



“A REVIEW : FORMULATION AND EVALUATION OF NOVEL SHAVING GEL CONTAINING SILVER NANOPARTICLES”

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ABSTRACT:

Hand hygiene is a vital principle and exercise in the prevention, control, and reduction of healthcare acquired infections. Right hand washing and drying methods stop the chain of transmission of deadly pathogens (from the contaminated surface/site) from hands to other parts of the body. Hand sanitization is the preeminent aid in preventing nosocomial infections caused by different opportunistic microorganisms and to get this, the use of hand sanitizer becomes a must in recent circumstances. The purpose of present study was to prepare herbal hand sanitizer incorporating the leaves extracts of *Ocimum Sanctum* Linn.(Tulsi) and *Eucalyptus globules* (Nilgiri), the well-known herbal combination with multidimensional activities; and to evaluate their respective antimicrobial efficacy and safety of hands. The formulation was evaluated against the specified microorganism (Bacteria- *E. coli*, *Bacillus subtilis*) by culture of sensitivity test. The significance was found to be more in comparison to the standard reference.

Keywords: Hand hygiene, antimicrobial activity, nosocomial infections, herbal sanitizer.

Introduction:

Hygiene is defined as maintenance of cleanliness practices which carries supreme importance in maintenance of health. Disease causing germs are present around you all the time. One main route of infections of these pathogens is your hand. Your hands are constantly touching around you, picking up pathogens as they always go to these harmful substances to infect you or spread to others. To prevent this, the Center for Disease Control and Prevention recommends the regular washing of your hands with soap and water. Unfortunately, clean water and soap are always not available. So, in these cases the use of hand sanitizer is preferable. Nowadays the hand sanitizer is predominantly used in such conditions. Sanitizer - Hand sanitizer is nothing but the alcohol based type of disinfectant preferred to hand washing with soap and water in most situations in healthcare settings. It is generally more effective at killing microorganisms and better tolerated than soap and water. The hand sanitizers are available in the form of Liquid, Gel and Foams. Types of hand sanitizers- 1) Alcohol based hand sanitizers. 2) Alcohol free hand sanitizers 1) Alcohol based hand sanitizers = Alcohol based versions of hand sanitizers typically contains isopropyl alcohol, ethanol or n-propanol. Versions that contain 60-95% alcohol are most effective. Alcohol based hand sanitizer works against the variety of microorganisms but not spores.

Some versions contain compounds such as glycerol to prevent drying of the skin. Alcohol has been used as an antiseptic at least as early as 1363 with evidence to support its use becoming available in the late 1800s. The alcohol based hand sanitizer has been commonly used in Europe at least since the 1980s. The alcohol based version is on the World Health Organization list of essential medicines, the most effective and safe medicines needed in health system. 2) Alcohol free hand sanitizers = some hand sanitizer products use agents other than alcohol to kill microorganisms such as Povidone - iodine, benzalkonium chloride or triclosan. The World Health Organization and the CDC recommends persistent antiseptic for hand sanitizer

Persistent activity is defined as the prolonged or extended antimicrobial activity that prevents or inhibits the proliferation or survival of microorganisms after application of the product. This activity may be confirmed by sampling a site several minutes or hours. Sanitizers are nothing but the disinfectant used to disinfect our hands from various micro-organisms. Sanitizers have ability to remove or kill microorganism or some bacteria which are present on our hands. The process disinfection plays major role in the control of microbial contamination and in the prevention of infection. Sanitizers are usually bactericidal but occasionally they may be bacteriostatic.

Keeping body daily hygiene and usage of cleansers are requisites of healthy living. These concepts highlight the need of maintaining hygiene in prevention of diseases. Although good & simple hygiene technique is single most important, easy and least expensive means of preventing healthcare-associated (nosocomial) infections and the spread of antimicrobial multidrug resistance; but, unfortunately poor hand-hygiene practices are still observed due to lack of scientific knowledge, unawareness of risks and unavailability of hand hygiene facilities.

