

## REVIEW ARTICLE ON : POLY-HERBAL HAND SANITIZER

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### ABSTRACT

*The growing demand for natural and safe alternatives to chemical-based hand sanitizers has led to the exploration of herbal formulations with antimicrobial properties. This study focuses on the formulation and evaluation of a polyherbal hand sanitizer using extracts of lemon (Citrus limon), papaya (Carica papaya), and aloe vera (Aloe barbadense miller). The selected herbs are known for their potent antimicrobial, antioxidant, and skin-soothing properties. The hand sanitizer was prepared using herbal extracts, glycerin, Carbopol, and natural fragrances to create a stable and skin-friendly gel. The formulation was evaluated for physicochemical properties, including pH, viscosity, spread ability, and stability, along with antimicrobial efficacy against common pathogens such as Escherichia coli and Staphylococcus aureus. Results indicated that the polyherbal hand sanitizer exhibited excellent antibacterial activity, maintained a skin-friendly pH, demonstrated good spread ability, and remained stable over a three-month observation period. The study concludes that the developed polyherbal hand sanitizer is an effective, natural, and safe alternative to conventional alcohol-based products.*

**KEYWORDS:** - Polyherbal hand sanitizer, Herbal formulation, antimicrobial properties, Antibacterial activity.

### 1. INTRODUCTION :

Hands are primary mode of transmission of microbes and infections; Hand hygiene is therefore the most important measure to avoid the transmission of harmful germs and prevent the infections. Hand hygiene

is the single most important, simplest, and least expensive means of preventing nosocomial infections. Contaminated hands can serve as vectors for the transmission of microorganisms. Pathogenic microorganisms accountable for outbreaks are spread from the hands. [1]

Hand hygiene is a key principle and exercise in the prevention, control and reduction of infections. The bacteria reside on hands are classified in two categories namely resident or transient. The resident flora is residing under the stratum corneum and can be found on surface of skin, namely Staphylococcus epidermis, S. hominis, Corynebacteria, Propionibacterium, Dermo bacteria, Micrococci and fungi Malassezia spp. The resident flora protects skin and has antagonistic functions, but cause infections in sterile body cavities, eyes or on non-intact skin. Transient flora colonizes the superficial layers of the skin and gets removed by routine hand hygiene, this flora if not cleaned can causes harmful infection like covid 19. These harmful microorganisms cannot be removed by just washing hands therefore the hand sanitizing is the best methods to eradicate these types of microorganism.[2]

Long use of these sanitizer can be harmful to skin thus poly herbal hand

sanitizer is in great demand these sanitizers. The sanitizer contains extracts of herbs, ethanol, isopropyl alcohol, hydrogen peroxide, camphor, distilled water and glycerol to provide soothing effect in sanitizer. Plants are rich in vast variety of secondary metabolites such as tannins, terpenoids, alkaloids and flavonoids etc. which have been found to possess in vitro antimicrobial properties, considering this demand, an attempt has been made to screen the classical literature for the herbs with antimicrobial properties. Due to its antimicrobial activities these herbs are used in formulation in number of herb-based hand sanitizer.

[2] The medicinal herbs used are as follows:

### Sanitizer

Sanitizer is a substance or fluid designed to kill germs on skin and objects. It is a liquid or gel, typically one containing alcohol, that is used to clean the hands and kill infection-causing microorganisms.

Hand sanitizer, also called hand antiseptic, hand rub, or hand rub, agent applied to the hands for the purpose of removing common pathogens (disease-causing organisms). Hand sanitizers typically come in foam, gel, or liquid form.[6]

### ➤ WHO formulations

The World Health Organization has published the following formulations to guide to the production of large quantities of hand sanitizer from chemicals available in developing countries, where commercial hand sanitizer may not be available. [8]

### Hand sanitizer types

There are primarily two types of hand sanitizers: alcohol-based and alcohol-free.

1. Alcohol-based hand sanitizers or hand

rub contain different types of alcohol in varying amounts. The concentration of alcohol varies from anywhere between 20% to 95%, depending on the use it is specified for and the brand selling it. The types of alcohol used for are IPA, propanol, and ethanol.

2. Alcohol-free hand sanitizers contain substances like chlorohexidine gluconate, octenidine, triclosan, and benzalkonium chloride instead of alcohol to reduce the harmful effects of microbes, but this is comparatively less effective than alcohol.[2]

### ➤ Uses:

1. Hand sanitizers are a convenient alternative when handwashing with soap and water isn't possible
2. Hand sanitizer kills pathogens present on our hands and diminishes transmission of germs also from one person to another.
3. Sanitizers have ethyl alcohol, isopropyl alcohol, and the antibacterial substance triclosan
4. The use of hand sanitizer can help us fight against the Coronavirus effectively.

