

Study and Development of Antibacterial Polyherbal Hand Wash

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Abstract - Good hand hygiene is a highly cost-effective public health measure, and a cornerstone of safe and effective health care. It is crucial to protecting against a range of diseases, stopping the transmission of COVID-19, and preventing other outbreak-related diseases. Many of the chemical antiseptic are now available in market as alcohol-based sanitizers, chlorohexidine products, etc. These soaps or solutions helps to reduce health care associated transmission of contagious disease more effectively but they have some shortcomings or adverse effects.

The aim of present work was to prepare formulations of polyherbal handwash from the leaves of *Blumea lacera* (Bhamurda), *Azadirachta indica* (Neem) and *Ocimum sanctum* (Tulsi). Patch test of the formulated hand wash shown no swelling, irritation or redness. Comparative study of formulated handwash with marketed handwash found the results with pH 7.76, colour greenish brown, homogenous texture, stable with foam retention of 12 ml and viscosity time in minutes 04: 24. Feasibility of process, utilization of readily available nearby medicinal plants, inherently safe product and low product development cost are the key strengths of present work. The screening of anti-microbial efficiency of the formulated poly herbal hand wash have shown potent anti-microbial activity against two different micro-organisms *Staphylococcus aureus* and *Escherchia coli*.

Keywords: *Blumea lacera* (Bhamurda), Polyherbal handwash, *Staphylococcus aureus* and *Escherchia coli*.

I. INTRODUCTION

The current COVID-19 pandemic has seen a focus of education and information on handwashing aimed both at people working within the health sector as well as to the general public. There has been a proliferation of public health messages through various sources about the importance of handwashing, and the correct techniques for handwashing.

Skin being the most exposed part of our body requires protection from skin pathogens. The hands of Health Care workers (HCWs) are the primary routes of transmission of multidrug resistant pathogens and infection to the patients. Hence, it brings up the use of antiseptic for hand wash purpose. 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 hands [1-3]. Many of the chemical antiseptics are now available in market as alcohol-based sanitizers, chlorhexidine products etc [4-5]. These soaps or solutions help to reduce health care associated transmission of contagious diseases more effectively but they have some shortcomings or adverse effects. Their frequent use can lead

to skin irritation and also resistant among pathogens. The aim of present work was to prepare formulations of polyherbal handwash from the ethanolic extracts of leaves of *Blumea lacera* (Bhamurda), *Azadirachta indica* (Neem), and *Ocimum sanctum*. **Fig 1.**

Blumea lacera was used to treat skin tumors, tumors being defined by the FMP as unexplained swellings on the skin surface. The FMPs did not understand the causative agent(s) behind various skin infections like ringworm or other fungal or bacterial skin infections. Their treatments were based on visual inspection of the skin. As a result, most of the infections were simply termed “charma rogh” for disease or disorder preparations are reportedly efficacious against a variety of skin diseases, septic sores, and infected burns. The leaves, applied in the form of poultices or decoctions, are also recommended for boils, ulcers, and eczema. The oil is used for skin diseases such as scrofula, indolent ulcers, and ringworm [6-8].

Neem (*Azadirachta indica*) tree has attracted worldwide prominence owing to its wide range of medicinal properties. Neem leaf and its constituents have been demonstrated to exhibit immunomodulatory, anti-inflammatory, antihyperglycaemic, antiulcer, antimalarial, antifungal,

antibacterial, antioxidant, antimutagenic and anticarcinogenic properties. Neem leaves possess a wide spectrum of antibacterial action against gram-negative and gram-positive microorganisms [9].

Ocimum sanctum has shown very good results in skin diseases and it is often taken as health drink. It is also found effective in treating wrinkles, stretch marks and

pigmentations. It also seems to be able to speed wound healing by improving blood circulation through the area and preventing cell death around a wound [10-12]. The present work is oriented at the study and development of Polyherbal Hand wash and the estimation of its various aspects for its evaluability. The results from the present work support the incorporation and utilization of herbs for the development of herbal handwash to give a better effect.

