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Antimicrobial Activities of Some Medicated Soaps Used By Mascara City Residents in Algeria

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Original Research Article

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Abstract: Medicated soaps for external uses are necessary to avoid related infections or diseases caused by some microorganisms. In the present study, four medicated soaps: Dettol, Protex, Dermoviva, and AB+ were investigated for their antimicrobial activities against *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Escherichia coli*, *Salmonella sp* and *Candida albicans*. Marseille soap was used as control. The antimicrobial effectiveness of selected medicated soaps was determined using paper disc and well methods. Soaps tested in the present research work showed varied levels of activity against the tested microbes. Among them, AB+ was the most active product, while Protex showed the lowest activity against the tested organisms' species.

Keywords: medicated soaps, antimicrobial activity, microorganisms.

INTRODUCTION

Soaps play an important role in removing and killing micro-organisms [1]. In chemical terms, soaps are made from the salts of fatty acids. Fatty acids are the principal components of the fats and oils found in animals and plants [2]. Soaps are either non antimicrobial soaps or an antimicrobial soap, also known as an antiseptic or medicated soap. Medicated soaps contain antiseptic substances in addition to the ordinary soap base [3]. Microorganisms are very diverse and found almost everywhere on Earth –such as in air, water, soil and rock, and even in plants, animals and the human body [4] and hence of great importance with reference to health [5]. Number of transient bacteria including Gram Positive and Gram negative are deposited from the environmental sources on the surface of skin and causes skin infection [6].

The well-documented transients are those that cause skin infections, such as *Pseudomonas aeruginosa* and *S. aureus*. Other important potentially pathogenic transient bacteria on hands could include food-poisoning organisms, such as pathogenic strains of *Escherichia coli*, and *Salmonella spp* [5]. Spread of infection by such bacteria can be prevented by use of antiseptic soaps, as it contains antimicrobial active ingredients [7]. According to Osborne and Grobe [8] that antibacterial soap can remove about 65-85% of bacterial flora from human skin.

The purpose of this study was to evaluate the antimicrobial activity of four medicated soaps available in the pharmaceutical shops of Mascara city, northwest of Algeria against

Staphylococcus aureus, *Pseudomonas aeruginosa*, *Escherichia coli*, *Salmonella spp* and *Candida albicans*

MATERIALS AND METHODS

Soaps used

Dettol, Protex, Dermoviva, AB+ and Marseille soaps tested in this the study for their antimicrobial activities were purchased from pharmaceutical shops within the Mascara city, northwest of Algeria.

Microbial Strains Used

The microorganisms used in this study included *Staphylococcus aureus*, *Escherichia coli*, *Salmonella* sp, *Pseudomonas aeruginosa* and *Candida albicans*. The tests organisms were obtained from the Microbiology Department, Laboratory of Medical Analysis at Dr Yessaâd Khaled hospital in Mascara city and the laboratory of Medical Analysis of Dr Abdellaoui of Medicine and Hematology in Mohammedia city (province of Mascara) in northwest of Algeria. The identity of the microorganisms used in

this study was confirmed by standard biochemical tests and morphological studies [9, 10].

Disc diffusion method

As a preliminary step, the antimicrobial activities of the soaps were determined by using paper disk diffusion method to screen the efficacy of soaps among all samples. The soaps were diluted at the following concentration 100, 200, 300 and 400 mg/ml. Marseille soap was used as a control. A volume of 100 μL of each concentration was, respectively, impregnated into the paper disk with 6 mm diameter, and then placed onto Mueller-Hinton agar plates, which were previously inoculated on the surface agar with a suspension for each tested organisms. The plates were then incubated at 37°C for 48 h. The antimicrobial activity was evaluated by measuring the diameter of inhibitory zones in millimeters [11].

