Studies on bactericidal activity of different soaps against – bacterial strains

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ABSTRACT

A prospective bactericidal activity of various market soaps was performed against bacterial strains ie. Staphylococcus spp, Pseudomonas spp and Serratia spp ascertain the efficacy of different soaps in daily use. Minimum inhibitory concentration (MIC) were determined by microdilution technique. Among the five soaps such as Lifebuoy, Dettol, Medimix, Savlon and Johnson’s Baby, the highest efficacy was performed by Medimix. Second most effective soap was Dettol. Third most effective soap was Lifebuoy where as Savlon and Johnson’s Baby exhibited similar activities, among this Johnson’s Baby is the less effective while comparing all other soaps. The bactericidal activities of these soaps were in increasing order in Medimix, Dettol, Lifebuoy, Savlon and Johnson’s Baby respectively.

Keywords: Soaps, Mic, Disc, Diffusion.

INTRODUCTION

Soaps are the combination of fats and oils (of animal or vegetable origin) and Salt. (5). Dermatological bars or cakes and disinfectants are chemical of different from soaps and contain modified detergents to enhance their use for antibacterial activity. The aim of this work to compare the efficacy of locally available market soaps against skin infected some bacteria such as Staphylococcus spp., Pseudomonas spp. and Serratia spp. as well as to provide data to clinician to decide for the selection of better and protective soap against pathogenic microorganism. (9).The great majority of the studies on the effect of antibacterial soaps on the flora of human skin have been carried out on hands because of the interest in determine in surgical scrub procedures and because hands carry large numbers of microorganisms and permit the demonstration of sizable reduction in numbers. (18).Bacterial resistance to antimicrobial agents has been increasing over the last few years due to many factors, including overall increased in member of antibiotics prescriptons. Urinary tract infections were the 2nd in frequency to respiratory tract infections (4).Gram negative bacteria responsible for the infection were proteins, Enterobacter, Pseudomonas, Serratia and Klebsiella ( 11).Gram positive cocci, are Staphylococcus, Saprophyticus, Staphylococcus aureus, Streptococci and Staphylococci epidermidis (18).An antibacterial soap can remove 65% to 85% of bacteria from human skin (15). Antibacterial soap and disinfectants are used as an adjunct to acne treatment, since they contain bacteriostatic agents. Detergency of soaps and disinfectants is another important factor in removing transient microorganisms from hands.Soaps and disinfectants is necessary in order to establish that which produce clean hands sufficiently in the easiest and most acceptable manner for specific food operation facilities (11).Soaps containing agents active against in reducing the incidence of pyogenic skin infection attributed primarily to Staphylococcus aureus associated with as increased susceptibility to skin infections with gram-negative species. The study influence adlib use of an antibacterial soap on the total aerobic bacterial flora on six skin sites. (18).A chemical widely used to make soap “antiseptic” survives sewage treatment and in being spread onto farmland and released into water. (14)When any antimicrobial is widely used or released, organisms have the potential to evolve resistance to its effects (7). Everyone agree that warming our hands is good, but there is little difference between using soap and using antimicrobial soap.
MATERIALS AND METHODS

Collection of Test Sample
The samples were collected from skin infection patients of the hospital.

Sampling Procedure
Samples were collected from the skin infected patients by using sterile cotton swab and kept inside a sterile screw cap tubes containing 1% peptone broth. The swabs collected are transported to the laboratory.

Isolation Of Organisms
Then the samples were streaked on Cetrimide agar, Mannitol salt agar, DNase agar, and Barid Parker agar plate. The results were recorded all the isolates were stored on Nutrient agar slants. Broth cultures were prepared for under going further methods.

Collection of soaps
To perform this experimental study different soaps of common use from shops were purchased and their dilution were made for testing the bactericidal activity of different organisms. The soaps used were Medimix, Dettol, Lifebuoy, Savlon, Johnson’s Baby.

Isolated Strain
Pseudomonas, Staphylococcus, Serratia.

Preparation of Inoculums
For inoculums preparation Mueller-Hinton broth was made according to manufacturer’s instructions and 5 ml of broth medium was dispensed in screw capped test tubes and sterilized by autoclaving at 121°C for 15 minutes. The test tubes were cooled and kept in an incubator for 24 hours at 35°C to check sterility. The isolated strains were inoculated in the sterilized test tube containing the medium, and placed in an incubator overnight at 35°C. The presence of turbidity in broth cultures was noted.

Preparation of Sterile Disc
Whatman’s No.3 filter paper were made in 5mm disc form and wrapped in aluminum foils and sterilize in an oven for 30 minutes. Each sterile disc was incorporated individually with 10 to 20 µl of soaps. These discs were allowed for air drying.

Assay of Antimicrobial Activity
Overnight cultures were kept ready for antibiotic assay. Assay of the antimicrobial activity of soaps was done by the following method.

- Disc Diffusion Method
- Agar Diffusion Method
- Minimum Inhibitory Concentration technique.

