundation, eye shadow which are irrespective of skin tone.
4. **WIDE SELECTION TO CHOOSE FROM:** These products are at economical prices and are sold for a cheaper price during sales.
5. **MINIMIZED SIDE EFFECTS:** The side effects with the use of natural hand washes are very less when compared to that of synthetic hand washes.
6. **COSMECEUTICALS:** It is the fastest growing segment in the pharmaceutical products which are intended to improve the health and beauty of the skin by providing a specific result.^[5]
7. The mild foaming action does not cause any irritation.
8. It is used for keeping the skin fresh and lithe.

9. Herbal hand wash keeps hand naturally nourishes.
10. Cleaning the hand with herbal hand wash removes dirt, pollutant, and harmful microorganisms. ^[6]
11. Lowers the risk of diarrhoea and intestinal problems.
12. These prevent the spread of diseases and keep your environment safe, neat and clean.
13. Easier access compared to using soap and water.
14. Herbs are readily available in both urban and rural settings, making it simple for everyone to use them.
15. The easiest way to get rid of microorganisms. ^[7]

DISADVANTAGES OF HERBAL HAND WASH:

- Herbal cosmetics have slower effects as compared to allopathic dosage form.
- Also, it requires long term therapy.
- They are difficult to mask the colour and odour.
- Manufacturing is time consuming and complicated. ^[8]

STEPS INVOLVED IN HAND WASHING:

Apply herbal hand wash to wet hands, 20 seconds of rubbing hands together each palm to palm.



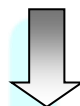
Rub your fingers together on both hands



Rub your hands together with your fingers



Rub each of your thumbs together.



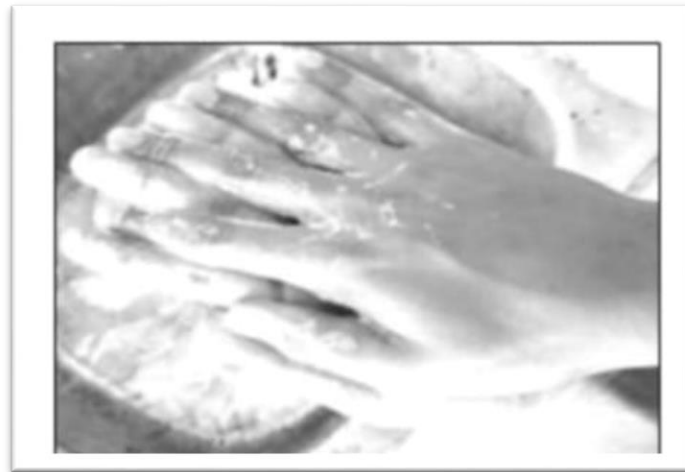
Rub your palms in circles. Then, using running water, properly wash your hands. ^[9]

STAGE-1



Apply herbal hand wash to wet hands, 20 seconds of rubbing hands together.

STAGE-2



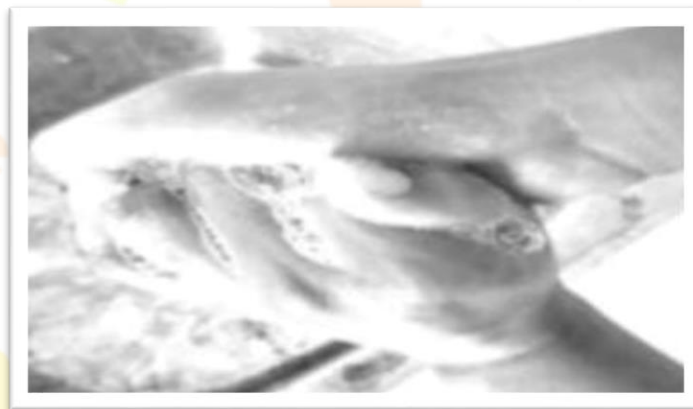
Palm to palm

STAGE-3



Rub your fingers together on both hands

STAGE-4



Rub your hands together with your fingers

STAGE-5



Each of your Rub thumbs together

STAGE-6



Rub your palm in circles. Then, using running water, properly wash your hands. [9]

ROLE OF HERBS USED IN POLYHERBAL HANDWASH

1. EUCALYPTUS:

Scientific name: *Eucalyptus globulus*.