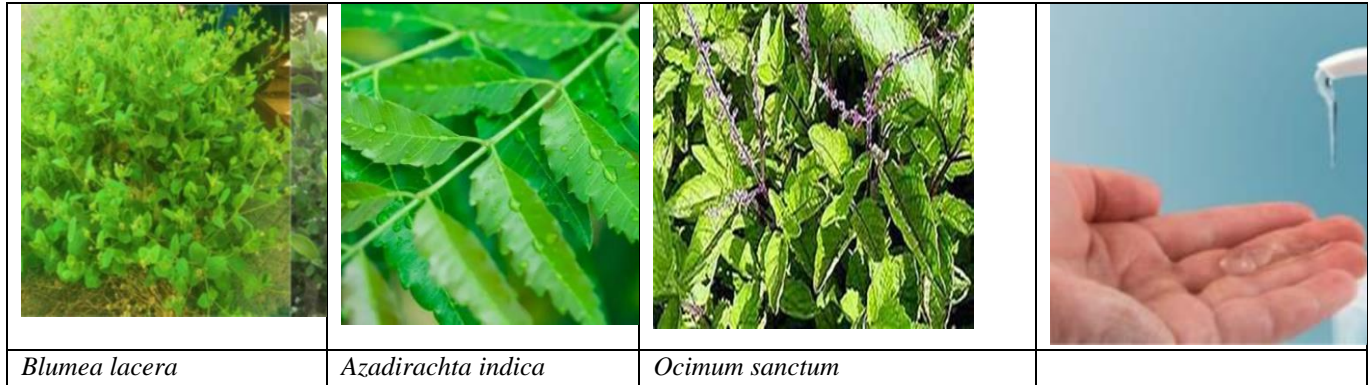


Fig.1: Plant species required for making formulations

II. MATERIALS AND METHODS

1. Collection of plant materials:

The plants *Blumea lacera*, *Azadirachta indica* and *Ocimum sanctum* were collected from college botanical garden. The ingredients required for formulation are as shown in Fig.2.

2. Preparation of herbal leaf extracts:

The leaves of collected plants *Blumea lacera* and *Azadirachta indica* are thoroughly washed and sun dried for 2-3 days. The desired amount of coarsely powdered leaves of selected plants were soaked in 50 % ethanol for 3 days. After maceration the extract was filtered and the filtrate was used for further procedure.

Preparations of herbal hand wash formulations: Herbal hand wash formulations were prepared according to composition given in table 1. To the 50 ml of extract required amount of Sodium lauryl sulphate along with glycerine were mixed with continuous stirring. The methyl paraben was dissolved in remaining quantity of purified water and dispersed into the extract. Rosemary oil was added for Fragrance. The formulated hand wash gel was filled in container and stored at cool and dry place until further evaluation.

Table 1: Formulation of Poly herbal hand wash F-1

Ingredients	Expected Quantity	Uses
Dried leaves of <i>Blumea lacera</i>	30 gm	Antimicrobial properties
Dried leaves of <i>Azadirachta indica</i>	10 gm	Antimicrobial properties
Dried leaves of <i>Ocimum sanctum</i>	10 gm	Antimicrobial properties
Sodium lauryl sulphate (SLS)	5 gms	Surfactant/Emulsifying cleaning agent

Glycerin	30 ml	Softening Agent
Methyl paraben	1.0 gms	Preservative
Rosemary oil	5 ml	Perfume
Purified water	Up to 100 ml	Vehicle



Fig.2: Ingredients required for making herbal formulations

Evaluation [13-14]

Physical Evaluation

Physical evaluation (colour) was done by sensory and visual inspection.

pH determination

One gram of sample of herbal hand wash was taken and dissolved it into 100 ml distilled water. The pH of solution was measured by previously standardized digital pH meter.

Viscosity

The viscosity of hand wash gel was determined by using digital Brook filed viscometer DV-II. Measured quantity of hand wash gel was taken into a beaker and the tip of

viscometer was immersed into the hand wash gel and viscosity was measured.

Foam height

1 gm of sample of polyherbal handwash was taken and dispersed in 50 ml distilled water dispersion was transferred into measuring cylinder. Volume was made up to 100 ml with water. This solution was taken in 10 test tubes in the series of successive portion of 1, 2, 3...10 ml and remaining volume is made up with water to 10 ml. Then the test tube was shaken for 15 sec. Then the test tube allowed to stand for 15 min. and the height of foam was measured.

Spread ability

A sample of 0.5 g of each formula was pressed between two slides and left for about 5 minutes where no more spreading was expected Diameters of spreader circles were measured in cm and were taken as comparative values for spread ability. The results obtained are average of three determinations.

