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Ayurvedic soaps or Ayurvedic shower gels: Which is more effective?

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Abstract :

Bar soaps are traditionally been one of the most commonly used means of hand sanitation, particularly since the advent of antimicrobial hand soaps. It has been demonstrated that soaps that do not contain agents that are antimicrobial in nature are seldom effective in decreasing the bacterial population present on the skin. Shower gels are higher viscosity variants of foam baths, often containing higher levels of active materials. Efficacy of herbal extracts and the extracts incorporated in formulations like soap and shower gel were evaluated. Vipruthi oil with 3 herbal extract components, Lakshadi oil, Eladi oil and Sandalwood oil were the extract formulations taken for antimicrobial efficacy testing. These extract formulations were individually tested for their efficacy against common pathogens and the same were incorporated in soap and shower gel formulations. The efficacy against *S. aureus, S. pneumoniae, S. epidermidis, P. aeruginosa* and *C. albicans* culture were evaluated by Zone of inhibition and Minimum inhibitory concentration test. Mean and standard deviation were used for statistical analysis. The Extract component I was found to be effective (100 microlitre (µl)) showing clear ZOI and MIC of 0.1 milligram/millilitre (mg/ml) against *S. pneumoniae.* The soap formulation with sandal and eladi oil was showing MIC of 0.5 mg/ml against *S. aureus* whereas the body wash with sandal and eladi oil was inhibitory at 2.5 mg/ml. Thus both soap and body wash formulations were found to be more or less similarly effective against selected pathogens.

Key-words: Antimicrobial, Soap, Shower gel, Body wash, Plant extracts, Phytotherapy

1. Introduction :

Nosocomial infections and person to person transmission of pathogenic organisms has become a problem that is costing health care facilities and patients millions of dollars every year[1].

The increasing prevalence of bacteria, that are resistant to antimicrobial agents and the inadequacy of certain antimicrobials in eliminating bacteria have resulted in a need for the development of a wider variety of more effective hand cleansers and has become a significant concern in maintaining good public health [2].

Hygienic conditions are necessary for maintaining good health in homes, communities, businesses and in health care settings. Soaps play an important role in removing and killing bacteria. Although fats and oils are general ingredient of soaps but some detergents are added to enhance the antibacterial activity of soaps[3] The soap should have good ingredients which have the ability to kill bacteria but not to damage body tissues. Health care workers should use soaps according to criteria of health and hygiene. In this way many immunocompromised or low immunity patients can be protected from transfer of pathogenic or opportunistic pathogens[4]

The market for bathing and showering products has been tremendous growth in recent years and there has been a significant move away from solid bathing products. Shower gels are probably the most widely used bathing preparations currently available in the marketplace. It helps to soak off dirt, body oils and cleanses well[5] Current formulation of shower gel contains TEA-Lauryl Sulfate, a base ingredient which is an anionic surfactant, viscous, yellow liquid that forms a gel at low temperatures. It is usually supplied at a

concentration of 35-40% in aqueous solution. This surfactant is safe compared with other surfactants and is free from 1,4 dioxane which is a carcinogen[6]

Due to their healing and nurturing properties, vegetable oils have been extracted from various plants for many years for use in cosmetics and body and skin care products. These plants are everlasting, easily available and century old tested source for healing various skin ailments[7]

Our soap and shower gel formulations contain herbal ingredients like vipruthi oil, eladi oil, lakshadi oil, sandalwood oil etc., which are taken from classical Ayurvedic text books and include benefits of antimicrobial and antidermatophytic effects, preventing excess sebum production, itching and body odor, brightness of the skin complexion, coolant to the skin, antioxidant, anti-inflammatory, antiaging, antiseptic effects etc.[8]

2. Subjects and Methods:

2.1. Test organism:

Staphylococcus aureus MTCC 1144, *Staphylococcus epidermidis* MTCC 435, *Streptococcus pneumoniae* MTCC 655, *Pseudomonas aeruginosa* MTCC 424, and *C. albicans* MTCC 3017 were procured from IMTECH, Chandigarh, were subcultured and stored in refrigerator.

2.2. Inoculum preparation:

Inoculum of bacterial cultures were prepared by inoculating in five ml of Nutrient broth and *Candida* in Sabouraud dextrose broth (Himedia, Mumbai, India). The inoculum size was adjusted to 0.5 MacFarland standard measuring 10^6 cfu/ml.

2.3. Scrutinizing of the extracts:

The formulation contains individual or combination of Vipruthi oil with 3 extract components, Eladi oil with 26 herbs, Lakshadi oil with 12 herbs and Sandal wood oil prepared as per classical ayurvedic text reference. These extracts are being used in the

products sucessfully. The above extracts were tested individually for antimicrobial activity by zone of inhibition (ZOI) and minimum inhibitory concentration (MIC). Then the formulations incorporated with extracts were tested for its antimicrobial efficacy against the selected bacterial and fungal cultures by MIC.

