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### FORMULATION OF POLY HERBAL HAND WASH WITH ANTIMICROBIAL ACTIVITY

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#### ABSTRACT

Hand hygiene is vital principle and exercise in the prevention, control and reduction of health care acquired infections. To avoid the adverse effects like itching, irritation, dermatitis etc., of the synthetic hand wash formulations an attempt has been made to formulate a polyherbal hand wash by using herbs which have antimicrobial property. The ethanolic extracts of leaves of *Mimosa pudica* (touch me not), *Azadirachta indica* (neem) and fruits of *Sapindus mukorossi* (reetha). The antimicrobial activity of prepared hand wash formulations was checked against skin pathogens *Bacillus subtilis*, *Escherichia coli* by cup plate method. Two herbal formulations showed significant antimicrobial activity than the commercially available standard hand wash (synthetic-dettol, herbal-pathanjali). So these plants materials can be used in the preparation of herbal hand wash on commercial scale.

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## INTRODUCTION

Hygiene is defined as maintenance of cleanliness practices which carries utmost importance in maintenance of health<sup>[1]</sup>. One of the primary modes of transmission of microorganisms are hands. To prevent the spreading of contagious diseases hand washing is absolutely important precaution. Hand washing is critical in food service and food production operations. It is also important in homes and day care operations<sup>[2]</sup>. Many marketed hand washes are chemical based so their frequent use can lead to skin irritation and also resistant among pathogens<sup>[3]</sup>. Plant extracts and products have been used for centuries in traditional medicine, functional food etc.. The main advantage of using natural source is that they are easily available, cheap and harmless compared to chemical products. Therefore research has been increased tremendously towards making natural products with improved quality yet less expensive and no side effects over chemical product<sup>[4]</sup>.

*Mimosa pudica* L. (Fabaceae) also referred Touch me not, Shameful plant, live and die. Leaves of this plant contain alkaloids, tannins, sterols, terpenoids, fatty acids and flavanoid c-glycosides<sup>[5]</sup> which are responsible for the antimicrobial activity. It also possesses antivenom, antifertility, anticonvulsant, antidepressant, aphrodisiac and various other pharmacological activities<sup>[6]</sup>.

*Azadirachta indica* (Meliaceae<sup>[7]</sup>). also referred Neem, margosa tree or Indian lilac. Various parts of neem tree have been used as traditional ayurvedic medicine in India. Neem leaves possess Terpenoids, alkaloids, tannins, saponins, flavanoids, amino acids<sup>[8]</sup>. It has wide spectrum of antimicrobial activity against gram-negative and gram-positive microorganisms. It is also used in many medicinal treatments like skin diseases, healthy pair, improve liver function, detoxify the blood, pest and disease control, fever reduction, dental treatments, cough, asthma, ulcers, piles, intestinal worms, urinary diseases etc<sup>[9]</sup>.

*Sapindus mukorossi* (Sapindaceae). Also referred as Reetha, Soap nuts, Chinese soap berry. It is a well known plant in the Indian medicinal system and is a popular ingredient of ayurvedic shampoos and cleaners also possesses foam properties, detergent abilities and long term preservative efficacy.

## METHODS

### Collection of plant materials:

*Mimosa pudica* (Touch me not) was collected from Kondaveedu Fort, in month of January. *Sapindus mukorossi* (Reetha) was collected from local market, Narasaraopet. *Azadirachta indica* (Neem) was collected from A.M.Reddy College of Pharmacy campus.

### Authentication of plant materials:

All collected plant materials were authenticated from Department of Botany, Acharya Nagarjuna University, Nagarjuna Nagar, Guntur.

### Extraction of plant materials:

Collected leaves of *Azadirachta indica*, *Mimosa pudica* were air dried and powdered using mixer grinder. 10gms of coarsely powdered leaves of both plants were soaked in 200 ml of ethanol and kept for maceration for about 3-4 days. After maceration the extract is filtered and the filtrate was collected and used for making hand wash.

Fruits of *Sapindus mukorossi* were dried, powdered and extracted using distilled water.

## FORMULATION OF HERBAL HAND WASH:

### Formulation I:

Herbal hand wash was prepared using carbopol-940 as a gelling agent in 0.5% w/v concentration with distilled water overnight. Then the swelled polymer was stirred using a mechanical stirrer to ensure the uniform dispersion of the polymer. The pH was adjusted to 7.0. Then this base was used to incorporate extract of *Azadirachta indica* and *mimosa pudica* to prepare formulation of hand wash by using sodium lauryl sulphate as a surfactant.

### Formulation II:

Herbal hand wash was prepared using carbopol-980 as a gelling agent in 0.5% w/v concentration with distilled water overnight. Then the swelled polymer was stirred using a mechanical stirrer to ensure the uniform dispersion of the polymer. The pH was adjusted to 7.0. Then this base was used to incorporate extract of *Azadirachta indica* and *mimosa pudica* to prepare formulation of hand wash by using *Sapindus mukorossi* as a surfactant.