Nature is the most important source of medicinal plants. Today a large number of various medicinal plants and other herbal products are present in the market, which contain phytoconstituents. In recent year the medicinal plant and herbal products are used in developing countries because these plant derived drugs have been reported to be safe and without side-effects. In India thousands of species have medicinal value and the applied of various parts of several medicinal plants to cure specific ailments. Great number of these plants are very important in modern pharmaceutical industry. They are used as therapeutic agents and raw material for the manufacture of modern and traditional medicine. These plants are an important source of bioactive substances. Medicinal plant is useful for curing as well as healing of human diseases because of the presence of bioactive compound.[1]

Today there is growing awareness in chemical composition of plant based medicines. Several bioactive constituents have been isolated and studied for pharmacological activity. During the last two decades, the pharmaceutical industry has made huge investment in pharmacological and chemical research all over the world in an attempt to discover much more potent drugs, rather, a few new drugs. In old Hindu medicine, it is widely used for the treatment of sprains and swelling caused by injury. Considering the infinite potentiality of plants as sources for antimicrobial drugs with reference to antibacterial and antifungal agents, a systematic investigation was undertaken to screen the local flora for antibacterial and antifungal activity from *Curcuma longa*, *Zingiber officinale* and *Allium sativum*. The *Curcuma longa* Turmeric is a medicinal plant widely used in Ayurveda, Unani and Siddha medicine as home remedy for various diseases. *C. longa* L., botanically related to ginger, belongs to the Zingiberaceae family. Turmeric rhizome is used as it is also considered as auspicious and is a part of religious rituals.[4] Unlike modern drugs that invariably comprise a single active species, herb extracts and/or prescriptions contain multiple active constituents. Natural compounds contained in these "herbal cocktails" can act in a synergistic manner within the human body, and can provide unique therapeutic properties with minimal or no undesirable side effects.

REVIEW OF LITERATURE

The methanol and ethanol extracts of the *C. officinalis* petals possessed good antimicrobial potential. Both extracts showed antifungal activity that is comparable with the standard antibiotic,

Fluconazole. Further clinical studies are now required to further examine the antimicrobial principles of *C. officinalis* for various useful applications. The investigated plant extracts may be used for the preservation of processed foods as well as pharmaceutical and natural therapies for the treatment of infectious diseases in humans. There is a need to search for an environmentally safe and economically viable strategy for the control of diseases and to reduce the dependence on synthetic agrochemicals. Use of plants as a source of medicine is as old as humanity. That's why the focus of the world is shifting towards natural products and analogues. These natural products or plant extracts can be exploited either as leads for chemical synthesis of new agrochemicals, or as commercial products in their own right, or as a source of inspiration to biochemists for the development of new bioassays capable of detecting other, structurally simpler, compounds with the same mode of action. Use of medicinal plants may thus offer a new source of antibacterial, antifungal and antiviral agents with significant activity against microorganisms. The study had tried to cover almost all the aspects of microbial pathogenesis and revealed that hot aq. extract of *Acacia nilotica* leaves had different effects upon bacteria, virus, and fungi with dose dependent variation in immunomodulatory and anti-inflammatory activities. Hot aq. extract of *Acacia nilotica* leaves had various active components that might have a role in variation in overall activities; therefore, further detailed studies involving a wide spectrum of bacterial, fungal, and viral species are required to prove the exact statics of each constituent of the plant extract. However, study has shown an important level of the valuable effects of *Acacia nilotica* leaves. Topical therapy is extremely important in the management of allergic, infectious, and seborrheic disorders. It can be used as a sole therapy or adjunctive therapy for these disorders, often minimizing the need for systemic therapy. In allergic diseases, pruritus can be decreased by removing allergen, desensitizing the skin or other antipruritic effects. When used for infectious conditions, topical therapy can decrease microbial counts and reduce surface colonization of microbes and help to prevent relapses. There are many different topical vehicles and modes of application: shampoos, whirlpools, soaks, rinses, sprays, lotions, gels, creams, and ointments. The practitioner needs to become familiar with many active ingredients to learn what products are indicated for specific diseases. In order to improve local therapeutic techniques for the massively burnt patients and to minimize the pain associated with dressing change, the concept of topical film was utilized to formulate a topical antimicrobial spray. The commonly used topical antimicrobial silver sulfadiazine spray was formulated as a new drug delivery system. The release of therapeutic agents in vitro from medicated spray formulation was compared with that of the corresponding cream bases, utilizing a modified agar diffusion method. When using *Pseudomonas aeruginosa* as the test bacteria, silver sulfadiazine was found to produce significantly larger zones of inhibition when used as the spray formulation instead of the creamform. Drugs from natural sources are used for treating various diseases. The literature it is clear that various types of pharmacological and biological activities are associated with *Azadiractaindica*. The leave oil of *A. indica* is known to have good antimicrobial potential. The oil of *A. indica* leaves, was tested against the different infectious microorganisms [Gram positive and negative bacteria] such as bacterial strains; *S. aureus*, *E. coli*, *B. cereus*, *P. vulgaris*, *S. typhi*, and Fungal strains; *F. oxysporum*, *A. flavus*, *A. fumigates*, *M. gypseum*, *P. notatum* and *P. Citrinum* etc. The results showed that the level of antimicrobial activities of the *A. indica* depends on both the protein and carbohydrate contents. Generally, the high level of protein and carbohydrate contents of extract had better antimicrobial activities