2.4. Minimum Inhibitory Concentration (MIC) Test:

MIC was determined by incorporating various concentrations of the extract or product (0.5-10 mg/ml) in ten ml of Mueller Hinton agar (Himedia) for bacterial cultures and SDA (Himedia) for *Candida.* The medium with extract or product weighed was mixed thoroughly and was allowed to solidify at room temperature. 100 µl of the inoculum (size of approx 10^8 cfu/ml) was inoculated on each plate. The plates were incubated for 24-48 hrs at 35 - 37ºC for bacterial cultures and for 5 days at 28°C for *C. albicans*. Tetracycline (10 µg) for bacterial cultures and Ketoconazole (Himedia) for *C. albicans* were maintained as positive control. The platings were done in triplicates and the mean values were taken.[9]

2.5. Agar well diffusion method:

Mueller Hinton agar (Himedia) and SDA plates inoculated with respective cultures by spreading on the surface of the media. A well was made in the center of the medium and from the stock (100 milli gram of sample dissolved in one ml of sterile 20 % DMSO) 50 and 100 µl was loaded in the well. Tetracycline (10 µg) for bacterial cultures and Ketoconazole (Himedia) for *C. albicans* were maintained as positive control. The plates were incubated at their respective growth conditions as given in MIC. The antibacterial activity was assessed by measuring the diameter of the zone of inhibition (in mm), and the platings were done in triplicates. Their mean values with standard deviation was taken.[9]

3.0. Results:

The extract component I of Vipruthi oil was found to inhibit *S. aureus* and *S. epidermidis* at 0.5 mg/ml, *S. pneumoniae* at 0.1 mg/ml, *C. albicans* at 1 mg/ml and at higher MIC value of 5

mg/ml against *P. aeruginosa*. Component II in vipruthi oil inhibited *S. pneumoniae* at 0.75 mg/ml whereas other 4 cultures were inhibited at 5 mg/ml. Component III inhibited *S. pneumoniae* at 0.5 mg/ml, *C. albicans* at 10 mg/ml whereas 3 other cultures were inhibited at 7.5 mg/ml. Eladi oil, Lakshadi oil and sandalwood oil did not show any inhibition against all the 5 cultures up to 10 mg/ml. Sandal soap showed inhibition at 0.5 mg/ml against *S. aureus* and *S. epidermidis*, 1 mg/ml against *C. albicans* and *S. pneumoniae*, 10 mg/ml against *P. aeruginosa*. Sandal body wash showed MIC of 2.5 mg/ml against *S. aureus* and *S. epidermidis*, 5 mg/ml against *S. pneumoniae*, 10 mg/ml against *C. albicans* and *P. aeruginosa*. Other soaps and body wash formulations showed inhibitions at higher MIC value. The results were tabulated in table (1-3). The control soap and body wash without any active extracts were not inhibiting any of the organism up to 30 mg/ml.

Table 1 : Zone of inhibition of Herbal extracts

Organisms/Extracts	Vipruthi oil Extract component I	Vipruthi oil Extract component II	Vipruthi oil Extract component III	Eladi oil	Lakshadi oil	Sandal wood oil	Ketoconazole	Tetracycline
S. aureus	32±0.5 mm	9±0.5 mm	18±2 mm	No zone	no zone	no zone	_	26±2
S. epidermidis	23±2 mm	11±1 mm	13±1 mm	No zone	no zone	no zone	_	26±2
S. pneumoniae	clear zone	23±0.5 mm	17±0.5 mm	No zone	no zone	no zone	_	24±0.5
P. aeruginosa	7±2 mm	no zone	no zone	No zone	no zone	no zone	_	18±2
C. albicans	36±0.5 mm	5±0.2 mm	5±2 mm	No zone	no zone	no zone	35±4	_

Table 2 : Minimum inhibitory concentration of Herbal extracts

Organisms/Extracts	Vipruthi oil Extract component I	Vipruthi oil Extract component II	Vipruthi oil Extract component III	Eladi oil	Lakshadi oil	Sandal wood oil
S. aureus	0.5 mg/ml	5 mg/ml	7.5 mg/ml	NA upto 10 mg/ml	NA upto 10 mg/ml	NA upto 10 mg/ml
S. epidermidis	0.5 mg/ml	5 mg/ml	7.5 mg/ml	NA upto 10 mg/ml	NA upto 10 mg/ml	NA upto 10 mg/ml
S. pneumoniae	0.1 mg/ml	0.75 mg/ml	0.5 mg/ml	NA upto 10 mg/ml	NA upto 10 mg/ml	NA upto 10 mg/ml
P. aeruginosa	5 mg/ml	5 mg/ml	7.5 mg/ml	NA upto 10 mg/ml	NA upto 10 mg/ml	NA upto 10 mg/ml
C. albicans	1 mg/ml	5 mg/ml	10 mg/ml	NA upto 10 mg/ml	NA upto 10 mg/ml	NA upto 10 mg/ml