Family: *Myrtaceae*.

Chemical constituents: Eucalyptol, α -Pinene, Camphene, Cineole, Phellandrene, Citronellal, Geranyl acetate.

USES: It is used as Anti-septic, Counter Irritant [10, 9, 11, 12]

2. ALOE VERA:

Scientific name: *Aloe barbadensis miller*.



Family: *Liliaceae*.

Chemical constituents: Aloin, anthraquinone glycoside, barbaloin, aloe-emodin, anthrone c-10 glucoside, isobarbaloin, β -barbaloin, saponins, muco polysaccharides, aloesone.

USES: It is used as anti-inflammatory. Aloe gel is used in skin cosmetics as a protective due to its anti-wrinkle property and it removes the dead tissues. It also increases the removal of dead tissue in skin. It is used in treatment of burns and wounds. [10, 13, 14, 6, 12]

3. NEEM:

Scientific name: *Azadirachta indica*.



Family: *Meliaceae*.

Chemical constituents: azadirachtin, nimbin, nimbidin, nimbidol, sodium nimbinate.

USES: It is used as an anti-bacterial, anti-fungal. It is used for maintenance of hand hygiene [14, 12, 15, 16, 17, 18]

4. PEPPER MINT:

Scientific name: *Mentha piperita*, *Mentha spicata*.



Family: *Lamiaceae*

Chemical constituents: Menthol, menthane, menthofuran, 1, 8-cineole, methyl acetate.

Uses: It is used as flavoring agent, aromatic, cooling refreshing property. It restores the natural pH balance, and removes the dead skin cells [14, 12, 19]

5. MIMOSA PUDICA (Touch me not)

Scientific name: *Mimosa pudica*



Family: *Fabaceae*.

Chemical constituents: alkaloids, flavonoids C-glycosides, sterols, tannins, terpenoids, saponins, fatty acids.

Uses: It consists of soothing property, and also anti-inflammatory. [12, 15, 17, 18]

6. CURRY LEAVES:

Scientific name: *Murraya koenigii*



Family: *Rutaceae*

Chemical constituents: mahanine, linalool.

Uses: It consists of anti- bacterial property. ^[20]

7. GARLIC:

Scientific name: *Allium sativum*



Family: *Liliaceae*

Chemical constituents: Allyl propyl disulphide, diallyl disulphide, allilin, allicin

Uses: It is used as a carminative and disinfectant. ^[14, 12]

8. GUAVA LEAVES

Scientific name: *Psidium guajava*



Family: *Myrtaceae*.

Chemical constituents: Quercetin, lycopene, vitamin C, polyphenols, tannins, essential oils, terpenoids, carotenoids.

USES: It consists of anti microbial, skin soothing and aromatic property. ^{[21, 22].}

9. PAPAYA LEAVES

Scientific name: *Carica papaya*



Family: *Caricaceae*.

Chemical constituents: Papain, chymo papain, proteolytic enzyme, polypeptides, amides.

Uses: It removes dead skin cells from skin and it act as a anti-fungal, anti-bacterial, anti-inflammatory agent. ^[14, 10,12]

10. TURMERIC

Scientific name: *curcuma longa*



Family: *Zingiberaceae*

Chemical constituents: Curcumin, curcuminoid, bisacurone, germacrone.

USES: It is used for wound healing, used to treat eczema, used to prevent the skin eruptions. [4, 12, 23]

11. TULSI

Scientific name: *Ocimum sanctum* or *ocimum tenuiflorum*.



Family: *Lamiaceae*

Chemical constituents: Eugenol, carvacrol, eugenol-methyl-ether, caryophyllin, anthocyanins.

Uses: It consists of anti-microbial and anti-inflammatory properties. It is used in the treatment of ringworm diseases [11, 12, 23, 24]

12. GREEN CHIRETTA

Scientific name: *Andrographis paniculate*



Family: *Acanthaceae*

Chemical constituents: Andrographolide, diterpenoids, flavanoids, polyphenols, neoandrographolide, dehydroandrographolide, labdane, andrograpanin.