## FORMULATION OF HERBAL HAND WASH:

Table.1: preparation of Formulation I.

| S.NO | Ingredients   | Quantity   |
|------|---|------------|
| 1    | Ethanol extract of <i>Mimosa pudica</i> and <i>Azadirachta indica</i> | 20ml       |
| 2    | Carbopol 940  | 40ml       |
| 3    | Sodium lauryl sulphate  | 6gms       |
| 4    | Rosemerry oil   | 5ml        |
| 5    | Distilled water   | Upto 100ml |

Table.2: preparation of Formulation II.

| S.NO | Ingredients  | Quantity   |
|------|--|------------|
| 1    | Ethanoic extract of <i>Mimosa pudica</i> and <i>Azadirachta indica</i> | 20ml       |
| 2    | Carbopol940  | 40ml       |
| 3    | Rosemerry oil  | 5ml        |
| 4    | Aqueous extract of <i>Sapundus mukorossi</i>                           | Upto 100ml |

### Evaluation of antimicrobial activity

Agar well diffusion method was performed for the determination of antimicrobial activity. After sterilization of nutrient medium and petridishes transfer into laminar air flow unit for aseptic transfer. 0.25µl of each bacterial inoculum was added to 25ml of nutrient medium and pour into petridishes after solidification cups were made by using borer (5mm). 50µl of test formulations I & II, synthetic handwash (dettol), marketed herbal hand wash (pathanjali) were added to each cup. Then the plates were incubated at 37°C for 24hrs in the incubator. After incubation, the diameter of clear zone of inhibition produced around the well was measured in mm compared to the standards(synthetic-Dettol, Herbal- pathanjali).

### RESULTS & DISCUSSION

The antimicrobial efficacy of the formulations of poly herbal hand wash was tested on *Staphylococcus aureus* and *Escherichia coli* by agar plate technique. The result of zone of inhibition showed that the herbal hand wash (I&II) shown significant antimicrobial activity than marketed products(dettol&pathanjali). The handwash prepared with Reetha showed little higher activity than the formulation with SLS because the SLS may interfere the activity of extracts

Table.9 :zone of inhibition of Formulations I&amp;II.

| S.NO | Standard and test samples             | <i>Escherichiacoli</i> | <i>Staphylococcus aureus</i> |
|------|---------------------------------------|------------------------|------------------------------|
| 1    | Synthetic hand wash (dettol)          | 14mm                   | 12mm                         |
| 2    | Marketed herbal hand wash(pathanjali) | 18mm                   | 16mm                         |
| 3    | Formulation I                         | 21mm                   | 19mm                         |
| 4    | Formulation II                        | 25mm                   | 24mm                         |

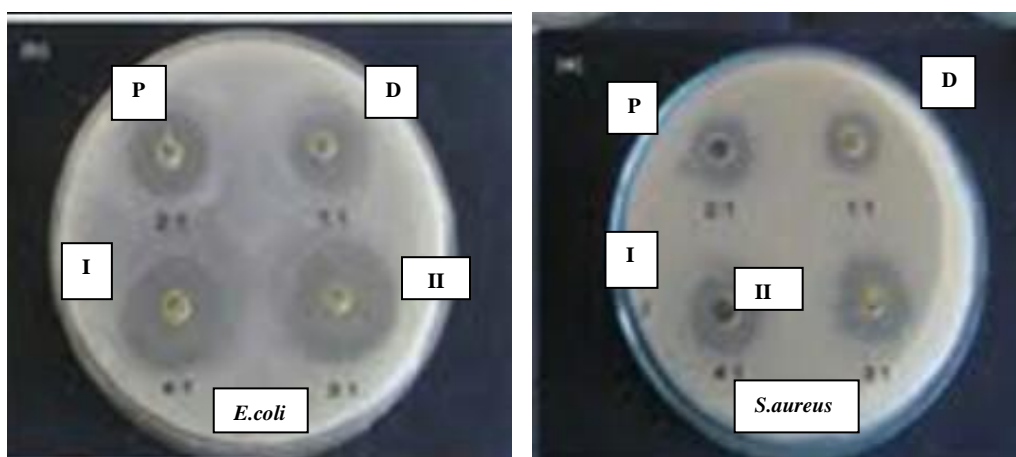
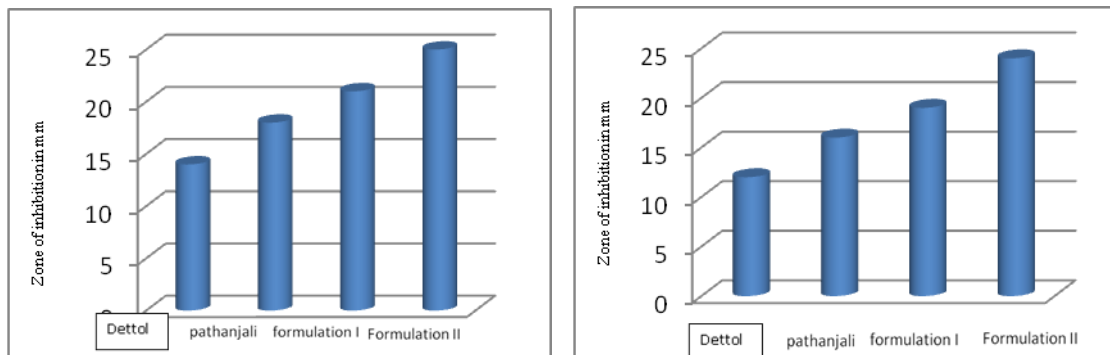


Figure .1: plates showing zone of inhibition for different organisms.

Figure.2 : antimicrobial activity of formulations on *E.coli*.Figure.3 : antimicrobial activity of formulations on *S.aureus*

## CONCLUSION

The results suggests that ethanolic extracts of *Mimosa pudica*, *Azadirachta indica* and their combinations with *Sapindus mukorossi* are capable of giving superior zone of inhibition to protect against the skin pathogens compared to pathanjali & dettol. Thus herbal hand wash prepared with plant extracts shows maximum activity and it has no side effects like skin rash and dryness.

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