

Evaluation of Some cleaning Products in Local Market in Reducing microbial Contamination of Hands

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Abstract:-

A study was carried on samples including 20 students from Department of Biology ,College of Science for Women , University of Babylon for the year 2008-2009 to detect microorganisms on hands of students during the academic performance of their duties and efficiency of hand washing with cleaning products plain soap , antiseptic soap ,Dettol and alcohol available in the local markets on the numbers of colony forming units (CFUs) of identified microorganisms and frequency it on 20 students . Results showed that several microorganisms were isolated from the hands before hand washing , *Streptococcus pyogenes* most frequency among the individuals of sample following *Staphylococcus aureus* , *Staphylococcus* sp. and *S. epidermis* respectively , also observed some but not all individuals were carried *Bacillus* sp. and yeasts on skin of their hands , therefore the frequency of it are little. After handwashing with alcohol treatment caused reduction of percentage of frequency for all identified microorganisms more than other treatments. The results of hand washing by used plain soap, antiseptic soap , dettol and alcohol on numbers of colony forming units (CFUs) of identified microorganisms showed that all treatments of hand washing were reduced all isolates of microorganisms with different percentage of reduction depending on type of treatments and isolate , also observed *S. pyogenes* less effected compared with other isolates when treated with cleaning products .

Introduction:-

Microorganisms carried on the skin of the human body have been divided into two distinct population resident and transient (15 , 18 , 23). The resident microorganisms survive and multiply on the skin(11).They are considered as permanent inhabitants of the skin of most people and are found on the superficial skin surface (epidermis) . However ,10-20 % of this total resident flora are found within the epidermal layer of skin and in skin surfaces ,where skin oils and hardened skin make their removal difficult and complete sterilization on skin impossible (26 , 28) .Transient microorganisms remain or destroyed by the skin's environment at a rate determined by the skin characteristics of each individual (27).The transient microbial flora represent recent contaminants of the hands acquired from colonized or infected patients or contaminated environments (e.g. examination tables , floors or toilets) during the course of the normal work day .These organisms live in the upper layers of the skin and are partially removed by washing with plain soap and clean water. They are the organisms most likely to cause nosocomial infections

(13). When the transient microorganisms found on health care personal however ,can become colonized in the deep layers with organisms that cause infection , such as *S. aureus* ,gram –negative bacilli or yeast and some type of this organism as *S. aureus* may be cause food poisoning if the person eating food have bacteria produce sufficient amount of illness- producing toxin (20 , 5) . It is impossible to completely remove all microflora from the skin, even with a surgical scrub (6). Also the presence of resident microorganism on skin aids in preventing pathogenic microorganisms from becoming attached and causing their specific illnesses or diseases (27) .Garner and Faver,1986 (6) discussed hand washing cleaning and disinfecting removes transient microorganisms and handwashing with antimicrobial-containing products kills or inhibits the growth of microorganisms (both transient and some resident microorganism) . Also About 80% of infectious diseases are transmitted by touch such as hepatitis A , shigellosis , *E.coli* , salmonellosis, common cold and influenza , these disease discuses and these effect have been demonstrated in both clinical and community setting around the world(3,10) .In handwashing programs including regular household visits to small numbers of families repeated over weeks or months have been associated with significant reductions in infectious illnesses(9,16) . Many studies since have confirmed that doctors decontaminating their hands between seeing patients can reduce hospital infection rates(11) . However, health behaviors such as handwashing can be difficult to change. Also was observed when handwashing with plain soap (detergents) is effective in removing most transient microbial flora(12) .The components of good handwashing include using an adequate amount of soap, rubbing the hands together to create some friction ,and rinsing under running water .The mechanical action of washing ,rinsing and drying removes most of the transient bacteria present (8 ,21) . Most observational studies have shown that alcohol – based hand rub is the preferred method for decontaminating hands and using this method is better than washing hands (even with a soap or an antibacterial soap)(19 , 2) . We performed a randomized trial to evaluate some cleaning products in local markets in reducing contamination of hands by using methods of standard handwashing with cleaning products a plain soap (non –antimicrobial), antiseptic soap ,dettol, and alcohol based solution available before and after handwashing during study day for students from Department of Biology ,College of Science for Women , University of Babylon .