Uses: It consists of antimicrobial and antibacterial property. [25, 26, 27, 28]

13. ORANGE PEEL:

Scientific name: *Citrus sinensis*.



Family: *Rutaceae*

Chemical constituents: limonene, galic acid, poly phenol, phenolic acid, mono terpene, lignin.

Uses: It is rich in anti-oxidants. It is used to detoxify the skin cleanse, lighten and brighten the skin. [29]

14. CLOVE

Scientific name: *Eugenia caryophyllus*



Family: *Myrtaceae*

Chemical constituents: Gallotannic acid, resin, chromone, eugenin, eugenol, volatile oil, eugenol acetate, caryophyllenes, ketones, alcohols, ester

Uses: It consists of anti septic and aromatic property. It is also used as a flavouring agent. It also consists of anti-microbial property and it kills many gram positive and gram negative bacteria including fungi. [12, 24, 23]

15. CINNAMON

Scientific name: *Cinnamomum zeylanicum*.



Family: *Lauraceae*.

Chemical constituents: Volatile oil, phlobatannins, mucilage, calcium oxalate, starch, mannitol.

Uses: It consist of anti septic and aromatic property, and also used as a flavouring agent. [12, 14]

16. JASMINE:

Scientific name: *Jasminum officinale*



Family: *Oleaceae*.

Chemical constituents: Jasmine, methyl jasmonate, benzyl acetate, isophytol, farnesene, jasmonate, jasmonic acid, jasminaldehyde, linalyl acetate.

Uses: Used to speed up the wound healing and also used to treat skin diseases. ^[30,31]

17. HIBISCUS FLOWER

Scientific name: *Hibiscus rosa-sinensis*



Family: *Malvaceae*

Chemical constituents: Thimin, riboflavin, niacin, ascorbic acid, anthocyanin pigment, cyaniding diglucoside.

Uses: It is used to treat various skin disorders. It gives anti-ageing effect to skin. ^[31, 12, 10]

17. FENUGREEK

Scientific name: *Trigonella foenum*



Family: *Fabaceae*

Chemical constituents: steroidal saponins, mucilage, diosgenin, yamogenin, trigogenin, smilagenin, sarsapogenin, flavonoids, vitexin, saponaritrine, triterpenoid saponin botulin lupeol.

Uses: It is used as anti-inflammatory agent, and also used as a skin cleanser. It acts as anti-oxidant. ^[10,14]

18. PAPAYA

Scientific name: *Carica papaya*



Family: *Caricaceae*

Chemical constituents: Proteolytic enzyme, papain, chymopapain, polypeptides, amides.

Uses: It removes dead skin cells from skin, and acts as anti fungal, anti bacterial, anti inflammatory agent. [12, 14]

20. LIQUORICE

Scientific name: *Glycyrrhiza glabra*



Family: *Fabaceae*

Chemical constituents: Glycyrrhizin, liquiritin, glabridin, isoliquiritigenin, isoliquiritin, enoxolone, licochalcone A, liquiritinaiposide, hispaglavridin a, glabrol.

Uses: It consists of good antimicrobial activity against *Bacillus subtilis*, *Staphylococcus aureus*. It is also used as anti-oxidant it protects our skin against free radicals. It also consist of anti –inflammatory and anti-fungal property.

It helps to reverse hyper pigmentation and can speed up the healing process by inhibiting production of melanin. [17, 5, 32]

21. ARGEMONE MEXICANA

Scientific name: *Argemone Mexicana* Linn.



Family: *Papaveraceae*

Chemical constituents: Sanguinarine, protopine, dihydrosanguinarine, coptisine, chelerythrine, allocryptopine, cryptopine, cheilanthifoline.

Uses: Used to treat skin diseases and act as anti- inflammatory. [2,33]

22. ROSE OIL

Scientific name: *Rosa rubiginosa*.



Family: *Rosaceae*

Chemical constituents: geraniol, citronellol, nerol, phenethyl alcohol, farnesol, citral, eugenol, heneicosane, methyl eugenol, geranyl acetate, rose oxide.

