

Antimicrobial activity of commercial “antibacterial” handwashes and soaps

Sir,

Soaps and handwashes labeled as being “antibacterial” can be purchased from any supermarket, but these commercial products rarely mention the antimicrobial spectrum of activity. In the present study, we evaluated six commonly used “antibacterial” handwash solutions and five commonly used antibacterial toilet soaps to evaluate the spectrum of their antimicrobial activity, without assessing the *in vivo* efficacy. The products selected and the main “antimicrobial” content mentioned on the products are listed in Table 1. To the best of the authors’ knowledge, this is the first study that compares the rapid efficacy of different hand washes and soaps available in the Saudi market.

The minimum inhibitory concentration (MIC) values of different products were determined against a total of 32 non

repetitive microbial strains (identified by Vitek 2 compact automated system) using agar dilution technique according to the Clinical and Laboratory Standards Institute (CLSI).^[1] The tested microorganisms were: *S. aureus* (14 including three MRSA isolates), *S. epidermidis* (6), *P. aeruginosa* (8) and *C. albicans* (4). The stock solution of each soap (for solid soaps, 50% w/v solution was made for preparation of the stock solution) was twofold serially diluted using sterile distilled water. Ten ml of each dilution was aseptically well mixed with 10 ml double strength sterile molten Mueller-Hinton agar (for bacterial species) or Sabouraud agar (for *C. albicans* isolates). The mixtures were poured in 9-mm diameter sterile Petri dishes. Ten µl of each tested microbial suspension (10^6 cfu/ml) were transferred onto the surface of the solidified plates. The plates were then incubated for 24 h at 37°C or 30°C for bacterial species or *C. albicans* isolates, respectively. The experiments were carried out in triplicate. The MIC was defined as the lowest concentration of the soap at which no visible growth was observed.

The rapid antimicrobial efficacy of the tested soaps was determined after 30 seconds contact time against four strains: *S. aureus* (29213), *S. epidermidis* (SE 12), *P. aeruginosa*

(Ps AT) and *C. albicans* (C4), according to Shintre et al, 2006.^[2] The experiments were carried out in triplicate and the means of Log₁₀ reduction (reduction factor) were calculated. Ethyl alcohol solution (70%) was taken as the positive control. During the study, blind experiments were carried out where the investigator was not being aware of the label or the active ingredient of the product being tested.

As shown in Table 2, CAREX antibacterial soap and 'Palmolive hygiene hand-wash' were the most rapid products against *S. aureus* 29213 showing an 8.69 log₁₀ reduction. On the other hand, the count of *S. epidermidis* (SE 12) was drastically reduced (an 8.86 log₁₀ reduction) after contact with Lifebuoy antibacterial hand wash, Dettol sensitive hand-wash, Palmolive hygiene hand-wash, Dettol sensitive soap and CAREX antibacterial soap. Moreover, Palmolive hygiene hand-wash, Lifebuoy active fresh soap and Vaseline antibacterial soap were the most active

preparations against the tested *P. aeruginosa* strain (reduction factor of 8.71). The previously mentioned reduction factors, 8.69, 8.86 and 8.71 are comparable with that of ethyl alcohol against *S. aureus* 29213, *S. epidermidis* (SE 12) and *P. aeruginosa*, respectively. On contrast, *C. albicans* isolate (C4) was the least affected microorganism showing 2.72 and 2.15 log₁₀ reduction as best values (much less than that of ethyl alcohol, 8.13) after contact with Palmolive hygiene hand-wash and Lifebuoy antibacterial hand wash, respectively. These two values are much less than that of ethyl alcohol (8.13 log₁₀ reduction) as shown in Table 2.

The minimum inhibitory concentrations (MICs) of the different products were determined against four different microbial species (*S. aureus*, *S. epidermidis*, *P. aeruginosa* and *C. albicans*). Among hand washes, Lifebuoy was the most active product against the three tested bacterial species: *P. aeruginosa*, *S. epidermidis* and *S. aureus*, while Palmolive was the most active one against *C. albicans*. On the other hand, CAREX was the most active soap against *P. aeruginosa* and *S. epidermidis* showing the lowest MIC values while both CAREX and Dettol sensitive soap were comparably active against *S. aureus* isolates. In addition, *C. albicans* showed more susceptibility to Lifebuoy active fresh soap than the other tested soaps.