Materials and Methods:-

Treatment Groups

Randomised sample consist of 20 students (age 19- 22years) from Department of Biology ,Collage of Science for Women , University of Babylon for the year 2008-2009 , to standard handwashing with a plain soap Fa (sodium palmitate ,sodium palm kernelate, titanium dioxide ,sodium chloride, glycerin,perfume) . Manufactured by Green Plant Industries,LLC-UAE., antiseptic soap Dettol(chloroxylenol 0.3%,sodium palmate, sodium cocoate ,0020pine oil,titanium dioxide ,silicon emulsion ,talc, aos,pigment yellow 1, cosmenyl red FGR) .Manufactured by PT. Jakarta, antiseptic agent dettol Lenol (chloroxylenol,

plaine oil, castor oil , soap, alcohol) Manufactured by Spartan ,Jordan, alcohol –based at concentration of 75% .

Microbiological Samples and Processing

for detecting microorganisms on hands of students and efficiency of hand washing with plain soap , antiseptic soap , Dettol and alcohol on numbers of colony forming units (CFUs) of identified microorganisms and frequency it in 20 students as fallowing :

1- Efficiency of washing hand with plain (non –antimicrobial)soap and water .

The hands were wetted under running sterile tap water (35 -38) °C, hands were washed with plain soap (non-antimicrobial) and water, then rub hands to gather vigorously for at least 30 seconds to produce soaped lathered , covering all surfaces of the hands and fingers .Rinse hands with water for 15-20 second ,and dried thoroughly with a disposable paper towels .Then use finger pad protocol (1) by finger tips were pressed lightly on the solidified nutrient agar plates before and after use of products .

2- Efficiency of washing hand with antiseptic soap and water .

Repeat the first procedure but by used antiseptic soap .

3 - Efficiency of dettol (antiseptic agent) hand rub .

Washing hands with dettol alone by wet hands first with it and rub hands to gathers vigorously for at least 30 seconds to produce soaped lathered, covering all surfaces of the hands and fingers .Rinse hands with sterile water (35 -38) °C for 15-20 seconds ,and dry thoroughly with a disposable paper towelt .Than use method finger pad test(1) before and after use of products. The finger pad were pressed on the nutrient agar plates and incubated it .

4 - Efficiency of alcohol – based hand rub .

Washing hands with alcohol (5 ml)at concentration of 75% , wet hands first with alcohol for 2 minutes as the previous technical , to ensure coverage of all surfaces of the hands and fingers , leaved it until the hands were dry. Then use method finger pad tested before and after use of products .

For all experimenters , the plates were incubated at 37 °C under aerobic conditions .The number of colony forming units (CFUs) for microorganisms contamination of hands were recorded after 24 - 48 h of incubation(7). The microorganisms were identified by using standar microbiological procedures (17). Percentage reduction of identified microorganisms and frequency it in 20 students were calculated .

Results and Discussion

Results showed that a list of microorganisms were isolated from the hands of university student before hand washing , the *Streptococcus pyogenes* was most frequency among the individuals of sample fallowing *Staphylococcus aureus* , *Staphylococcus* sp. and *S. epidermis* respectively , also observed some but not all individuals carry *Bacillus* sp and yeasts on skin of their hands , therefore the frequency of it are little . The effect of hand washing by use of plain soap, antiseptic soap, dettol and alcohol on frequency percentage shown that alcohol treatment caused reduction of percentage of frequency for all identified microorganisms more than other treatments (Table 1) .

The results of effect of hand washing by using of plain soap, antiseptic soap , dettol and alcohol on percentage numbers of colony forming units (CFUs) of identified microorganisms showed that all treatments of hand washing were reduced all isolates of microorganisms with different percentage of reduction depending on type of treatments and isolate , then observed *S . pyogenes* less

effecting compared with other isolates when treated with all treatments of hand washing (Table 2). Alcohol and detoll treatments generally is a more effective method to remove or kill CFUs of microorganisms to 89.10 and 88.02% respectively compared with other methods(plain soap, plain antiseptic soap) were 46.30 and 70.26 % respectively (Fig. 1) .