Dilution of Soaps
Dilute the soaps into 5 µl and 10 µl concentration.
After that the Muller Hinton agar plates were prepared, sterilized and 20 ml of media was poured on petriplates. After solidification other parts of Muller Hinton agar at pourable temperature was mixed with test microbial strains and poured over solidified agar. After solidification wells were made each well incorporated 20 to 30 µl of serially diluted soaps and further incubated at 37°C ± 0.5°C for 12 to 24 hours. The zone of inhibition was determined by measuring the diameter in millimeters of zone to which the soap inhibited the growth of the organism.

Preparation of seed culture
Each test organisms were inoculated into the Muller Hinton Broth and incubate 37°C ± 0.5°C for 4 to 6 hours.
Divide the soap plate into different sector and inoculate spot inoculums on the plate with each organism and further incubate the plate 37°C ± 0.5°C for 18-24 hours.

After incubation the plates were observed and the results were recorded.
FIG. 1 EVALUATION OF ANTIBACTERIAL ACTIVITY OF SOAPS BY WELL METHOD IN BACTERIAL STRAINS

FIG. 2 EVALUATION OF ANTIBACTERIAL ACTIVITY OF SOAPS BY DISC METHOD IN BACTERIAL STRAINS

FIG. 3 EVALUATION OF ANTIBACTERIAL ACTIVITY OF SOAPS BY MIC (10µl) METHOD IN BACTERIAL STRAINS

FIG. 4 EVALUATION OF ANTIBACTERIAL ACTIVITY OF SOAPS BY MIC (5µl) METHOD IN BACTERIAL STRAINS

FIG. 5 SENSITIVITY TEST BY ANTIBIOTIC AGAINST BACTERIAL STRAINS

- Tobramycin (TB30)
- Ciprofloxacin (CF5)
- Trimethoprim (TR30)
- Colistin (C40)
- Gentamicin (G30)
- Netilin (NT30)
- Chloramphenicol (C30)
- Kanamycin (K30)
- Norfloxacin (NX10)
- Streptomycin (S25)
- Amikacin (A30)
- Ampicillin (A10)
- Cephalexin (CP30)
- Cephalothin (CH30)
RESULTS AND DISCUSSION

In present study isolate, *Staphylococcus spp.*, *Pseudomonas spp.*, and *Serratia spp.* was used to test the efficacy of antimicrobial soaps (Medimix, Dettol, Lifebuoy, Savlon, Johnson’s Baby) were compared. Data revealed in well method in Fig 1 against Bacterial strains, Medimix shows maximum zone of inhibition against *Pseudomonas* with a diameter of (1.2mm), *Staphylococcus* (1mm) and *Serratia* (0.8mm) and shows less zone in Lifebuoy against *Pseudomonas* (0.3), Savlon against *Staphylococcus* (0.5mm), and Lifebuoy against *Serratia* with a diameter of (0.5mm) respectively. According to (9), *S. aureus* was used to test the efficacy of antimicrobial soaps such as (Safeguard, Dettol, Lifebuoy, Johnson’s Baby) deodorant soap (Lux), plain soap (Sufi and Sunlite) and disinfectant (Phenol) were compared. In the evaluation of antibacterial activity of soaps of disc method in bacterial strains shows that Medimix shows maximum zone of inhibition against *Pseudomonas* with a diameter of (0.4mm), *Staphylococcus* (0.7mm) and *Serratia* (0.6mm) and shows less zone in Savlon and Johnson’s Baby against *Pseudomonas* (0.2mm) and Savlon and Johnson’s Baby against *Staphylococcus* (0.4mm) and Lifebuoy against *Serratia* with a diameter of (0.3mm) in Fig 2.

When efficacy of antibacterial soaps was compared Medimix was found to be more effective against *Pseudomonas*, *Staphylococcus* and *Serratia* in agar diffusion and disc diffusion method. Safeguard was found to be more effective against *S. aureus* than all other soaps. This study was supported by study of (1). In the MIC method at the concentration level of 10 µl against Bacterial strains, Medimix shows maximum zone against *Pseudomonas* (0.9mm), *Staphylococcus* (0.8mm) and *Serratia* (1.3mm) and shows less activity in Savlon against *Pseudomonas* (0.2mm), Savlon and Johnson’s Baby against *Staphylococcus* (0.1mm) and Savlon and Johnson’s Baby against *Serratia* with a diameter of (0.3mm) in Fig 3. According to the antibiotic sensitivity test against Bacterial strains.(12) Ciprofloxacin shows more effective against *Pseudomonas* with diameter of (3mm) and Trimethoprim and Penicillin G shows less effective. In *Staphylococcus* Ciprofloxacin shows more effective with a diameter of (2.8mm) and colistin shows less effective at (0.9mm) and in *Serratia spp* Ciprofloxacin and Cephalexin shows more effective at (2.6mm) and less effective in Trimethoprim, Colistin, Penicillin G and Ampicillin respectively in Fig 5.