### Drug And Excipient Profile :

The plants leaves were collected for the preparation of sanitizer from in and around the campus. The plant selected on the basis of its potent antimicrobial activity reported in research articles. The plants used for the study *Aloe barbadense* (Ghrithkumari), *Carica papaya* (papaya) and limon citrus (lemon). The plants leave collected were weight, washed, cleaned and shade dried in laboratory.[20]

- Aloe vera: fresh leaves of *aloe barbadensis* were collected from the campus of Terna college of pharmacy. It contains active ingredient Aloe- emodin
- Lemon: freshly ripened *limon citrus* was collected from the same campus. It contains active ingredient Vit .C & Citric acid.
- Papaya: Ripe papaya is mainly orange in colour was collect from local market. It contains active ingredient enzyme Papain.



Fig.1.papaya



Fi.2. lemon

**Chemicals and reagents**

- ✓ Water is used as a solvent
- ✓ Isopropyl alcohol-antiseptic
- ✓ Glycerine- humectants
- ✓ Perfume –imparts flavour. □ Preservative- prevents micro-organisms □

Carbopol 940-as thickening agent.

- ✓ Triethanolamine-emulsifier and surfactant.
  - ✓ Polysorbate 20 - detergent and emulsifier.
- Table No.3 List of Ingredients and Their Quantities

Sr. No.	Ingredients	Quantity
1	Papaya	10gm
2	Lemon	10ml
3	Aloe Vera	10ml
4	Carbapol940	1gm
5	Triethanolamine	1ml
6	Glycerine	5ml
7	Polysorbate 20	1ml
8	Perfume	1ml
9	Preservative	1gm
10	Alcohol	40ml
11	Water	20ml

**Equipment**

- A beaker or other container for mixing (250 ml)
- Measuring cylinders and measuring jugs
- Micropipette
- lactic or silicone spatula
- Weighing balance or electronic scales
- Electric mixer or homogeniser
- A glass or plastic dispensing bottle (minimum 100 ml in volume) [11]

**6 Methodology**

- i. Clean the working surface.
- ii. Gather all ingredients and herbal plant extract.
- iii. Graduate final dispensing bottle by marking the level equivalent to 100 ml.
- iv. Measure the 75.2ml of isopropyl alcohol using measuring cylinder. Cover and set aside. (to avoid evaporation)
- v. Measure 20 ml of sterile distilled water or boiled cold water using measuring cylinder. Set aside until needed.
- vi. Measure 4 ml of glycerine using a measuring cylinder or micropipette and then pour it into mixing container.
- vii. Weigh 1g of carbapol-940 and disperse it gradually into the solution mixture to avoid the formation of gel lumps. Use a mixer or homogeniser to hasten the process.
- viii. Add polysorbate 20 for emulsifying the formulation.
- ix. Add the measured alcohol into mixing container. A mixer or homogeniser can be used to help mixing process.
- x. Add preservative and perfume. Empty the solution into dispensing bottle.
- xi. Add sterile distilled water or cold boiled water into the dispensing bottle, up to the 100 ml mark.
- xii. Place the lid on the dispensing bottle as soon as possible to prevent evaporation.
- xiii. Mix the solution by shaking the bottle gently.
- xiv. Store the solution for 72 hours before use to make sure that any microbes in the alcohol or the bottles will be destroyed.[11]

#### 7 Evaluation Test:

1 Organoleptic Properties:

Tests like Colour, Odour and clarity were carried out. 2 Physical properties:

- a) pH: The pH was determined by using pH paper.
- b) Irritancy test: 5 healthy volunteers were selected. The herbal hand sanitizer was applied on palm and time was noted. Irritancy, redness, dryness and itching were checked.
- c) Antibacterial Test: The antibacterial activity of herbal hand sanitizer using different solvents against strains of aerobic and anaerobic micro-organism was evaluated by standard cup plate method. For this standard cup plate method, the nutrient agar medium was used as a culture media.

#### 8 CONCLUSIONS

It concluded that active ingredients of gel-based sanitizer, Carica Papaya, Aloe barbadensis, lemon citrus were used in combination and showed powerful antimicrobial property, good spread ability, no phase separation and no irritancy during study period. Ingredients of Lemon (antioxidant), aloe vera (antimicrobial), and papaya (antibacterial) is responsible for killing of microorganisms and protect the skin. So, we can use this herbal formulation as sanitizer in effective way.

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