Our results conformed previous researches reported that skin consist of resident (colonizing) and transient(contaminating) microorganism such as *Staphylococcus aureus* ,*S.epidermis*, *Staphylococcus* spp., *Streptococcus haemolyticus* ,alpha streptococci , spore –forming bacilli and yeast (14). The population of *Streptococcus pyogenes* more than numbers *Staphylococcus aureus* and *S. epidermis* (Table 1) this result differ with another studies that a population of *Staphylococcus epidermis* more than numbers *S. aureus* on healthy skin (14 ,23 ,15) this difference in number of microorganisms found on hands may be attributed to a function of the work environment(4, 24). Normally , low population of yeasts are also present as resident bacteria (22).*Streptococcus pyogenes* is one of the most frequent pathogens of humans. Its ability to colonize and rapidly multiply and spread in its host while evading phagocytosis and confusing the immune system. *Streptococcus pyogenes* is estimated that between 5-15% of normal individuals harbor the bacterium, usually in the respiratory tract without signs of disease. As normal flora, *S. pyogenes* can infect when defenses are compromised or when the organisms are able to penetrate the constitutive defenses. A variety of types of supportive infections can occur ,when the bacteria are introduced or transmitted to vulnerable tissues,. Streptococci also acute diseases associated with *Streptococcus pyogenes* occur chiefly in the respiratory tract, bloodstream, or the skin cause an array of suppurative diseases and toxinoses (diseases due to the production of a bacterial toxin), in addition to some autoimmune or allergic diseases when invade the skin .*S .aureus* (cause of Staphylococcal food poisoning) is the only true pathogenic organism included in the resident microflora group of skin. About 35 % of normal adults carry *S . aureus* and are particularly susceptible to infection when the normal protective skin barrier is broken(22). Many research confined that handwashing is emphasized as the single most important measure to prevent cross transmission of microorganisms and thus to prevent nosocomial infections (29). Hand washing with plain soaps or detergents (in bar, granule, leaflet, or liquid form) suspends millions of microorganisms and allows them to be rinsed off; this process is often referred to as mechanical removal of microorganisms. This process removes transient microorganisms. Hand washing with antimicrobial-containing products kills or inhibits the growth of microorganisms; this process is often referred to as the chemical removal of microorganisms(both transient and some resident microorganisms)(6) .Multiple in vitro and in vivo experiments have indicated considerably better antimicrobial killing with alcohol hand disinfectants than with hand washing, and the use of alcohol-based hand rubs has been associated with a decrease in nosocomial infection rates (12, 25) .Another study conformed that alcohol-based hand rub requires less time, is microbiologically more effective, and is less irritating to skin than traditional hand washing with soap and water.

finally,handwashing is the most effective way to prevent the spread of communicable disease (29) .

Table(1) Percentage of frequency of microorganisms before and after handwashing with treatments

Isolates of microorganisms	Treatments											
	Plain soap		Antiseptic soap			Dettol		Alcohol – based				
	Percentage of Frequency (%)		Reduction of Frequency (%)	Percentage of Frequency (%)		Reduction of Frequency (%)	Percentage of Frequency (%)		Reduction of Frequency (%)	Percentage of Frequency (%)		Reduction of Frequency (%)
	Before	After		Before	After		Before	After		Before	After	
<i>Staphylococcus aureus</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Staphylococcus epidermis</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Streptococcus pyogenes</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Staphylococcus spp</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Bacillus sp</i>	0	0	0	0	0	0	0	0	0	0	0	0
Yeast	0	0	0	0	0	0	0	0	0	0	0	0

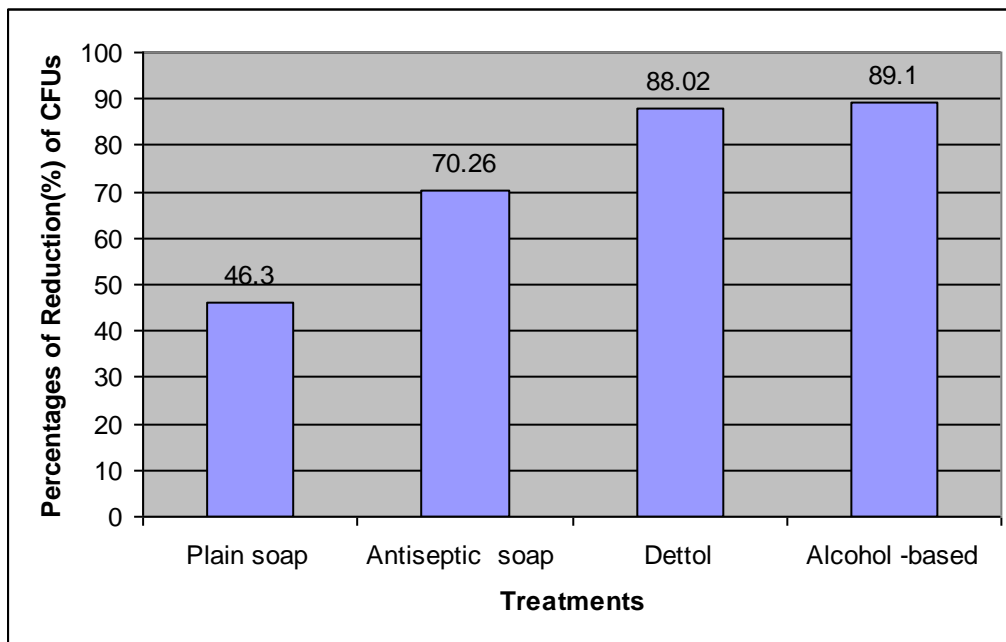
*Percentage of frequency for 20 students