Table 3 : MIC for products with ayurvedic formulations

Product/Organisms	*S. aureus*	*S. epidermidis*	*S. pneumoniae*	*P. aeruginosa*	*C. albicans*
Soap with vipruthi oil	2.5 mg/ml	2. 5 mg/ml	2.5 mg/ml	5 mg/ml	5 mg/ml
Soap with Sandal and eladi oil	0.5 mg/ml	0.5 mg/ml	0.5 mg/ml	10 mg/ml	1 mg/ml
Soap with glycerine and lakshadi oil	2.5 mg/ml	2. 5 mg/ml	2.5 mg/ml	10 mg/ml	2. 5 mg/ml
Body wash with vipruthi oil	5 mg/ml	7.5 mg/ml	5 mg/ml	7.5 mg/ml	10 mg/ml
Body wash with sandal and eladi oil	2.5 mg/ml	2. 5 mg/ml	5 mg/ml	10 mg/ml	10 mg/ml
Body wash with lakshadi oil	5 mg/ml	5 mg/ml	7.5 mg/ml	10 mg/ml	10 mg/ml
Soap without extracts	Not active upto 30 mg/ml	Not active upto 30 mg/ml	Not active upto 30 mg/ml	Not active upto 30 mg/ml	Not active upto 30 mg/ml
Body wash without extracts	Not active upto 30 mg/ml	Not active upto 30 mg/ml	Not active upto 30 mg/ml	Not active upto 30 mg/ml	Not active upto 30 mg/ml

4.0. Discussion:

Soap formulations were effective as proved in earlier study [4,10-11] The soap formulations were found to be superior in antimicrobial activity when compared with shower gel formulations. Numerous cleaning agents are available in the market, which are presented in various forms with distinct formulations. A study concludes that the active ingredients alone may not be sufficient to judge the antimicrobial efficacy of a handwash, as other factors such as concentration of active ingredient and other additives might influence the antimicrobial properties[12] As discussed in earlier study by Riaz *et al*., 2009, it was observed that Gram positive bacteria were killed at low concentration of soaps than Gram negative bacteria. In our current study soaps are more effective than shower gels in antimicrobial efficacy. Already there is published data for soap with sandal and eladi oil with various efficacies like acne reduction, antimicrobial efficacy, blemishes reduction, black and white head reduction etc.[11] Eventhough regular soap is an excellent surfactant that can be produced from readily available raw materials, its major disadvantage is its poor performance in hard water[5] Hence shower gels are more opted one for cleaning as there is not much difference in killing germs.

5.0. Conclusion:

The ayurvedic preparations of soaps and body wash were found to be effective in combating pathogenic germs like *S. aureus*, *S. epidermidis*, *S. pneumoniae*, *P. aeruginosa* and *C. albicans.*

6.0. Acknowledgement:

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7.0. References :

1. Kampf, G., and A. Kramer. 2004. Epidemiologic Back-ground of Hand Hygiene and Evaluation of the Most Im-portant Agents for Scrubs and Rubs . *Clinical Microbiology Reviews*. 7: 863-93.

2. Stickler , D.J. , and B. Thomas . 1976 . Sensitivity of Providence to Antiseptics and Disinfectants . *Journal of Clinical Pathology*. 29 : 815-23

3. Friedman, M., and Wolf R. 1996. *Clini Dermatol.* 14 (1) : 7-13.

4. Riaz S, Ahmad A, Hasnain S. Antibacterial activity of soaps against daily encountered bacteria. *Afr. J Biotechnol.* 2009; 8: 1431-6.

5. Williams D.F. and Schmitt W.H. 1996. Chemistry and technology of the Cosmetics and Toiletries Industry. Second edition by Blackie Academic and Professional. Pg No. 300

6. www.cosmeticsinfo.org

7. Riechart RD. 2002. Oilseed medicinals in natural drugs and dieteary supplements-new functional foods. *Trends Food Sci. Technol.* 13 : 353-60.

8. Nishteswar.K and Vidyanath R. Sahasrayogam. 2011. Chowkhamba Krishnadas academy, Varanasi, Third edition. Pg No. 124-5.

9. Clinical and Laboratory Standards Institute. Performance standards for Antimicrobial susceptibility testing: Seventeenth informational supplement. 2007. CLSI document M100-S17 (ISBN 1-56238-625-5) - 940 West Valley Road, Suite 1400, Wayne, Pennsylvania. 19087-1898 USA: Clinical and Laboratory Standards Institute.

10. Selvamohan, T and Sandhya, V. 2012. Studies on bactericidal activity of different soaps against-bacterial strains. *J. Microbiol. Biotech. Res.* 2(5) : 646-50.

11. Navin Kumar Sharma, Prabha Manju M., Babu K., Sreenivasa Prabhu DK., Jayashree M., Jayanthi Swaminathan, Hilda Solomon. 2013. Evaluation of Antimicrobial, Safety and

efficacy of Medimix bathing bar with sandal and eladi oil. *Egyptian Dermatology Online Journal*. 9(2) : 1-15.

12. Geraldo IM, Gilman A, Shintre MS, Modak SM. 2008. Rapid antibacterial activity of 2 novel hand soaps: Evaluation of the risk of development of bacterial resistance to the antibacterial agents. *Infect Control Hosp. Epidemiol.;* 29 : 736-41