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Formulation and Evaluation of Polyherbal Hand Wash (Gel)

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Abstract: ***The main aim for the Preparation of Polyherbal Hand wash Gel 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. 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 Neem 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 Neem 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.***

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

1. Introduction

Hand washing with soap and water has been taken part of personal hygiene for hundreds of years [1], [2] and has Been usually embedded in spiritual and cultural behavior. Although, the linkamong Hand washing and the spread of disease changed into set up simplest two centuries in the past, despite the fact that this can be considered as extraordinarily early with admire to the discoveries of Pasteur and Lister that passed off decades later. In the middle of 19th century, Ignaz Semmelweis in Vienna (Austria), and Oliver Wendell Holmes in Boston (USA), revealed that the hands of health care workrs spread nosocomil infection.

In 1847, observations of Semmelweiss conluded that after performing autopsies by physician on their hands had a disagreeable odor despite hand washing with soap and water before entering the clinic. He hypothesized therefore that “cadaverous particles” were transmitted via the hands and caused the childbed fever. After a theory of disease offering developed by Pasteur, Semmelweis's findings goes worldwide acceptance after his death, when Pasteur developed the scientific theory of disease offering a theoretical explanation for Semmelweis's findings. In 1980s remarkable evolution made in concepts of hand hygiene in health care. Simultaneously in the same year first national hand hygiene guidelines were published, [3], [4] furthermore several other countries also published the new guidelines in this array. In the year 1995 and 1996, the CDC/HICPAC within the USA recommended that besides antimicrobial soap or alcoholic antiseptic agent be used [5], [6] for washing hands.

Anatomy and physiology of skin:
Skin is the layer of usually soft, flexible outer tissue covering and largest organ of the human body that plays a physical barrier between the external and the internal environment that is serves function of protection and homeostatics. PH of skin is 4 to 5.6. The Skin composed of three layers:

a) Epidermis
b) Dermis
c) Subcutaneous Tissue.

(a) Epidermis
The Epidermis is a thin layer of skin. It is the outer layer of skin. It is composed of epithelial tissue. Functions of the

epidermis include touch and protection. This Skin is further divided into five separate layers, they are the:

1) **Stratum Corneum**
   The Stratum Corneum is the outermost layer of epidermis, and is made up of 10 to 30 thin layers of continually shedding, dead keratinocytes. The corneum is referred to as the 'Horny layer', because its cells are toughened like an animal's horn
2) **Stratum Lucidum**
   Present only in skin of fi ngertips, palms, and soles; consists of four to six rows of clear, flat, dead keratinocytes with large amounts of keratin.
3) **Stratum Granulosum**
   The Stratum Granulosum is a thin layer which is placed in between the stratum spinosum and stratum lucidum. This layer helps to form a waterproof barrier that function to prevent fluid loss from the body. In this layer production of keratin occurs which is the main component of skin.
4) **Stratum Spinosum**
   The Stratum Spinosum layer found in in between the stratum basale and the stratum granulosum. This layer provide strength and flexibility to skin.
5) **Stratum Basale (Stratum germinativum)**
   Eight to ten rows of many - sided keratinocytes with bundles of keratin intermediate fi laments; contains projections of melanocytes and intraepidermal macrophage.

(b) The Dermis:
The Dermis is a middle layer of skin. Underneath the epidermis lies the dermis. As there was presence of blood vessels the skin was nourish due to oxygen and nutrients and helps to remove waste products. It contains nerves that help us relay signals coming from the skin. These signals include various sensation like touch, pressure, temperature, etc. It also contains Collagen, a protein that is responsible for giving skin strength.

(c) The Subcutaneous Tissue / Hypodermis / Subcutis:
It is the innermost layer of the skin which is made up of fat cells and connective tissue. The Subcutis acts as a layer of insulation to protect internal body organs and muscles from shock and changes in temperature. Skin is being the most exposed part of our body requires protection from skin pathogens. Usually, transient and resistent flora type of microbes present on the hands. Resident flora (E. g., Staphylococcus aureus) colonizing deeper skin layers, Transient flora (Gram negative bacilli) which colonizes the superficial skin layers and these microbes are easily removed by Hand washing. [7]

In the Current Scenario of mechanized life style, Natural remedies are more acceptable in the belief that they are safer with fewer side effects that the synthetic ones. Herbal formulations have growing demand in the world market. Considering this ultimatum; an attempt has been made to screen classical literature for the herbs with antimicrobial properties and found that Azadirachta indica (Neem) and Mentha Piperita (Pudina) has this antimicrobial activity [8].

