Efficiency of some disinfectants on *Pseudomonas aeruginosa* isolated from different sources

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Abstract

A total 133 of samples (36 faecal, 32 nasal, 39 milk and 26 water) were collected from cattle showed signs of diarrohea, respiratory symptoms and clinical mastitis. All samples were cultured onto different and specific media (nutrient, blood and pseudomonas agar base with CN supplement) and they were identified biochemically. *Pseudomonas aeruginosa* isolated with an incidence of 16.66%, 12.5%, 5.12% and 7.69% from feacal swabs, nasal swabs, milk and water samples respectively. Preparation of culture suspension was done and matching with MacFerland tube No.1. The influence of disinfectants (chlorine, formalin and virkon`S) were carried out by using the minimum inhibitory concentration (MIC) method. Determination of decimal reduction time of disinfectants was detected. The effect of chlorine disinfectant was tested at concentrations: 50 ppm, 200 ppm, 1000 ppm, 5000 ppm and 20000-50000 ppm in the following times: 5, 10, 15, 30 minutes for each concentration. Chlorine induced complete destruction at 200 ppm and 1000 ppm after 15 and 30 minutes respectively. Higher concentrations, 5000 ppm and 20000-50000 ppm succeeded to eliminate the microorganism completely after 5 minutes only. The efficacy of formalin was carried out at concentrations: 1%, 3%, 5% and 7% for 5, 10, 15 and 30 minutes for each concentration. It was noticed that 5% formalin could destroy the microorganism after 10 minutes while 7% formalin gave complete elimination after 5 minutes. Lastly, virkon`S was tested at concentrations: 0.01%, 0.1% and 1% for 5, 10, 15 and 30 minutes. Results of virkon` S efficacy on *Pseudomonas aeruginosa* revealed that it could inhibit the growth completely at concentration 10 g/liter (1%) after 5 minutes exposure only. The phenol coefficient of virkon was 2. It was concluded that virkon`S was the most efficient disinfectant.

Key words: *Pseudomonas aeruginosa, virkon`S, diarrohea.*

Introduction

Since microorganisms were identified as agents of infection, various methods have been described to either eliminate them totally or just restrict the number of viable cells. Despite best efforts to identify and eliminate these infectious microorganisms, they continue to emerge and re-emerge. These pathogenic bacteria significantly contribute to human and animal illness and death. The successful eradication of these pathogens with antibiotics has been complicated by the development of highly resistant strains as well as the appearance of new virulent pathogens.

Some non antibiotic antimicrobial agents of various preparations have been developed and introduced with the aim of breaking the chain of infections in farms, laboratories and homes called disinfectants **(Olowe *et al*., 2004)**. Disinfectants act on microorganisms at several target sites resulting in membrane disruption, metabolic inhibition and lysis of the cell. They could be classified into three categories (1) high level disinfectants (eliminate vegetative bacteria, tuberculosis bacilli, fungi, viruses and some bacterial spores. (2)Intermediate-level disinfectants (destroy all vegetative bacterial cells, the majority of fungi and tuberculosis bacilli). (3) Low-level disinfectants (activity only on fungi and able to eliminate bacteria in vegetative form) **(BC centre, 2003)**.

Infection with *P. aeruginosa* is considered as one of the most dangerous disease all over the world due to its pathogenicity to animal and man. *P. aeruginosa* can inhabit the nasopharynx and lower digestive tract. In addition, it is

responsible for mastitis infection in dairy cattle leading to serious economic losses. It can be isolated from wide range of inanimate, animal and human environment. It is found in warm moist environment (soil, water and sewage), occasionally can be isolated from normal human skin. Finally, *P. earuginosa* has been recorded in most cases of endometritis, pneumonia, urogenital tract infection, severe form of gastroenteritis, skin infection and wounds **(Kapour, 1986)**.

The indiscriminate use of antibiotics is potentially capable of giving rise to a higher incidence of infections with resistant bacteria such as *P. aeruginosa*, which may be transmitted from animal to human and thereby complicates the therapy of human diseases. Therefore *P. aeruginosa* has been consistently reported as problematic organism in showing resistance not only to antibiotic but also to disinfectants. Mucoid variant of *P. aeruginosa* produce large amounts of a thick extracellular polysaccharide coat surrounding colonies serves in control of cell to cell adhesions, more colony formation and synthetic antibacterial agent from the bacteria cell **(Rutala, 2004)**.