Of the 15 antibiotic disc such as Tobramycin, Ciprofloxacin, Trimethoprim, Colistin, Penicillin G, Gentamicin, Netilin, Chloramphenicol, Kanamycin, Norfloxacin, Streptomycin, Amikacin, Ampicillin, Cephalexin, Cefalothin among this Ciprofloxacin shows more effective against *Pseudomonas*. Trimethoprim + and Penicillin G shows less effective. When efficacy of five different soaps were compared, MIC of Medimix against *Staphylococcus* was 0.8 mm in 10 µl, Dettol against *Staphylococcus* was 0.4 mm in 10 µl, Lifebuoy against *Staphylococcus* was 0.2 mm in 10 µl. Savlon and Johnson’s Baby against *Staphylococcus* was 0.1 mm in 10 µl. In MIC of 5 µl Medimix against *Staphylococcus aureus* was 1.1mm, Dettol against *Staphylococcus* was 0.3 mm, Lifebuoy against *Staphylococcus* was 0.2 mm, Savlon against *Staphylococcus* was 0.3 mm and Johnson’s Baby against *Staphylococcus* was 0.1 mm. This shows that Medimix exhibited more active against *Staphylococcus* than Dettol, Lifebuoy, Savlon and Johnson’s Baby. When efficacy of deodorant soap (Lux) and plain soaps (Sunlite and Sufi soap) was compared, MIC of Sufi soap against *S. aureus* was 10240 µg/ml, and MIC of Sunlite was 20480 µg/ml, whereas MIC of Lux was 24576 µg/ml. This showed that Sufi soap and Sunlite exhibited more activity against *S. aureus* than Lux. (2).

Antibacterial activity of Johnson’s Baby soap was comparable to that of Medimix, Dettol, Savlon and Lifebuoy, but it was less effective against all the 3 sp. such as *Pseudomonas, Staphylococcus* and *Serratia* soap. According to (10) antibacterial activity of Johnson’s Baby soap was comparable to that of Safeguard and Dettol soap, but it was less effective than Safeguard against *S. aureus* but more than that of Dettol. The ingredients include in Johnson’s Baby soap was sodium palm Kernelate, Sodium Palmate, Water, Mineral oil, Fragrance, Glycerin, Titanium Dioxide, Dimethicone, C12 – C15 Alkyl Benzoate, Steareoxytrimethylsilane, Stearyl alcohol, Disodium EDTA, Hydrolyzed Milk Protein, Tocopherol Acetate. Johnson’s Baby soap care baby’s delicate skin needs in growing years. Dettol soap gives 10 times better protection against a wide range of germs. The key ingredients such as Sodium soap, Fragrance, TCC, Colour, Preservative. Savlon soap also used as a liquid handwash which gives gentle protection and active ingredient such as Triclosan may be present. Lifebuoy shows balanced germ protection and which is made from 100% vegetable oils. Medimix soap shows more effective for dry skin, it contains a unique combination of the purest and finest grade vegetable glycerine and the time tested Ayurvedic formulation of Lakshadi Oil.

In *Staphylococcus spp.* Chloramphenicol shows more effective and Colistin shows less effective and Cephalexin and Ciprofloxacin shows more effective against *Serratia spp* and Colistin, Penicillin G, Trimethoprim and Ampicillin shows less effective in skin infection pathogens. Among the 10 antibiotics such as Oflaxacin, Enaxacin, Gentamicin, Enoxacin, Tobramicin, Norfloxacin, , Nalidexic acid, Amoxicillin, Cefazolin. Oflaxacin was more effective against both Gram negative bacilli and Gram positive cocci. Enaxacin and Gentamicin were equally effective against Gram-positive urinary tract isolates, while Enoxacin was more effective than Gentamicin against Gram-negative bacilli. Tobramicin was the second most effective against Gram-negative bacilli Co-tromoxazole was 47.88% and
42.86% effective against both Gram-positive and Gram-negative urinary tract pathogens. (14) Chloramphenicol has more effective against Staphylococcus comparable to that of Colistin. Chloroxylenol has effectiveness comparable to that of Triclosan. (3) Norfloxacin was more effective than Kanamycin in skin infection sample. According to (14) Norfloxacin was extremely effective against urinary tract isolates. Hand rubbing with an alcohol based solution is more effective than handwashing with an antiseptic soap in reducing bacterial contamination of health care workers hands during routine patient care. (10) found that hand rubbing was equivalent to antiseptic handwashing in reducing hand contamination. Prevention concluded that alcohol based hand rubs are more effective than washing hands with antimicrobial or non antimicrobial soap, can be made more accessible require less time to use and are less prone to cause irritant contact dermatitis (10). In Fig 4 in MIC method at the concentration level of 5 µl against bacterial strains, Dettol shows maximum zone against Pseudomonas with a diameter of (0.6mm), Medimix shows maximum zone against Staphylococcus (1.1mm) and Serratia at (1.3mm) and shows less active in Johnson’s Baby against. Pseudomonas, Staphylococcus (0.1mm) and Serratia (0.4mm).

REFERENCES

[7] Halden, (2006). Antimicrobial is widely used or released, organisms have the potential to evolve resistance to its effects