2. Review of Literature

Zeeshan Afsaret et al. (2016) formulation and evaluation of poly herbal soap and hand sanitizer. The objective seen in this resech project was to prepare hand sanitizer and soap formulations using the extracts of Cassia fistula, Milletiapinnata and Ficus religiosa and to investigate the antimicrobial activity of the extracts against the common organisms which cause nasocomial infections. Furthermore to evaluate testability and phytochemical parameters of the prepared formulations so that they can be further standardized and used commercially. Zeeshan Afsaret et al (2016) firstly collect the plants Cassia fistula, Milletia pinnata and Ficus religiosa from Mysore district, the specimen were authenticated at RRL, Bangalore. For extract preparation Zeeshan Afsaret et al used leaves and bark of Cassia fistula, Milletia pinnata and Ficus religiosa were dried in hot air oven at 35^{o}C for three days, powdered to a mesh size of # 40 and stored in air tight for extraction Zeeshan Afsaret et al (2016) used solvents such as Petroleum ether, Chloroform, Ethyl acetate, Methanol, and 40% methanol for extraction. In this synerio preliminary antimicrobial screening by agar well diffusion method against the organisms E coli (MTCC - 1698), S aureus (MTCC - 1143) and P aeruginosa (MTCC - 2453). The extracts which exhibited maximum activity were selected for the formulation. Zeeshan Afsaret et al (2016) prepared combination in two different concentrations i. e.250 mg each (750 mg) and 500 mg each (1500 mg) and these concentration were further used in the formulation and evaluation parameter was checked, the result revealed in the project of Zeeshan Afsaret et al (2016 was most of the extracts exhibited good antimicrobial effect among which the ethyl acetate bark extracts of Cassia fistula and Ficus religious and methanolic bark extracts of and Milletia pinnata and Cassia fistula exhibited maximum activity with zones of inhibition ranging from 14 to 18 mm. also The prepared formulations when tested for antimicrobial activity exhibited zones of inhibition ranging from 18 to 26 mm which was far better than the zones of inhibition of individual extract [9].

Rina maskare et al. (2019) formulation and evaluation of poly herbal hand sanitizer. The objective of this project was to prepare herbal hand sanitizer and to investigate whether the formulation show an antimicrobial activity against the common organisms which cause nasocomial infections. Rina maskare et al. (2019) used leaves of Azadirachta indica and Eucalyptus globules collected from Gondia city in 2019later the leaves was dried in shed coarsely powdered and then used further work. for the formulation of hand sanitizer the methodology used by Rina maskare et al. (2019) is as follows firstly extraction of Azadirachta indica and Eucalyptus globulus was done in MIBP Gondia, for extraction solvents like Ethanol, methanol was used which was obtained from S D FINE - CHEMLIMITED, Mumbai, India. Also Bacterial Strains: Escherichia coli, Pseudomonas aeruginosa, Staphylococcus aureus, Bacillus subtilis were procured form D. B. Science College, Gondia. Was used in this project to observe inhibition of bacterial growth. The result revealed in this study was the % yield was found to be 14% and 16% for Azadirachta indica and Eucalyptus globulus respectively. The methanolic and ethanolic extract

showed good antibacterial activity against E. coli, S. aureus, B. subtilis with 1.56 mg/ml, 3.12mg/ml, 3.12mg/ml and 1.56mg/ml, 3.12mg/ml, 3.12mg/ml and mild to moderate antibacterial activity against P. aeruginosa with 6.25mg/ml and 12.5mg/ml respectively [10].

A. Mounika et al (2017), Formulation and evaluation of polyherbal hand wash gel containing essential oils. The objective seen in this research project was to evaluate the antibacterial efficiency of various herbal oils such as eucalyptus oil, cinnamon oil, geranium oil, pappermint oil, rosemary oil, colve oil and orange oil. The anti - microbial activity of the formulated herbal hand wash gel was tested common organisms by pour plate technique and the results obtained were compared with commercial antibacterial standards. A. Mounika et. al firstly collect the oils from Allin exporter Mumbai and Ooty. In this synerio preliminary anti - microbial screening by pour plate techniques against E. Coli and S. Aureus A. Mounika et. al prepared two Formulation in which first formulation is prepared by using HPMC - 50 as gelling agent and other by using carbapol 940. And evaluation parameters was checked, the result reveled in the project of A mounika et. al According to zone of inhibition the combination of cinnamon and geranium oil was equally effective against both the bacteria. It produces wider zone of inhibition against S. Aureus 7.5 mm, E. coli 8 mm [11].