On the other hand, using the proper disinfectant considered as an essential part of infection control practices and the use of liquid disinfectants in animal laboratories is accepted as contributing with the maintenance of good hygienic standards **(Blackmore, 1972)**.

The aim of this study was to evaluate the efficacy of some commercial disinfectants against *P. aeruginosa* strains isolated from different sources. The minimum inhibitory concentration, the time exposure were examined to achieve complete destruction of the microorganism.

Material and Methods

Samples:

A total 133 of samples were collected from faecal swabs (36), nasal swabs (32), milk samples (39) and water samples (26).

-Faecal swabs: were collected from cattle showing symptoms of diarrhoea.

-Nasal swabs : were collected from cattle showing symptoms of respiratory disorders.

Each sample was labeled with the primary essential identifications (animal number, case history).

-Milk: milk samples were separately collected from cows showing signs of mastitis. The udder, teats and hands were perfectly washed with clean soap and water then dried with disposable paper towels for best cleaning practice. The teats were disinfected with 70% ethyl alcohol. The first foremilk stream was discarded then milk was drawn from each quarter into two sterile screw capped McCartney bottles. Milk samples were incubated aerobically at 37ºC for 24 hours then centrifuged at 3000 r.p.m. for 20 minutes. The cream and supernatant fluid were discarded, while the milk sediment were cultured onto different cultured media.

-Water: Under aseptic condition water samples were centrifuged at 3000 rpm for 15 minutes. The supernatant was discarded and 1 ml was taken from sediment and inoculated onto 9 ml of sterile nutrient broth then incubated at 37 C for 24 hours. A loopful from incubated tubes were cultured onto the solid different culture media.

Bacteriological examination, all samples were inoculated into the following media: nutrient agar, blood agar, and pseudomonas agar base with C-N supplement, All plates were incubated aerobically at 37ºC for 24-48 hours. The developed colonies were picked up and sub-cultured for purification. The pure colonies were identified morphologically and biochemically according to **Carter and Cole (1990)**.

Efficiency of some disinfectants on isolated *P. aeruginosa*: the influence of certain disinfectants were carried out by using minimum inhibitory concentration method (MIC) according to **(Mazzola *et al.*, 2001, 2003 and Biljana *et al*., 2012)**.

Disinfectants used were: chlorine, formalin and Virkon`S.

Table (1). Disinfectants and its concentrations

Disinfectants	Dilution	Concentration
Chlorine (4.6% sodiumhypocllorite)	1 part to 9 parts 1 part to 50 parts 1 part to 1 part	0.5% (5000 ppm) 0.1% (1000ppm) 2.5 to 5% (2000 to 5000 ppm)
Formalin (37%formaldehyde)	10 part to 1000 30 parts to 1000 50 parts to 1000 70 parts to 1000	1% 3% 5% 7%
Virkon`S (20.4% potassium peroxy-monosulphate ,1.5% sodium chloride)	10 g/L 1.0 g/L 0.1 g/L	1.0% 0.1% 0.01%

Preparation of culture suspension: The isolated *Pseudomonas aeruginosa* was purified on nutrient agar and incubated for 24 hours at 37º C, then transferred in a test tube containing sterile saline to make matching with MacFerland tube No 1 , containing approximately ($3x10^8$ C.F.U./ml).

Test performance:
Determination of minimum inhibitory concentration (MIC) for every chemical agent was developed, through the classic method of successive dilution. In twelve numbered screw tubes (10 x 100 mm), 1 mL of TSB (trypticase soy broth) medium was distribu-ted for every tube, except for the tube number 1. Tubes were submitted to autoclave under constant pressure and temperature of 121 °C. For the first and the second tubes of the series, 1 mL of tested sanitizing agent was added; tube 2 was stirred and 1 mL was withdrawn and transferred to tube 3. This successive transference was repeated until tube 11. It was added to all flasks, except for flask number 11, 0.1 mL of inoculation (tested microorganism) at known concentration. Incubation at optimal temperature was de-veloped for 24 and 48 hours. After this period, the reading was recorded; the MIC is the concentration of the higher dilution tube in which the absence of bacterial growth occurred. Tubes 11 and 12 are positive (TSB + inoculation) and negative (TSB + antimicrobial) controls.