Uses: It consists of wound healing property. It is also have a regenerative effect on cell tissue, and also beneficial for dry, sensitive, ageing-skin. [14, 34, 23]

23. LEMON

Scientific name: *Citrus limon*



Family: *Rutaceae*

Chemical constituents: Volatile oils, hesperidin, pectin, limonene, calcium oxalate, geranyl acetate, terpenol.

Uses: It shows antibacterial activity against *staphylococcus aureus*, *E. coli*, *bacillus subtilis*, *pseudomonas aeruginosa*, *Salmonella* species. Lemon leaves have great potential as antimicrobial compounds against micro organisms. [12, 24, 35, 13]

24. SOAP NUT

Scientific name: *Sapindus mukorossi*



Family: *Sapindaceae*

Chemical constituents: Saponins (10%-11.5%), sugars (10%), and mucilage, seeds contain fatty acids, linoleic, oleic, palmitic, stearic, oleanolic acid and sapindic acid.

Uses: It is used as a foaming agent. Used to clean the skin, remove tan, and to eczema skin disease. The potent moisturizing property of the soap nut keeps the skin well hydrated. [2, 9]

25. COCONUT SHELL

Scientific name: *Cocos nucifera*



Family: *Palmae*

Chemical constituents: fat (65-68%), carbohydrates (15%-20%), proteins (9%), crude fibers, trimyristine, trilaurin, tripalmetin, tristearin.

Uses: Coconut shell exfoliates is a natural remedy that reduces lines and aging signs on skin. [12, 36]

FORMULATION OF HERBAL HAND WASH

MARKETED PRODUCTS

1. KHADI NATURALS [37]



- BRAND NAME: Khadi naturals ayurvedic hand wash
- Ingredients: Neem, tulasi , aloe, lemon

2. PATANJALI ALOE HAND WASH [38]



- BRAND NAME: Patanjali Aloe vera hand wash
- Ingredients: Aloe vera, neem, mint, tea leaves

3. Himalaya hand wash ^[39]



- **BRAND NAME:** Himalaya hand wash
- **Ingredients :** Aloe vera, neem

4. AXIOM HERBAL HAND WASH ^[40]



- **BRAND NAME:** Axiom herbal hand wash
- **Ingredients :** Tulsi, Aloe vera ,neem

5. AROGYA HERBAL HAND WASH ^[41]

- **BRAND NAME :** Arogya hand wash
- **Ingredients:** Aloe vera, Tulsi, Neem, Lemon peel



6. BIO HYGIENE ^[42]



- **BRAND NAME:** Bio Hygiene
- **Ingredients:** Aloe vera, neem, lavender leaves,

7. VADDI HERBAL HAND WASH ^[43]



- **BRAND NAME:** VAADI
- **Ingredients:** Aloe vera, Neem oil, Ginger

8. ASHPVEDA HERBAL HAND WASH ^[44]



- **BRAND NAME:** ASHPVEDA
- **Ingredients:** Basil, Neem, Aloe vera, Neem

9. JOOVES HAND WASH ^[45]



- **BRAND NAME:** JOOVES
- **Ingredients:** Tulsi, Aloe vera, Ginger

10. AVIS HERBAL HAND WASH ^[46]



- **BRAND NAME:** AVIS HERBAL HAND WASH
- **Ingredients:** Neem, Tulsi, Turmeric

II. ACKNOWLEDGMENT

Authors are thankful to the management, principal, faculty and staff of Seven Hills College of Pharmacy (Autonomous), Tirupati, Andhra Pradesh, India-51756 for providing necessary support and facilities to carry out the work.