Mashood Ahmed shah et. al (2014), formulation evaluation and antibacterial efficiency of herbal Hand wash gel. The objective seen in this research project was to formulate and evaluate polyherbal hand wash gel containing cinnamon oil. The anti - microbial activity of formulated herbal Hand wash gel was tested against e. coli, S. Aureus and salmonella and the results obtained were compared with commercial antibacterial standards. Mashood Ahmed shah et. al firstly collect the cinnamon, mentha, lavender, eucalyptus and nutmeg oil from alpha chemicals, India. S. aureus, E. coli and salmonella were collected from department of microbiology, lincoln University college Malaysia In this synerio preliminary anti - microbial screening by spread plate technique against gram positive and gram negative bacteria. Mashood Ahmed shah et. al prepared formulation of 100 ml and these concentrations were further used in the formulation and evaluation parameter was checked. The results reveled in the project of mashood Ahmed shah et. al was cinnamon oil shows great activity. The widest the zone of inhibition against S. Aureus with diameter of 4.0 cm, E. coli 3.5cm followed by salmonella 3.0cm [12].

3. Problem definition

Synthetic soap containing solutions that are now commonly available in the market do help reduce health care associated transmission of contagious diseases & pathogens more effectively but they do have some shortcomings or adverse effects. Their frequent use can lead to skin irritation and also create resistant among pathogens. Also the companies manufacturing such synthetic formulations leave these harmful chemicals into the environment which may lead to disturbance in the various eco systems. So this study gives a new approach to come back antibiotic resistant of pathogenic organism and provide safe and healthy living through germ free hand. As Herbal Hand wash contains natural ingredients that do overcome pathogenic resistance and also if left in the environment will not create any disturbance in the eco systems.

4. Materials and method

4.1 Collection of plant material:

The plants Neem [Azadirachta indica] & Peppermint [Mentha piperita] leaves were collected from Gurukrupa Institute of Pharmacy College Campus, Majalgaon. 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, Clove oil and Tulsi oil were collected from the local market of Majalgaon. Soil extract were chosen for antibacterial activity.

4.2 Extraction of plant material:

10 grams of each dry plant material Neem, Peppermint powder and 5gm of Ritha powder were added in water. The mixture was heated on water bath at 60^0 C for 1 hour, and then filtered through Whatman Filter Paper to get the Particle free Extract. [8], [10]

4.3 Authentication of plant material

The plant material was Identified and Authentify by Dr. I. B. Salunkhe (M. SC., Ph. D., and Head Department of Botany), Sunderrao Solanke Mahavidyalay, and Majalgaon. [11]

4.4 Method of Preparation

1) Polyherbal Hand wash Gel was prepared using Carbopol 940 as Gelling agent which is socked in 15ml distilled water overnight.
2) Neem and Peppermint extracts, Ritha Powder along with Tulsi and Clove 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 [8], [9]

4.5 Formulation Table:

Table 1: Formulation Table

Sr. No.	Ingredients	Quantity (gm/ml)	Uses
1	Neem	10	Antimicrobial Agent
2	Tulsi	10	Purifying Agent
3	Pudina	5	Antibacterial Agent
4	Clove Oil	0.50	Antibacterial Agent
5	Ritha	5	Foaming Agent
6	SLS	3	Foaming agent
7	Carbopol 940	5	Gelling Agent
8	Methyl Paraben	0.50	Preservative
9	Glycerin	2.5	Softening Agent
10	Rose Oil	Q. S.	Perfume
11	Distilled Water	Up to 100ml	Vehicle
12	Turmeric	Q. S.	Colorant

4.6 Evaluation Parameters of Polyherbal Hand wash Gel

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

1) 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. [8], [9], [12], [13]

2) Appearance and Homogenicity:
Appearance and Homogenicity was evaluated by visual inspection. [8], [9], [14]

3) Grittiness:
1ml of Gel was taken on finger tips and rubbed between two fingertips, then the formulation was evaluated. [12], [14], [15]

4) 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. [9], [15]

5) 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. [8], [9], [12], [14], [16], [23]

6) Spread ability:
0.5gm 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. [9], [12], [17]

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

8) 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]

9) 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]

10) 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]

11) 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 × 0.29
DP = 29 %

12) 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]

13) Antimicrobial Study of Polyherbal Hand wash Gel:
The Screening of anti - microbial efficacy of the formulated Polyherbal Hand wash 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 (Patanjali), Second one with Formulated Polyherbal Hand wash Gel. It was taken care that sample should 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. [14], [18], [21].