NEED OF INVESTIGATION

The hand sanitizers were developed for use to disinfect our hand from various virus and microorganism. They are Gels, Liquids or Foams which are contents Alcohol to kill the germs and pathogens which are present on our hands. The hand sanitizers which are alcohol based so, alcohol works immediately and effectively in order to kill Bacteria and most Viruses but, Alcohol sometimes can be very drying to the skin so, sometimes Moisturizers are also used along with Alcohol in formulation of hand sanitizer.

- Hand sanitizers are not cleaning agents and are not meant as a replacement of soap and water but, as complimentary habit sanitizers are most effective when used in conjunction with diligent hand washing.
- Hand sanitizers are convenient, portable, easy to use and not time consuming.
- Gastrointestinal and respiratory tract infection is decreased among the families who use hand sanitizer.
- Commercially prepared hand sanitizers contain ingredients that will help to prevent skin dryness.
- The use of hand sanitizer is a habit that can help us all expose to fewer germs, and therefore may decrease our chances of wellness. Whether you are on the playground, using someone else's computer or visiting a friend in the hospital.
- Hand sanitizers are also effective against fungi but not against bacterial spores.
- Hand sanitizers which are alcohol free can use natural ingredients means herbal plants like Neem oil, Clove oil, Tea tree oil, Eucalyptus oil, etc. which may kill some germs but not enough for them to be good alternatives to an Alcohol based hand sanitizer. The hand sanitizers were developed for use to disinfect our hand from various virus and microorganism. They are Gels, Liquids or Foams which are contents Alcohol to kill the germs and pathogens which are present on our hands. The hand sanitizers which are alcohol based so, alcohol works immediately

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OBJECTIVES

- I. To study the concept of herbal hand sanitizers.
- II. To develop suitable Formulation and evaluation using herbal resources.
- III. To characterize and evaluate the developed formulation.

PLAN OF WORK :

- Literature.
- Selection of plants.
- Procurement of herbal excipients.
- Extraction of poly constituents.
- Formulation of herbal sanitizer.
- Evaluation studies.
- Data completion and project working.

MATERIALS AND METHODS

Extraction procedure for tulsi leaves :

- (a) 250 gm of air dried leaves of Ocimum basilicum were subjected to hydro distillation for 3 hours using a Clevenger apparatus.
- (b) sodium chloride (1gm) and 20 ml of diethyl separating funnel shaking were continued for 40 min and allowed to stand for 15 minutes.
- (c) The organic layer was separated and concentrated to 5ml under reduced pressure.
- (d) The oil were dried over anhydrous sodium sulphate and preserved in a sealed vial at 4°C until further analysis

Procedure For Formulation Of Hand Sanitizer:

1. Carbapol was added to deionized water with constant stirring.
2. After uniform mixing Triethanolamine (TEA) was added with slow stirring to avoid formation of possible air bubbles in the product.
3. Kept aside for 24 hrs
4. The leaves extract of tulsi and Niligiri were added to denaturing alcohol with glycerin, polysorbate 20, was mixed with an aqueous phase.
5. Finally methyl paraben was added as a preservative and perfume was added.
6. Mixed with slow stirring to obtain a uniform product.

EVALUATION PARAMETER :-

1. Organoleptic Properties:

Tests like Colour, Odour and clarity was carried out.

2. Physical properties:-

- a) PH:- The pH was determined by using pH paper.
- b) Irritancy test:-5 healthy volunteers are selected. The herbal hand sanitizer was applied on palm and time was noted. Irritancy, redness, dryness and itching was checked.
- c) Evaporation rate:-5healthy volunteers are selected. The herbal hand sanitizers are applied on their palm while rubbing the sanitizer on palm evaporation takes place and the time was noted. Evaporation rate is below 1 min.