REFERENCES

1. Sachin Jalindar Fartade et al., Formulation & Development and evaluation of dual-purpose antimicrobial poly herbal gel, face wash and hand wash. World Journal of Pharmaceutical Medical Research, May 2020; 6(6): 198-203.
2. Priyanka V Bagade et al., Formulation and evaluation of gel based herbal hand wash using extracts of *Arergemone mexicana*. International Journal of Pharmaceutical Sciences and Medicine, June 2021; 6(6): 23 -28.
3. Ritesh kumar et al., Development and anti bacterial characterization of mint hand wash .International Journal of Pharmaceutical Sciences, July 2018;9(1).
4. https://emed.ie/Infections/Hand_Washing.php
5. Jagtar Singh et al., Formulation and evaluation of anti microbial herbal hand wash gel containing aqueous extracts *Sapindus mukorossi*. Research Square .September 2022; 1-8: <https://doi.org/10.21203/rs.3.rs-2012254/v1>.
6. Komal Tikariya et al., Formulation and evaluation of herbal hand wash using Neem and Aloe vera extract. Indian Journal of Pharmacy Practice, 2023, 10(2): 89 – 93.
7. Neha Jaywant Lokhande et al., A Review on herbal hand wash. International Journal of Research Publication and Reviews. March 2023, 4(2): 4498-4504.
8. Vijay et al., Formulation and evaluation of poly herbal hand wash. International Journal of Novel Research and Development, July 2023, 8 (7): 2456-4184.