Determination of decimal reduction time of chemical agents used for disinfectant purposes: **(Herigstad *et al* 2001)**
From a previously serial dilution, a drop of disinfectant bacterial mixture was applied over the surface of standard plate count agar at the time intervals 5, 10, 15, and 30 minutes from original zero time.
Dilution of the chemical agent to the appropriate bactericidal concentration must be effected with clean water. Meanwhile, direct contact with dirty materials should be avoided, the presence of which cause gradual loss of strength and become a vehicle of contamination to other surfaces. Solutions of chemical agents should be kept in closed containers, well protected from air contaminants and provided with a facility which releases a constant required amount.

Determination of phenol coefficient (Rideal-walker coefficient) for virkon`S disinfectant: (Chandrakant, 2008).

Series dilutions of phenol and virkon`S disinfectant are prepared. A standard amount of *Pseudomonas aeruginosa* strain ($3x10^8$) were added to each dilution at 5 time intervals, samples were inoculated on a growth medium which was incubated for 24-48 days at 37º C. Then the growth was examined. The highest dilution that kills the bacteria after 10 minutes

exposure but not 5 minutes is used to calculate the phenol coefficient.
The phenol coefficient was calculated as follow :

$$\text{Phenol coefficient} = \frac{\text{The highest dilution of virkon after 10 minutes exposure}}{\text{The highest dilution of phenol after 10 minutes exposure}}$$

Results
Results shown in Table (2) revealed that the *P. aeruginosa* was isolated from clinical cases (suffering from diarrhoea, respiratory symptoms and mastitis) and environmental samples (water) with an incidence of 10.52%. The prevalence rate was 16.66%, 12.5%, 5.12% and 7.69% from faecal swabs, nasal swabs, milk and water samples respectively.
The efficacy of some disinfectants against *Pseudomonas aeruginosa* isolated from different sources was illustrated. The results in Table (3) showed that *Pseudomonas aeruginosa* was relatively equally resistant to the action of chlorine concentration of 200 ppm and 1000 ppm at 10 minutes exposure, while chlorine concentration of 1000 ppm killed the organism after 15 minutes. The highest concentration of this disinfectant (5000 ppm and 20000-50000 ppm) destroyed the organism completely after 5 minutes exposure. There is no effect of chlorine at 50 ppm concentration on the inhibition of *Pseudomonas aeruginosa* growth.

Table (2). Rate of isolation of *P. aeruginosa* from different samples.

Samples	No. of examined samples	No. of Positive samples	%
Faecal swabs	36	6	16.66
Nasal swabs	32	4	12.5
Milk swabs	39	2	5.12
Water	26	2	7.69
Total	133	14	10.52

Table (3). Bactericidal action of chlorine on *Pseudomonas aeruginosa* isolated strains.

Concentration Of chlorine	No. of m.o	Exposure time per minute			
		5	10	15	30
50 p.p.m (0.001 %)	3×10^{8}/ml	+	+	+	+
200 p.p.m. (0.25%)	3×10^{8}/ml	+	+	+	-
1000 p.p.m. (0.1%)	3×10^{8}ml	+	+	-	-
5000 p.p.m. (0.5%)	3×10^{8}/ml	-	-	-	-
20000-50000 p.p.m. (2.5-5%)	3×10^{8}/ml	-	-	-	-

As shown in Table (4), *Pseudomonas aeruginosa* of different origins could resist 1% and 3% formalin for 15 minutes exposure while, after 30 minutes complete inhibition of growth happened. It was noticed that 5% formalin had a marked killing effect on the growth after 5 minutes. Concentration of 7% has powerful bactericidal effect on the examined organism.

Reviewing the results of the effect of the different concentrations of virkon`S (Table 5). It seems that all *Pseudomonas aeruginosa* strains could resist the effect of 0.01% concentration virkon`S at 5-10-15-30 minutes. Using concentration of 0.1% of the same disinfectant could eliminate the microorganism after 30 minutes exposure. On the other hand virkon`S 1% concentration was able to destroy all isolates of *Pseudomonas aeruginosa* after 5, 10, 15 and 30 minutes.

The phenol coefficient of virkon`S disinfectant was studied (Table 6). The highest dilution that kills the bacteria after 10 minutes exposure but not 5 minutes is used to calculate the phenol coefficient.

Table (4). Bactericidal action of formalin solution on *Pseudomonas aeruginosa* isolated strains.

Concentration of formalin	No. of m.o	Exposure time per minute			
		5	10	15	30
1%	3 x 10^8/ml	+	+	+	-
3%	3 x 10^8/ml	+	+	+	-
5%	3 x 10^8/ml	+	-	-	-
7%	3 x 10^8/ml	-	-	-	-

Table (5). Bactericidal action of Virkon`S on *Pseudomonas aeruginosa* isolated strains.