Table(2) Numbers of colony forming unites of microorganisms and percentage reduction before and after handwashing with treatments

Isolate s of microo rganis ms	Plain soap				Antiseptic soap		Dettol		Alcohol – based			
	Number of colony forming unites		Percenta ge of Reductio n (%)		N u m b e r o f c o l o n y f o r m i n g u n i t e s	P e r c e n t a g e o f R e d u c t i o n (%)	N u m b e r o f c o l o n y f o r m i n g u n i t e s	P e r c e n t a g e o f R e d u c t i o n (%)	Numb er of colon y formi ng unites		P e r c e n t a g e o f R e d u c t i o n (%)	
	B e f o r e	A f t e r	B e f o r e	A f t e r					B e f o r e	A f t e r		B e f o r e
<i>Staphyl ococcu s aures</i>	9 7 ε	37 2	.417 1	1ε. .	1 7 ε	.24 λλ	3 ε λ	9 2 .5 2	1 2 λ	λ	93.7 5	

<i>Staphylococcus epidermis</i>	4	9	577	10	2	67.86	2	9	1	9	93.07
<i>Streptococcus pyogenes</i>	1303	1079	257	120	077	83.0	177	1187	672	98	84.90
<i>Staphylococcus spp</i>	130	1	20.99	100	3	7	0	0	120	0	100
<i>Bacillus sp</i>	2	0	100	104	8	0723	0	0	14	1	92.85
Yeast	0	0	0	0	0	0	0	0	26	0	100

***Percentage of frequency for 20 students**



Figure(1) Comparison of percentages reduction in microorganisms CFUs of students hands after handwashing

Conclusions

The results suggest during routine the study day ,the students hand rubbing with alcohol based solution in constriction of 75% and dettol is more efficient in reduction hand contamination than hand washing with soap (non – antimicrobial) or plain soap (antimicrobial) .So must be hand washing from transient microorganisms or other contaminated environments (contaminated laboratories, examination tables, floors, fecal contamination remains on hands and fingertips after using the toilet with bad hand washing or food borne illness) on the surface of skin with hand soaps or detergents or other methods and drying hands completely after using water and soap ,by disposable paper towels is the preferred method of hand drying .

A simple hand wash program that is adequate and necessary for preventing the transfer of pathogenic microorganisms.

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تقييم بعض منتجات التنظيف الموجودة في أسواقنا المحلية في خفض

تلوث الميكروبي لليدين

أفراح حاتم عمران
كلية التمريض

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كلية العلوم للبنات

جامعة بابل

الخلاصة :

نفذت دراسة لتقييم منتجات التنظيف المتوفرة في أسواقنا المحلية ، على عينة من ٢٠ طالبة من قسم علوم الحياة – كلية العلوم للبنات ، جامعة بابل للعام الدراسي ٢٠٠٨-٢٠٠٩ و تحديد الأحياء المجهرية المتواجدة على أيدي الطالبات أثناء أداء واجباتهم الدراسية و تأثير غسل اليدين باستخدام منتجات التنظيف المتمثلة بالصابون العادي و الصابون المطهر و الديتول و الكحول المتوفرة في اسواقنا المحلية على عدد الوحدات المكونة لمستعمرات الإحياء المجهرية المشخصة وتكرارها في عينة الطلبة . أظهرت النتائج ، عزل أحياء مجهرية متعددة من اليدين قبل وبعد الغسل و هي بكتريا *Streptococcus pyogenes* التي كانت أكثر تكرارا بين أفراد العينة تبعثها البكتريا *Staphylococcus aureus* و *Staphylococcus sp* و *S. epidermis* على التوالي . كما لوحظ احتواء أيدي بعض أفراد العينة على البكتريا *Bacillus sp* و الخمائر على جلد أيديهم لذلك كان تكرارها قليل . سببت معاملة الكحول خفض النسبة المئوية لتكرار الأحياء المجهرية المشخصة أكثر من المعاملات الأخرى . كذلك أظهرت نتائج غسل اليدين باستخدام الصابون العادي و الصابون المطهر و الديتول و الكحول خفض في عدد الوحدات المكونة لمستعمرات الأحياء المجهرية المشخصة لجميع العزلات بنسب مختلفة اعتمادا على نوع المعاملة والعزلة، كما لوحظ ان البكتريا *S pyo - gene s* . كانت اقل تأثر مقارنة بالعزلات الأخرى عندما تم معاملتها بمنتجات التنظيف .

Detection of Trichomo