We also tried to evaluate the correlation between handwashes/soaps with the same primary antimicrobial agent with regard to the mean of log₁₀ reduction to the same four organisms: *S. aureus* (29213), *S. epidermidis* (SE 12), *P. aeruginosa* (Ps AT), and *C. albicans* (Pearson's correlation coefficient was used as the statistical measure). A statistically significant positive correlation was observed among all the soaps that had triclocarban as the main active ingredient (Pearson's coefficient ranging from 0.76 to 0.92). The handwashes containing triclocarban also showed a moderately strong positive correlation (Pearson's coefficient, -0.7). However,

Table 1: Tested products and active ingredients as per label disclosure

Commercial tested products	Active ingredient(s)
Lifebuoy antibacterial handwash	Triclocarban
J. Casanova blue handwash	Chloroxylenol
Dettol sensitive handwash	Chloroxylenol
Vatika herbal handwash	<i>Olea europaea</i> extract (olive), para chloro meta xyleneol
Palmolive hygiene handwash	"Natural"
Protex herbal handwash	Herbal, triclocarban, rosemary extract (<i>Rosmarinus officinalis</i>)
J. Casanova blue soap	Chlorometaxyleneol
Lifebuoy active fresh soap	Triclocarban
Dettol sensitive soap	Triclocarban
CAREX soap	Triclocarban
Vaseline antibacterial soap	Triclocarban

Table 2: Mean of log₁₀ reduction after 30 s contact

Handwash/soap	Mean of log ₁₀ reduction			
	<i>S. aureus</i> 29213	<i>S. epidermidis</i> 12 (SE12)	<i>P. aeruginosa</i> (Ps. AT)	<i>C. albicans</i> (C4)
Lifebuoy antibacterial handwash	3.95	8.86	3.42	2.15
J. Casanova blue handwash	0.81	0.64	0.32	0.53
Dettol sensitive handwash	3.81	8.86	2.27	0.55
Vatika herbal handwash	0.71	0.34	0.22	0.3
Palmolive hygiene handwash	8.69	8.86	8.71	2.72
Protex herbal handwash	0.67	4.26	0.42	0.61
J. Casanova blue soap	2.85	2.01	3.72	0.85
Lifebuoy active fresh soap	2.55	3.04	8.71	0.95
Dettol sensitive soap	2.85	8.86	4.02	0.85
CAREX soap	8.69	8.86	4.31	1.93
Vaseline antibacterial soap	2.25	2.98	8.71	0.81

S. aureus: *Staphylococcus aureus*, *S. epidermidis*: *Staphylococcus epidermidis*, *P. Aeruginosa*: *Pseudomonas aeruginosa*, *C. albicans*: *Candida albicans*

the handwashes containing chloroxylenol as the active agent did not show good correlation. We conclude that the active ingredient 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. To corroborate this point, it has been shown that relatively two novel soap formulations: (1) a combination of triclosan, polyhexamethylene biguanide, and benzethonium chloride added to a soap base (TPB soap); and (2) a combination of farnesol, polyhexamethylene biguanide, and benzethonium chloride added to a soap base (FPB soap), have both been shown to be superior to triclosan alone.^[3]

A large meta-analysis of the effectiveness of antibacterial soaps by Montville and Schaffner, suggests that although the actual differences in antimicrobial efficacy between antimicrobial and non antimicrobial soaps were small, but antimicrobial soaps still gave more consistently statistically significant results, especially with respect to bacterial colony forming unit reductions.^[4]

We noticed that none of the commonly used brands contained triclosan. Triclosan, which used to be the most common active ingredient of handwashes, is now being replaced by triclocarban in many soaps and handwashes, partly because of problems such as the development of bacterial resistance to triclosan.^[5] Triclocarban belongs to the anilide family and has shown to have very low MICs for various common pathogenic bacteria.^[6] 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.^[7]

In general, the triclocarban-containing handwashes seemed to be more effective than chloroxylenol-containing handwashes. Although most of the tested products had some anticandidal activity, it was minimal compared with antibacterial activity. Similar low anticandidal activity for consumer soaps and handwashes has been demonstrated in previous studies too.^[8] Antiviral activity was not evaluated in our study. In this limited study, Lifebuoy antibacterial handwash (containing triclocarban) and Palmolive hygiene handwash (containing unspecified "natural" active ingredients) were more superior (in terms of microbiological efficacy in reducing bacterial counts *in vitro*) compared with other handwashes, whereas among the soaps CAREX was the superior brand.

The main limitation of our study was that we included only a few limited brands, which are the most commonly available and used brands in this region. We did not evaluate *in vivo* efficacy of the handwashes or soaps and we did not test against strains of *Streptococci*, *Escherichia coli*, or *Serratia marcescens*, which are the other relevant microorganisms used for testing efficacy

of antibacterial soaps and handwashes.^[8,9] We did not compare with non antibacterial soaps or handwashes, mainly because our focus was only on comparing the antimicrobial efficacy of common commercially available brands.

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