5. Result and Discussion

Table 2: Result and discussion

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	No irritation	No Irritation
7	pH	7.92	8.11
8	Foam Retention	15ml	18ml
9	Stability	Stable	Stable
10	Cleaning Action	29%	29%
11	Dirt dispersion	Light	Light

5.1 Viscosity

Table 3: Viscosityof Formulated Polyherbal Hand wash

Sr. No.	Time (min)
1	05: 24: 99
2	06: 04: 54
3	06: 32: 23

Table 4: Viscosity of marketed Hand wash

Sr. No.	Time (min)
1	10: 28: 31
2	08: 57: 11
3	09: 16: 41

5.2 Spread ability

Table 5: Spreadability of formulated polyherbal hand wash

Sr. No.	*Diameter (cm)*	*Radius (cm)*
1	3.4	1.7
2	4	2
3	4.2	2.1

Table 6: Spreadability of marketed hand wash

Sr. No.	*Diameter (cm)*	*Radius (cm)*
1	3.5	1.75
2	3.5	1.75
3	4.0	2.0

5.3 Foam Height

Table 7: Foam Height of formulated polyherbal hand wash gel

Test tube	*Sample: water*	*Foam Height (cm)*
1	1: 9	1
2	2: 8	1.3
3	3: 7	1.4
4	4: 6	1.5
5	5: 5	1.8
6	6: 4	2
7	7: 3	2
8	8: 2	2.3
9	9: 1	3.3
10	10: 0	3.5

Table 8: Foamheight of marketed hand wash

Test tube	*Sample: water*	*Foam Height (cm)*
1	1: 9	0.5
2	2: 8	1
3	3: 7	2
4	4: 6	2.1
5	5: 5	2.3
6	6: 4	2.7
7	7: 3	3.8
8	8: 2	4.0
9	9: 1	4.2
10	10: 0	4.4

5.4 Antimicrobial Activity

Table 9: Antimicrobial activity Formulated Polyherbal Hand wash Gel

Efficacy	Diameter
Before Incubation	1.8cm
After Incubation	3.4cm

Table 10: Antimicrobial activity of marketed hand wash

Efficacy	Diameter
Before Incubation	1.8cm
After Incubation	3.6cm

Figure 1 (a): before incubation of formulated polyherbal hand wash

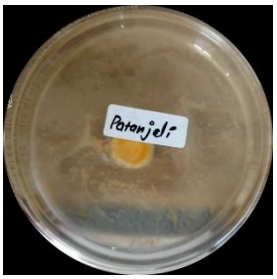

Figure 1 (b): before incubation of marketed hand wash

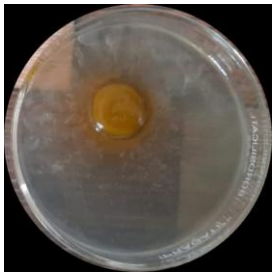

Figure 2 (a): after incubation of formulated polyherbal hand wash

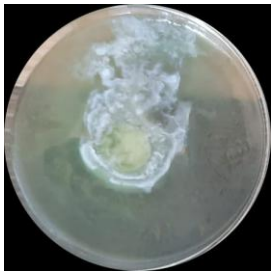

Figure 2 (b): after incubation of marketed hand wash

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

6. 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 foof primarypect of 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.

7. Future Scope

Many of the chemical Hand washes are now available in the market as alcohol based sanitizers consisting of other synthetic detergents. Alcohols and Detergents do reduce health care related transmission of harmful diseases but they do also have some short comings and adverse effects on human tissues and environment. Frequent use of such synthetic chemical based formulations can lead to skin irritation and also resistant among pathogens. Production cost of such synthetic formulations are also high, due to addition of synthetic chemicals & alcohols. To overcome these problems it's necessary to replace synthetic chemicals with natural ingredients. As natural ingredients don't have any adverse effects on human skin and environment. Hence Herbal Hand Wash can be a new way developed to combat antibiotic resistant of pathogenic organism and provide safe, healthy, natural living through germ free hands. Furthermore such Herbal formulations can also reduce the manufacturing cost and proven to be more economical than synthetic chemicals as these herbs are easily available in the environment in abundant and also can be cultivated easily.

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