9. Jayant Londhe et al., Formulations of herbal hand wash with potential antibacterial activity, International Journal of Research in Advent Technology ,February 2015; 11-15.
10. Made Prem Kumar et al., Formulation and evaluation of herbal hand wash using Eucalyptus globules. International Journal of Pharmacy & Pharmaceutical Research, August 2019; 16(1): 223-232.
11. Moiz khan , Aziz khan , Muley Vitthal Ravsaheb, Prachi Udupurkar, Formulations and evaluation of herbal hand wash .International Journal of Innovative Research in Technology, June 2023;10(1): 40-43.
12. C.K. Kokate, A.P. Purohit ,S.B. Gokhale, Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhale (2007), 37th edition ,pp 14.42-14.44, 9.10- 9.16, 9.3- 9.4, 14.61 -14.64, 14.46 – 14.48, 12.11- 12.12, 14.71- 14.72, 14.87 – 14.89 , 14.34 – 14.36, 18.20- 18.22, 8.21- 8.23, 12.11 – 12.12, 14.54 – 14.55, 11. 45 – 11.46.
13. DebGopal Ganguly et al., Preparation and evaluation of poly herbal hand wash of different herbal source. Calcutta Institute of Pharmaceutical Technology and Allied Health Sciences. November 2022; 20(2): 8113-8123.
14. Swati V Patil et al., Formulation and evaluation of poly herbal hand wash gel . Journal of Pharmacognosy and Phytochemistry. 2023; 12(4): 104 -112.
15. Raj Deep Singh Meena et al., Formulation and evaluation of poly herbal hand wash by the extract of azadirachta indica and mimosa pudica with antibacterial activity. International journal of pharmaceutical research and application. November 2021; 6(6): 1199-1205.
16. Mohammad A. Alzohairy .Therapeutics role of *Azadirachta indica* and their active constituents in diseases prevention and treatment. January 11, 2016; 1-10.
17. Nikita p. aware et al., Development and Evaluation of Poly herbal hand wash containing *Mimosa pudica*, *Azadirachta indica* and *Glycyrrhiza glabra*. International Journal of Pharmaceutical Sciences Review and Research, October 2022; article no. 5: 23-26.
18. Prital Vinayak Phad et al., Formulations of antimicrobial poly herbal hand wash ,International Journal for Research Trends and Innovation 2022; 7(6) :1656 -1662.
19. Mashood Ahmed shah et al., Formulation & Evaluation and antibacterial efficiency of herbal hand wash gel. International journal of pharmaceutical sciences Review and Research, April 2014; article no. 23: 120-124.
20. https://www.google.com/search?q=scientific+name+family+chemical+constituents+of+curry+leaves&dq=scientific+name%2C+family+%2Cchemical+constituents+of+curry&gs_lcrp=EgZjaHJvbWUqCQgBECEYChigATIGCAAQRrg5MgkIARAhGAoYoAEyCQgCECEYChigATIJCAMQIRgKKGKABMgkIBBAhGAoYoAHSaQkyNtc2MGoxajeoAgCwAgA&sourceid=chrome&ie=UTF-8
21. Snehal Mahdev et al., Formulation and Evaluation of natural herbal hand wash using guava leaves and reetha extract. International Journal of Research Publication and Review, March 2023; 4 (3): 1100 – 1102.
22. Jyoti Vikas Aoughade et al., Formulation and Evaluation of herbal hand wash from *Psidium guajava* leaves. March 2023; 4 (3): 2417 -2427.
23. Niraj terkar et al., Formulation and Evaluation of poly herbal hand wash gel. International Journal of Science and Research. August 2021; 10 (8): 1213 – 1218.
24. Rohi Jaysing Bhor et al., Formulation and Evaluation by phytochemical analysis of herbal hand wash .Asian Journal of Pharmaceutical Education and Research, March 2018; 7(1): 111- 121.
25. *Andrographis paniculata* scientific name family chemical constituents - Google Search.
26. Koushlesh kumar Mishra et al., Development and Evaluation of herbal hand wash gel containing *Andrographis paniculata* alcoholic extract. IP Indian journal of Immunology and Respiratory Medicine.2022; 7 (2): 73-77.
27. Tushar Rukari et al., To study in – vitro antimicrobial activity of poly herbal hand wash formulation. 2022; 12(3):237-242.
28. Gopal Arora et al., A review of herbal anti- septic formulations. Journal of Research in Medical and Dental Sciences. August 2022; 10(2): 34 -38.
29. Vikrant Y. Patil et al., Formulation and Evaluation of Herbal Hand Wash Tablet International Journal for Research in Applied Science and Engineering Technology. June 2023; 11(6).
30. Shaifali Patel, Kinjal H Shah. Formulation and Evaluation of Herbal Handwash Containing Extracts of Jasmine and Hibiscus Flower. International Journal For Multidisciplinary Research. August 2023; 45(4).
31. Shail Fail Patel et al., Formulation and Evaluation of Herbal Hand Wash containing extract of Jasmine & Hibiscus flower .International Journal for Multidisciplinary Research. August 2023; 5(4)
32. https://www.google.com/search?q=glycyrrhiza+glabra+uses+for+herbal+hand+wash&sca_esv=572849866&bih=643&biw=1366&rlz=1C1ONGR_enIN1070IN1070&hl=en&ei=v_knZeSAE8cseMPge2vwAo&ved=0ahUKEwik3N3U0_CBAXVPTmwGHYH2C6gQ4dUDCBA&uact=5&dq=glycyrrhiza+glabra+uses+for+herbal+hand+wash&gs_l=lp=Egxdn3Mtd2l6LXNlcnAiL GdseWN5cnJoaXphIGdsYWJyYSB1c2VzIGZvcjBoZXJiYWwgaGFuZCB3YXNoMgUQIRigATIEECEYFUiQqgFQqQdY4p4BcAN4AZABAJgB3gagAd1aqqEOMC4zLjE2LjguNC4zLjG4AQPIAQD4AQHCAGoQABhHGNYEGLADwglKEAAYigUYsAMYQ8ICDhAAGOQCGNYEGLAD2AEBwgIQEC4YigUYyAMYsAMYQ9gBAsICBxAuGIoFGEPcAg0QLhiDARixAxiKBRhDwgIFEAAYgATCAgcQABiKBRhDwgIWEc4YigUYQxiXBRjcBBjeBBjfbNgBA8ICCxAuGIMBGLDGLIAEwgIaEC4YgweYsQMYgAQYIwUY3AQY3gQY3wTYAQPCAgUQLhiABMICCBAAGIoFGJECwgIGEAAYFhgewgIHEAA YDRiABMICBhAAGB4YDcICBAAGAgYHhgNwgIIEAAYigUYhgPCAggQIRgWGB4YHcICBxAhGKABGAriAwQYA CBBiAYBkAYSugYGCAEQARgJugYGCAIQARgIugYGCAMQARgU&scient=gws-wiz-serp
33. https://www.google.com/search?q=argemone+mexicana+chemical+constituents&sca_esv=572890011&rlz=1C1ONGR_enIN1070IN1070&ei=rAcoZavWGZ6z4-EPwpaC8Ak&ved=0ahUKEwir3N44PCBAxWe2TgGHUKLAJ4Q4dUDCBA&uact=5&dq=argemone+mexicana+chemical+constituents&gs_l=lp=Egxdn3Mtd2l6LXNlcnAiJ2FyZ2Vtb25lIG1leGJlYW5hIGNoZW1pY2FsIGNvbN0aXRlZW50czIIEAA YigUYkQIyCBAAGIoFGIYDMggQABiKBRiGAzIIEAAYigUYhgNlSnNQ-gRY7lxwAXgBkAEAmAGoDqABvsEBqgELNC0xLjAuNy45LjS4AQPIAQD4AQHCAGoQABhHGNYEGLADwglIMEAA YigUYQxhGGPsBwgIFEAAYgATCAgUQLhiABMICBhAAGBYHhGp4gMEGAAGQYgGAZAGCA&scient=gws-wiz-serp