Agar well diffusion method

Activity of soap was tested individually with well diffusion method [11]. Sterilized Mueller-Hinton agar media (15-20 mL) was poured in the petri-plates near the flame. After solidification of media, plates were streaked with microorganism's culture by sterile cotton swabs. Wells of 6 mm diameter were made in each of plates with sterile cork borer. Using a micropipette, 100 µl of the plant extracts were added to the wells made in the plate and allowed to diffuse at room temperature for 30 min then incubated at 37oC for 48 hours. Antimicrobial activity was evaluated by measuring the zone of inhibition (mm) against the microorganisms' strains.

Determination of minimum inhibitory and bactericidal concentrations

The soaps, which exhibited the best antimicrobial activity in the paper disk diffusion assay, and some individual constituents, were selected for determining the minimum inhibitory concentration (MIC) and the minimum bactericidal concentration (MBC) using broth dilution method. The soaps were diluted to give the final concentrations of 18.75, 37.5, 75, 100, 150, 200, 300, 400 mg/mL. 100 µl of 10^5 CFU/ml of the strains was inoculated in tubes with equal volume of nutrient broth and soaps. The tubes were incubated aerobically at 37 °C for 24-48 h. The MIC was considered as the lowest concentration that prevented the visible growth. MBC value was determined by sub culturing the test dilution [which showed no visible turbidity] on to freshly prepared nutrient agar media.

RESULTS AND DISCUSSIONS

The result obtained in disc diffusion method in this study of the zone diameter of inhibition of the soaps on the various test microorganisms is presented in Table 1.

Table-1: Diameter of inhibition zone (mm) of the different soaps against tested organisms

Germs	Concentration (mg/ ml)	Dettol	Protex	Dermoviva	AB+	Marseille
S. aureus	100	6,5	06	06	7,5	06
	200	6,5	06	10	08	06
	300	10	06	14	08	06
	400	14	06	16	11	06
E. coli	100	06	06	06	06	08
	200	07	7,25	06	08	08
	300	12	07	06	10	10
	400	14	07	06	14	14
P. aeruginosa	100	06	06	06	08	06
	200	06	07	7,25	08	06
	300	06	07	10	11	06
	400	06	11	14	16	06
Salmonella sp	100	06	06	06	7,5	06
	200	06	7,25	08	8,5	06
	300	06	7,5	8,5	10,5	06
	400	06	10	11	16	06
C. albicans	100	06	7,5	06	7,5	7,25
	200	08	08	06	08	7,5
	300	8,25	10	06	11	08
	400	10	16	06	16	10

The different concentrations of the soaps showed varying zones of inhibition on the test microorganisms. The zone of inhibition is in direct relationship with soap concentrations. It ranged from 06 mm to 16 mm. The highest zone of inhibition (16 mm) was recorded in the soap concentration of 400 mg/ml. Among soaps, AB+ was the most active product against the four tested organisms' species: *E. coli, P.*

aeruginosa, Salmonella sp and *C. albicans*, while Protex showed the lowest activity against all tested bacteria (*S. aureus, E. coli, P. aeruginosa* and *Salmonella sp*). On the other hand, Dettol was active against *S. aureus* and *E. coli*, Dermoviva on *S. aureus* and *P. aeruginosa.*

Table 2 shows the effect of different soaps on the growth of microbial strains using the Agar well diffusion method and the effect was expressed as diameter of inhibition zone. All soaps showed an inhibitory effect against the tested microbial strains (*S. aureus, P. aeruginosa, E.coli, Salmonella. sp* and *C. albicans*) in concentration of 20 mg/ ml. The soaps exhibited lowest activity with diameter of inhibition zone ranged between 06 and 08 mm. Dermoviva, AB+ and Dettol have shown the greatest inhibition zone diameter of 08 mm against *E.coli* and *S. aureus*. Among microorganisms, *E.coli* was more sensitive for soaps, while *C. albicans* was more resistant. The same effect was noticed for Protex, Dermoviva and AB+ on *P. aeruginosa, Salmonella. sp* and *C. albicans.*

Table-2: Diameter of inhibition zone (mm) of the different soaps (20 mg/ ml) against tested organisms

	Diameter of inhibition zone (mm)				
	Dettol	Protex	Dermoviva	AB+	Marseille
S.aureus	7.5	06	08	07	06
P.aeruginosa	6.5	07	07	07	06
E.coli	08	07	08	08	08
Salmonella. sp	6.5	7.5	7.5	07	06
C.albicans	6.5	06	06	06	09