Determination of Homogeneity

The formulated gels were examined for their colour, clarity, and homogeneity and phase Separation by visual inspection.

Stability: The Stability studies were carried out for Polyherbal Hand wash 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.

Cleaning Action

Table 2: Comparative study of formulated handwash with marketed handwash

Physical parameters	Present Work (Formulated hand wash)	Marketed hand wash 1 Aloe vera	Patanjali antibacterial hand wash2	Appolos lemon gram hand wash3
Colour	Greenish brown	Green	Yellowish pink	Yellow
pH	7.76	7.38	8.93	7.39
Homogeneity	Homogeneous	Homogeneous	Homogeneous	Homogeneous
Texture	Turbid	Translucent	Translucent	Translucent
Foam Retention	12 ml	8 ml	15 ml	13 ml
Stability	Stable	Stable	Stable	Stable
Viscosity time in minutes	04: 24: 99	10: 28: 31	09: 16: 41	08: 57: 11

Study of antibacterial activity of formulated hand wash

The organisms used were Staphylococcus aureus (Gram +ve) and Escherichia coli (Gram -ve) **Fig 3.** Agar well plate diffusion method was used to study the antibacterial activity. Results are as shown in **table 3**

2 gm wool was taken and placed in grease; the same was then placed in a 100 ml of water containing 1gm of Polyherbal Hand wash in a beaker and was shaken for 5 minutes. The solution was removed and sample was taken out, dried and weighed. The amount of grease removed was calculated using the formula.

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

DP = Percentage of Detergency power

T = Weight of Formulated Preparation

C = Weight of Marketed Preparation

And percentage of detergency power was found 31%

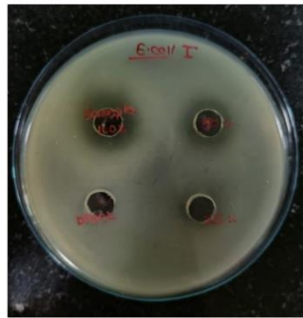
Dirt dispersion test 1ml of Polyherbal Hand wash was added in a test tube containing 10ml of distilled water. A drop of Indian ink was added; the test tube was stoppered and shaken. The amount of ink in the foam was estimated as none, light, moderate, or heavy [15]

Skin irritation test

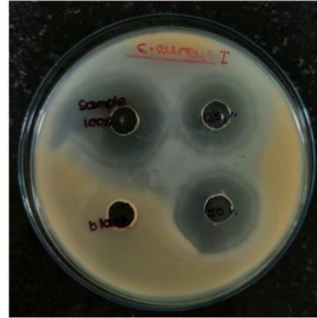
Skin irritation test (primary) was planned to perform on human volunteers, for each gel, five volunteers were selected. 1.0g of formulation herbal hand wash was applied on an area of 2 square inch to the back of hand, covered with cotton and secured firmly in adhesive plaster. This was allowed to remain in close contact with the skin for over 24 hours, after which the site of application was examined for any signs of lesions or irritation [16-21]. The formulated handwash is then compared with three different marketed handwash and the results are as shown in **table 2**

Table 3: Study of antibacterial activity of formulated hand wash

Concentration of sample	Zone of inhibition (E coli)	Zone of inhibition (S. Aureus)
1.5	19 mm	30 mm
1.0	15 mm	26 mm
0.8	12 mm	24 mm
Standard drug Streptomycin 0.8 µg/ml	11 mm	12 mm



Antibacterial activity against E.coli



Antibacterial activity against S. Aureus

Fig.3. Screening of antibacterial activity of formulated hand wash

III. CONCLUSION

The present study was carried out to formulate polyherbal hand wash gel containing herbal extract which can be used not only for the purpose of cleaning hands but also for the prevention of bacterial growth. Utilization of herbs *Blumea lacera* in combination with *Azadirachta indica* and *Ocimum sanctum* in prepared handwash showed pH 7.76, greenish brown color, homogenous texture, stable with foam retention of 12 ml and viscosity time in minutes 04: 24. Formulated hand wash showed potent antibacterial activity with inhibition zone of 12 mm and 24 mm against bacterial stain *Staphylococcus aureus* (Gram +ve) and *Escherichia coli* (Gram -ve) which was within range to that of standard drug streptomycin.

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.

IV. REFERENCES

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