Concentration of Virkon`S	No.of m.o	Exposure time per minute			
		5	10	15	30
0.1/1000 (0.01%)	3 x 10^8/ml	+	+	+	+
1/1000 (0.1%)	3 x 10^8/ml	+	+	+	-
10/1000 (1%)	3 x 10^8/ml	-	-	-	-

Table (6). Phenol coefficient of Virkon`S disinfectant.

Disinfectant	Dilutions	Exposure time per minute		
		5	10	15
Virkon`S	0.1/1000	+	+	+
	1/1000	+	+	+
	10/1000	-	-	-
Phenol	1/100	+	+	-
	2/100	+	-	-
	3/100	+	-	-

Discussion

Pseudomonas aeruginosa is one of the most important microorganism that causes disease to man and animals. It usually gives rise to suppurative processes and occasionally to generalized infection. Therefore, particular attention has been focused to *P. aeruginosa* in this study.

The given results in Table (2) showed that *P. aeruginosa* was isolated from different sources. It was isolated from clinical cases suffered from diarrohea and respiratory manifestations. Investigation of faecal and nasal samples revealed isolation of *P. aeruginosa* in an incidence of 16.66% and 12.5% respectively. These results agree with finding of **Riad (1994)** who detected *P. aeruginosa* from faecal and nasal swabs in incidence of 17.0% and 13.5% respectively. Examination of milk samples from cows showed signs of clinical mastitis resulted in isolation of *P. aeruginosa* in incidence of 5.12%. Similar results were obtained by **Aziz (2002)** who isolated *P. aeruginosa* from cows suffer from mastitis in incidence of 3.1%. Regarding to *P. aeruginosa* isolated from water samples, results revealed incidence of 7.69%. This result tends relatively to agree with **Kiss *et al*., (1983)** and **Sotohy and Ahmed (1996)** who isolated *P. aeruginosa* strains from water samples in incidence of 4.77% and 9.5% respectively.

A disinfectant can be described as an agent, usually chemical, which destroys or inhibit the growth of microorganisms (except ordinarily bacterial spores) and can be sporostatic. Disinfectants may inactivate cells in a variety of ways including cell wall and cytoplasmic membrane damage, electron transport interference and the coagulation of proteins and nucleic acids. Chemical disinfection is appropriate for the inactivation of liquid wastes, such as cultures of etiologic agents, associated biologicals and human blood and blood products. It can also serve to decontaminate some solid infectious wastes in a small clinic or laboratory where contaminated swabs, disposable culture loops, etc., are placed in jars of disinfectant when steam sterilization or incineration are unavailable. On the other hand, Contact with contaminated surfaces carries a risk of causing an infection, moreover floors become contaminated with microorganisms from setting airborne bacteria by contact with shoes, wheels, other objects and occasionally by spills. Using soap and water for cleaning was less effective in reducing the number of bacteria than was using disinfectants **(Gerald and Denver 1999)**.

Microorganisms vary greatly in their resistance to disinfectants, for example, gram positive bacteria are more susceptible to chemical disinfectants while mycobacteria, bacterial spores and gram negative bacteria are more resistant. Gram negative bacteria possess an outer membrane that acts as a barrier to the uptake of disinfectants. Pathogenic microorganisms also vary in their ability to survive or persist in the environment (i.e., bedding, debris, feed), and in their potential routes of transmission. Additionally, some microorganisms are also resistant at creating a biofilm that enhances their ability to persist in the environment and avoid the action of disinfectants **(Ewart, 2001).**

Due to the capacity of surviving in unfavorable environmental conditions and to the high resistant to antibacterial agents, antiseptics and disinfectants, *P. aeruginosa* continues to be an important pathogen in laboratories, farms and acquired infections. The high resistant of *Pseudomonas* Spp. seams to be associated with chemical composition of the external membrane. In addition *P.aeruginosa* reported associated with contamination of the surfaces and equipment cleaning when nongermicidal cleaning -solution instead of disinfectants were used to decontaminate the environment. On the other hand *P. aeruginosa* was resistant to the antibiotic agents as well as quaternary ammonium chloride and phenols. So the use of the proper concentration of a disinfectant and appropriate contact times are important to achieve the best results **(Glenda 2005)** .

The results in this work examined the effect of the most common used disinfectants on *Pseudomonas aeruginosa* namely: chlorine, formalin and Virkon`S.