According to the results given in Table 3, MIC of AB+ soap was found more effective against *S. aureus, P. aeruginosa, Salmonella sp, C. albicans* and *E. coli* (18.75, 37.5, 75, 75 and 150 Mg/mL, respectively) as compared to those of the other tested soaps. On the other hand, the Protex soap was found more susceptible than Dettol and Dermoviva against *P. aeruginosa, Salmonella sp, C. albicans* and *E. coli*. The MIC values of Dettol soap against *S. aureus, C. albicans* and *E. coli* were found in the range between 37.5 and 150 Mg/mL. The Dermoviva soap displayed antimicrobial activity against *S. aureus, P. aeruginosa* and *Salmonella sp* with MIC values of 150 Mg/mL, whereas Marseille, control soap showed activity against *E. coli*, and *C. albicans* with MIC values of 37.5 –75 Mg/mL.

Table-3: MIC and MBC Values of the different tested soaps

Germs	Soaps C (Mg/mL)									
	Dettol		Protex		Dermoviva		AB+		Marseille	
	MIC	MBC	MIC	MBC	MIC	MBC	MIC	MBC	MIC	MBC
S. aureus	37,5	100	Abs	Abs	150	400	18 ,75	100	Abs	Abs
P. aeruginosa	Abs	Abs	150	400	150	400	37,5	100	Abs	Abs
E. coli	150	400	150	400	Abs	Abs	150	400	37,5	100
Salmonella sp	Abs	Abs	150	400	150	400	75	200	Abs	Abs
C. albicans	150	400	75	200	Abs	Abs	75	200	75	200

The assayed antiseptic soaps have demonstrated satisfactory antimicrobial effect. This may be due to differences in their antimicrobial active components and type of formulations used. The antimicrobial active ingredients (AAIs) included irgasan, Triclocarban, trichlorocarbanlide (TCC), mercuric iodide, monosulfiram, and trichloroxylenol which are considered manufacturer dependent [12]. We noticed that the assayed antiseptic soaps (Dettol, Protex, Dermoviva and AB+) contain Triclocarban, which belongs to the anilide family and has shown to have very low MICs for various common pathogenic bacteria [13]. However, triclocarban has also been shown to have significant absorption into the human body after showering and may have some effect in inhibiting human enzymes, therefore warranting further detailed studies [14].

The antimicrobial activity of Dettol has been revealed by many authors [15-19, 7, 11] revealed in their study that Dettol was active against *E. coli, S. aureus* and *Salmonella typhi*. Also Protex and Dettol were reported to have inhibitory effects against *E. coli* and *S. aureus* and also against *Pseudomonas aeruginosa* [20]. Presently, there is no documented research work on the antimicrobial activity of Dermoviva and AB+.

CONCLUSION

This study proved that all the soaps had antimicrobial activity against all the given organisms strains but AB+ soap in the most effective soap against all the given germs. Protex soap had the least antibacterial activity against all the given organisms strains. It can be suggested that use of them would be helpful to prevent skin infections and transmission of

skin pathogens. Further studies are required to better evaluate the effect of these medicated soaps and to isolate the bioactive compounds responsible for the observed activities.