34. Zeeshan Afsar et al., Formulation and comparative evaluation of poly herbal preparation for their Disinfectant effect, The International Journal of Therapeutic, 2018; 1(1):54-56.
35. Souvik Giri et al., Comparison and Evaluation of antimicrobial activity of *Mimosa pudica*, *Azadirachta indica* and *Citrus limon* in aqueous based hand wash with marketed herbal product, Research Journal of Pharmacy and Life Sciences, December 2022, 3 [3]: 28-35.
36. Dian Fita Lestari et al., The formulation of liquid hand wash made from coconut shell activated charcoal, Advance in Biological Science Research, 2020, 14 [National conference].
37. https://www.amazon.in/KHADI-NATURALS-Handwash-Pack-Neem/dp/B08CL52JNQ/ref=asc_df_B08CL52JNQ/?tag=googleshopmob-21&linkCode=df0&hvadid=586284951025&hvpos=&hvnetw=g&hvrand=2558689044227753508&hvpone=&hvptwo=&hvqmt=&hvdev=m&hvdvcmdl=&hvlocint=&hvlocphy=9300796&hvtargid=pla-1715120169327&psc=1#
38. https://m.netmeds.com/non-prescriptions/patanjali-aloevera-hand-wash-250ml?source_attribution=ADW-CPC-Pmax_beauty_purchase&utm_source=ADW-CPC-Pmax_beauty_purchase&utm_medium=CPC&utm_campaign=ADW-CPC-Pmax_beauty_purchase&gad=1&gclid=CjwKCAjwKipBhBtEiwAWjgwrOzQN2uLnIppFZWJhJyfx-RA3mlL9WJ1cASF7gipTe_YYvLqEGenhoCbxQQA_vD_BwE
39. https://www.amazon.in/Himalaya-Pure-Hands-Purifying-Tulsi/dp/B084W4YRXV/ref=asc_df_B084W4YRXV/?tag=googleshopmob-21&linkCode=df0&hvadid=397330579105&hvpos=&hvnetw=g&hvrand=14996877554801043050&hvpone=&hvptwo=&hvqmt=&hvdev=m&hvdvcmdl=&hvlocint=&hvlocphy=9152563&hvtargid=pla-1115167345114&psc=1&ext_vrnc=hi
43. https://www.amazon.in/Vaadi-Herbals-Velvety-Soft-Jojoba/dp/B07J675T3G/ref=asc_df_B07J675T3G/?tag=googleshopmob-21&linkCode=df0&hvadid=397100944019&hvpos=&hvnetw=g&hvrand=4398851775506758807&hvpone=&hvptwo=&hvqmt=&hvdev=m&hvdvcmdl=&hvlocint=&hvlocphy=9152563&hvtargid=pla-838403999988&psc=1&ext_vrnc=hi
44. <https://www.ashpveda.com/products/hand-wash-lemon-hand-wash>
45. https://jovees.com/ginger-papaya-handwash.html?utm_source=google&utm_medium=cpc&utm_campaign=PerformanceMax-LanguageBengali-Pravis&utm_term=-&utm_content=&gad=1&gclid=CjwKCAjw-KipBhBtEiwAWjgwrNwvetWjx6tD5ejJX2eHvaIFY-37zv6J2yiw8t4s35YKN3PGBUkQxRoCh1wQAvD_BwE
46. <https://m.indiamart.com/proddetail/avis-herbal-hand-wash-500ml-22380651688.html>