Among these disinfectants is chlorine. Using chlorine concentration of 200 p.p.m.of (0.25%) and 1000 p.p.m. (0.1%) failed to eliminate *P. aeruginosa* before 30 and 15 minutes respectively. While higher concentrations as 5000 p.p.m. (0.5%) and 20000-50000 (2.5-5%) had a complete bactericidal effect after 5 minutes (Table 3). These results are nearly confirmed by **BC centre (2003)** who reported that chlorine is typically diluted 1:50 (1000 p.p.m.) for surface disinfectant while using 5000 p.p.m. to clean up blood spills. For disinfecting instruments using 2000 p.p.m. cholorine is a very strong solution and should be used in a limited cases. Chlorine has been used as disinfectant in water treatment, but Chlorinated drinking water should not exceed 6-10 p.p.m.. Chlorine considered an intermediate-level disinfectant, having a broad spectrum of antimicrobial activity, remove dried and fixed organism from surfaces, do not leave toxic residues, unaffected by water hardness, inexpensive and fast acting. It is used with gram negative *P. aeruginosa*. The most prevalent chlorine product are aqueous solution of 4-6% sodium hypochlorite, it does not decompose for 30 days when stored in brown bottle **(William *et al* ., 2008)**.

The most obvious disadvantage of chlorine is that it can be corrosive to equipments and post health risks to humans and wildlife due to the formation of undesirable halogenated compounds such as haloacids and others compounds **(Fiessinger 1985)**. Because of the toxicity of these disinfectant by-products, optimizing chlorine application and seeking alternatives to chlorinated sanitizing agents are important to reduce the release of chlorinated residues to the environment **(Greene *et al*., 1993)**.

Regarding formalin as a bactericidal agent, showing that 1% formalin had been considered highly effective against *P. aeruginosa* in 30 minutes exposure. When using 3% and 5% formalin, complete destruction of *P. aeruginosa* in15 and 10 minutes exposure respectively. On the contrary at the concentration of 7% solution destroyed all tested strains at once. This is similar to **Riad (1994)** who declared that formalin solution when used in 1% was highly effective against *P. aeruginosa* in 25-30 minutes and 7% concentration eliminated *P. aeruginosa* completely. While using 3% and 5% formalin solution had a better results in 20 and 15 minutes respectively. Also **Marcia *et al*., (2000)** mentioned that using1.08% of formalin was effective when tested against *P. aeruginosa* and it is recommended as instrument disinfectant. Moreover, **Essam *et al*., (2009)** proved that using 2.5% formalin achieved 100% killing *P. aeruginosa* in 20 minutes

Formalin is a high-level disinfectant so at variable concentrations destroy a wide range of microorganisms. The aqueous solution is bactericidal, tuberculocide, fungicide, virucide and sporicide. Formalin is an externally reactive chemical that interact with protein and RNA in vivo. It used as a surface disinfectants and a fumigant and has been used to decontaminate wooden surfaces and mechanical equipments. Its use must occur in an air tight building, which must remain closed for at least 24 hours after treatment.

It should be handled in the workplace as a potential carcinogenic at long term exposure to low level in the air or on the skin can cause asthma like respiratory problems and skin irritation such as dermatitis and itching. For these reasons, workers should have limited direct contact with formalin and these considerations limit its role in sterilization and disinfection process **(William *et al*., 2008).**

Among the powerful broad spectrum disinfectants used in this study was Virkon`S. it affected *P. aeruginosa* at 0.1% in 30 minutes. The efficacy of virkon`S at 1% was very high, it eliminated *P. aeruginosa* completely in only 5 minutes . This was in agreement with that recorded by **Elgohary (1999).**

Virkon`S is a powerful broadspectrum multipurpose disinfectant. It could be beneficial in routine disinfection as it have a wide active range both under clean and dirty conditions. It is typically used for cleaning up, hazardous spills, disinfecting surfaces and soaking equipments. Virkon`s would not have irritant or toxic effect on animals and materials utilized in laboratories environment **(Callegaro *et al*.,**

1993). Virkon`S is not classified as harmful or toxic **(Christensen *et al*., 2011)**.

Phenol coefficient may be defined as killing power of germicide or antimicrobial agent towards a tested microorganism compared to that of phenol. It is the ratio of the highest dilution of disinfectant killing the organism in 10 minutes but not in 5 minutes, to the highest dilution of phenol showing the same result. Our results showed that phenol coefficient of virkon `S was 1.05. Disinfectants that are more effective than phenol have coefficient > 2 **(Saunders, 2003)**.