REFFERENCE

1. Mercier, C. (1997). Infection Control: Hospital and Community. Nelson Thornes edition. p.87.
2. Leslie, A. R. (1994). *Handbook of integrated pest management for turf and ornamentals*. CRC Press.
3. Ikegbunam, M. N., Metuh, R. C., Anagu, L. O., & Awah, N. S. (2013). Antimicrobial activity of some cleaning products against selected bacteria. *International Research Journal of Pharmaceutical and Applied Sciences*, *3*, 133-135.
4. Singh, S. R., Krishnamurthy, N. B., & Mathew, B. B. (2014). A review on recent diseases caused by microbes. *J Appl Environ Microbiol*, *2*(4), 106-115.
5. Johnson, S. A., Goddard, P. A., Iliffe, C., Timmins, B., Rickard, A. H., Robson, G., & Handley, P. S. (2002). Comparative susceptibility of resident and transient hand bacteria to para-chloro-meta-xylenol and triclosan. *Journal of applied microbiology*, *93*(2), 336-344.
6. CN, O. (2014). Antibacterial Activities of Some Medicated Soaps on Selected Human Pathogens. *American Journal of Microbiological Research*, *2*(6), 178-181.
7. Chaudhari, V. M. (2016). Studies on antimicrobial activity of antiseptic soaps and herbal soaps against selected human pathogens. *Journal of Scientific and Innovative Research*, *5*(6), 201-204.
8. Osborne, R. C., & Grube, J. (1982). Hand disinfection in dental practice. *Clinical preventive dentistry*, *4*(6), 11.
9. Von Graevenitz, A. (1971). Practical substitution for the indole, methyl red, Voges-Proskauer, citrate system. *Applied microbiology*, *21*(6), 1107-1109.
10. Ben Hassen, S., Messadi, L., & BEN ASSEN, A. (2003). Identification et caractérisation des espèces de Staphylococcus isolées de lait de vaches atteintes ou non de mammite. In *Annales de médecine vétérinaire* (Vol. 147, No. 1, pp. 41-47). Université de Liège, Faculté de médecine vétérinaire.
11. Abbas, S. Z., Hussain, K., Hussain, Z., Ali, R., & Abbas, T. (2016). Anti-Bacterial Activity of Different Soaps Available in Local Market of Rawalpindi (Pakistan) against Daily Encountered Bacteria. *Pharm Anal Acta*, *7*(522), 2.
12. Tronsmo, A., Gjøen, T., Sørum, H., Godfroid, J., Yazdankhah, S. P., Jelmert, A., ... & Skaar, I. (2016). Antimicrobial resistance due to the use of biocides and heavy metals: a literature review. Opinion of the Panel Panel on Microbial Ecology of the Norwegian Scientific Committee for Food Safety. *VKM Report*.
13. Drugeon, H. B., Rouveix, B., & Michaud-Nerard, A. (2012). Triclocarban antibacterial activity on resistant Staphylococci, Streptococci, and Enterococci. *Medecine et maladies infectieuses*, *42*(6), 276-279.
14. Schebb, N. H., Inceoglu, B., Ahn, K. C., Morisseau, C., Gee, S. J., & Hammock, B. D. (2011). Investigation of human exposure to triclocarban after showering and preliminary evaluation of its biological effects. *Environmental science & technology*, *45*(7), 3109-3115.
15. El Mahmood, A. M., & Doughari, J. H. (2008). Effect of Dettol® on viability of some microorganisms associated with nosocomial infections. *African Journal of Biotechnology*, *7*(10).
16. Riaz, S., Ahmad, A., & Hasnain, S. (2009). Antibacterial activity of soaps against daily encountered bacteria. *African Journal of Biotechnology*, *8*(8).
17. Ikpoh, I. S., Lennox, J. A., Agbo, B. E., Udoekong, N. S., & Iyam, S. O. (2017). Comparative studies on the effect of locally made black soap and conventional medicated soaps on isolated human skin microflora. *Journal of Microbiology and Biotechnology Research*, *2*(4), 533-537.
18. Okore, C. C., Mbanefo, O. N., Onyekwere, B. C., Onyewenjo, S. C., Ozurumba, A. U., & Abba-Father, C. A. (2014). Antimicrobial efficacy of selected disinfectants. *American Journal of Biology and Life Sciences*, *2*(2), 53.
19. Kaliyadan, F., Aboulmagd, E., & Amin, T. T. (2014). Antimicrobial activity of commercial "antibacterial" handwashes and soaps. *Indian dermatology online journal*, *5*(3), 344.
20. Mwambete, K. D., & Lyombe, F. (2011). Antimicrobial activity of medicated soaps commonly used by Dar es Salaam residents in Tanzania. *Indian journal of pharmaceutical sciences*, *73*(1), 92.