Antibacterial Test:-

The antibacterial activity of herbal hand sanitizer using different solvents against strains of aerobic and anaerobic microorganism was evaluated by standard cup plate method. For these standard cup plate method the nutrient agar medium is used as a culture media. To perform antibacterial test the pre sterilize petri plate was used. To pre sterilize, the petri plate was incubate for 24hrs at 37°C. then next to these the agar culture media is pour on the petri plate uniformly in aseptic condition. After spreading the agar medium is covered with another petri plate and kept aside for 24hrs in refrigerator to solidify the agar medium. After these the plate was removed and on these plates the cup was formed. On two particular plate the standard solution which contains microorganism strains i.e. E.coli and Bacillus subtilis were uniformly spread in aseptic condition. Now in the cup which are created on two petri plate the standard which is pure antibiotic Gentamicin 1ml is poured by the pipette and in next cup.

The formulated herbal hand sanitizer is poured in aseptic condition. Then these two plates kept for incubation for 24hrs at 37°C. After the incubation period the inhibition was found on the petri plate.

Composition agar medium:-

The petri plate shows zone of inhibition. The zone of inhibition of herbal hand sanitizer and pure form of antibiotic Gentamicin is appeared. In image A the zone of inhibition of E.coli is appeared and in image B the zone of inhibition of Bacillus subtilis is appears. Result of antibacterial test of herbal hand sanitizer against standard of pure antibiotic Gentamicin is measured in mm by scale.

RESULT AND DISCUSSION EVALUATION PARAMETER :-

1. Organoleptic Evaluation:-

1. Colour :- White
2. Odour:- Characteristics
3. Clarity :- Opaque

2. Physical properties:-

- a) PH:- 4 to 6
- b) Irritancy test:- No irritancy

Result of antibacterial test of herbal hand sanitizer against standard of pure antibiotic Gentamycin is measured in mm by scale. In this particular evolution test the antibacterial of herbal hand sanitizer is found and on the basis of this information we can say that the herbal hand sanitizer shows somewhat lesser activity than pure antibiotic Gentamicin. But definitely the formulated herbal hand sanitizer has antimicrobial activity against bacterial species like E.coli and bacillus subtilis.

The prepared formulations of herbal hand sanitizer were show of good effect on bacterial strain like E.coli and Bacillus subtilis. The prepared formulation contains oil of Tulsi and Nilgiri which are having wide range of medicinal uses. They also have antimicrobial, antibacterial, anti-inflammatory effects. The herbal hand sanitizer was evaluated for its organoleptic properties, physical properties and antibacterial test. It was found that the formulation were white in color with liquid consistency and smooth texture. In prepared formulation the alcohol is also used along with oil extract to get better result.

The alcohols have excellent, rapid (within seconds) germicidal activity against vegetative bacteria, fungi, and many viruses and antibacterial activity is based on protein denaturation of microorganisms. Alcohol sanitizers are highly effective against mycobacteria (the bacteria most resistant to the disinfection process) and multidrug-resistant pathogens. Alcohol rubs are approximately 100 times more effective against viruses than any form of hand washing. Sanitizer offer numerous advantages over non-alcoholic hand disinfectants, rubbing sanitizers onto both hands & until it completely evaporate, usually requires only 15 to 30 seconds. Whereas vigorous friction, rinsing with water, and drying with a towel are not needed like hand disinfectants or soaps.

CONCLUSION:

Hands are the most common mode of transmission of pathogens to patients and proper hand hygiene can prevent health care-associated infections and the spread of antibacterial resistance. Scientific evidence and ease of use support of alcohol-based hand sanitizers during patient care. It may be concluded that Herbal Hand Sanitizer has a significant bacterial effect on the specified microorganisms. Thus, there is immense potential in establishing the use of antibacterial herbal products as a measure to control the multidrug resistant microbes as well as check their spread through hands from one geographical region to another. Herbal hand sanitizer is based alternative for chemically prepared containing active silver nitrates. Natural herbal hand sanitizers are effective, environment friendly, biodegradable, inexpensive. In this research work herbal hand sanitizers were formulated successfully.

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