Finally virkon`S gave the best results among all the tested disinfectants, which was confirmed by **Act (1987)** and **Gasparino *et al.* (1995)**.

As the result that, disinfectant effectiveness depends on many factors. First, type of contaminating microorganism as each disinfectant has unique antimicrobial attributes. Second, degree of contamination to determine the quality of disinfectant required and time of exposure. Among these factors, presence of organic matter and other compounds such as soaps may neutralize some disinfectants. Moreover, presence of proteinaceous materials at high levels can absorb and neutralize some chemical disinfectants. Lastly, , the chemical nature of disinfectant should be considered in order to select the appropriate. Concentration, quantity of disinfectant and its toxicity to the environment and relative safety to people who may be exposed **(Springthorpe 2000)**. As the use of suboptimal concentration might lead to the development of resistant and virulent strains **(EL-Mahmood and Doughari 2009)**.

As a conclusion, the effective use of disinfectants is a part of multibarrier strategy to prevent health care associated infections. The minimum inhibitory concentration method should be taken to use the optimal concentrations of the disinfectants to evaluate the performance of every disinfectant and reduce the incidence of acquired infection. It is important to study the time of decimal decreasing. Finally, disinfection protocols may vary depending on the need of the farm or laboratory. No single disinfectant is adequate for all situations. Disinfection protocols used on a daily basis will differ from those needed to control an infectious disease outbreak. However, both have one component in common; thorough cleaning and washing prior to the application of any disinfectant is essential.

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اختبار كفاءة بعض المطهرات على ميكروب السودوموناس ايروجينوذا المعزول من مصادر مختلفة

هانى ميشيل عزيز، امانى نبيل ضبع' هالة فؤاد حبشى
قسم البكتريولوجى-معهد بحوث صحة الحيوان

الملخص العربى

تم تجميع عدد 133 عينة (36 مسحات من البراز, 32 مسحات انفية, 39 عينة لبن, 26 عينة مياة) وقد تم تجميع هذة العينات من ابقار تعانى من الأسهال و الأعراض التنفسية وايضا اعراض التهاب الضرع. تم زرع هذة العينات علي الأجار المغذى والاجار المغذى المضاف الية الدم بنسبة 5% وميديا السودوموناس وقد تصنيف هذه المعزولأت بيوكيميائا. تم عزل ميكروب السودوموناس ايروجينوزا بنسبة 16.66%, 12.5%, 5.12%, 7.69% من المسحات البرازية, المسحات الأنفية, عينات اللبن وعينات المياه على التوالى. وقد اجريت دراسة لكفائة و تاثير بعض المطهرات(الكلورين, الفورمالين, الفيركون اس) على ميكروب السودوموناس ايروجينوذا باستخدام طريقة اقل التركيزات المثبطة باجراء تجربة ارتباط الوقت و القضاء على البكتيريا. و كانت التركيزات المستخدمه لكل مطهركالتالى: الكلورين(50, 1000, 5000, 200000 - 50000 حزء فى المليون), الفورمالين (1%, 3%, 5%, 7%) والفيركون اس (01,0%, 1,0%, 1%) وذلك فى الأوقات التالية 5, 10, 15, 30 دقيقة لكل تركيز من التركيزات السابقة لكل مطهر. وجد ان مطهر الكلورين بتركيز 200 و 1000 جزء فى المليون يمنع نمو البكتيريا بعد 15, 30 دقيقة على التوالى اما التركيزات الأعلى لهذا المطهر (5000, 20000-50000 جزء فى المليون) كان لها تاثير مثبط تماما لنمو البكتيريا بعد 5 دقائق من التعرض لهذا التركيز. وقد لوحظ ان 5% فورمالين يمنع نمو البكتيريا بعد 10 دقائق بينما 7% من هذا المطهر نظهر تاثيرة على نمو الميكروب بعد 5 دقائق فقط. عند دراسة كفاءة مطهر الفيركون اس على ميكروب اليودوموناس ايروجينوزا وجد انة يقاوم نمو الميكروب عند استخدام تركيز 1% اي 10 جم/اللتر بعد 5 دقائق فقط. و بحساب معامل الفينول لمطهر الفيركون اس وجد انة 2. و يمكن الحكم بان مطهر الفيركون اس كان الأكثر كفاءة من بين المطهرات المستخدمة.