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ISOLATION OF *HELICOBACTER PYLORI* FROM DRINKING WATER OF AL-REFAI CITY AND STUDY THE EFFECT OF ZEOLITE POLYMER ON THEM

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ABSTRACT : The study included knowledge of the effect of using beads of the strong cationic and anionic resin(zeolite) in reducing the numbers of *Helicobacter pylori* in drinking water in Al-Refai city, DhiQar province, Iraq. Both types of resins showed great efficiency in reducing the numbers of bacteria in drinking water, after they had been treated with 3% hydrochloric acid as for the cationic resins and by 3% sodium hydroxide as for the anionic resins.The reduction was significant at contact time of 15 and 30 minutes. The rate of the reduction at both times were (100%) as for the cationic resin while the reduction rate in case of using anionic resin was lower than the cationic resin. The efficiency of the beads of the cationic and anionic resin in reducing the number of bacteria was lower when they were washed by distilled water only. Again the cationic ion exchange resins was more efficient than the anionic resin. The study concluded that the resins of Amber lite type, which has never been, as to our know ledge in purifying water, is an efficient material to draw the bacteria of water. Hence, it has been concluded that these resins can be used in purifying drinking water instead of using chlorine, ozone or the uv-light.

Key words : *H. pylori*, drinking water, ionic exchange, zeolite.

INTRODUCTION

Microorganisms exist in soil, air, also in both of salty and fresh aquatic environments, which accountformore than 70% of the Earth's surface, or 139 million square miles. As a matter of fact water is consideredas a basic means for transporting various pathogens, whether treated or untreated, the problem of waterpollution in microscopic areas remains a problem for many countries, including developed countries (Kalaf, 1987; Kaneko and Igarashi, 1981).

Bacterial growth conceder a major problem in the water distribution system as well as in domestic water filters (Payment, 1989). The World Health Organization (WHO) reports that 80% of diseases are caused by water contamination in pathogenic microorganisms. Microorganisms in the water have serious effects on human health (Kaneko and Igarashi, 1981). Half of the diseases diagnosed in hospitals worldwide are related to diseases resulting from water contamination with bacteria. (Biswas, 1983 and Bourne, 1982).

Microorganisms in water vary according to the quality of the water, since the microscopic life in the surface water is different from that found in groundwater and air water. Even water can be a source of many diseases because of inaccuracies in treatment, as there is little water does not need treatment before the person to drink or for other purposes. The treatment of water aims to remove the turbidity, smell and unwanted taste, as well as remove some metals such as iron, manganese and remove the hard to fit the industry and washing and most important of all this elimination of pathogenic and unwanted bacteria and the removal of toxic chemicals. Numerous attempts to get waternon-polluting sources and search ways of purification are honest and although it is still more than half the world's population do not have access to safe drinking water, noting that the construction of modern water purification plants costs less than the treatment of water pollution disease costs (Almusleh, 1988; Melgar *et al*, 1997).

Techniques and transactions may not be similar depending on the type of surface water and the purpose of using this water, all transactions aimed at obtaining safe water for human consumption Bacterium and chemical as well as acceptable qualities such as smell, taste (Almusleh, 1988). In addition to the above, the treatment systems must be highly susceptible to reduction of germs (Kaneko, 1997).

Disinfection is one of the most important processes and the last one to arrest or kill pathogens in the water distribution system (Hoff, 1986; Weiner, 1976). The water

purification leads to the killing of bacteria and viruses in water and where necessary and the amount of cleanser should be small and should be non - toxic to humans, and it must be easy to control, easy and environmentally friendly (AL-Layla *et al*, 1977). The amount of material suspended in water determines the amount of disinfectant used.

The chemical disinfection using chlorine different forms, the most widely used in the cleansing which is cheap and easy to get certified in the treatment of (Kawabata *et al*, 1992). The chlorination of drinking water is one of the most important methods of purifying the water to rid them of the factors of injury or reduction (Kaneko, 2000 and Kaneko, 1998). However, in recent years there has been an inaccurate treatment of chlorinated water, as well as an undesirable taste and odor of treated water, due to the interaction between chlorine and organic compounds or organic compounds found naturally in water. Some sources suggest that chlorination leads to the formation of organic chlorine compounds in water (trihalo methan) they are toxic compounds. Some bacteria are not affected by chlorine. Despite its high efficiency, especially those bacteria that stick to organic carbon molecules, these bacteria usually resist chlorination (LeChevallier *et al*, 1984). It was also found that the production of bacteria to the governor is an important factor to protect bacteria from the action of disinfectants, especially chlorine (LeChevallier *et al*, 1988).

In addition to the above, there are risks of pressure resulting from the storage and use of chlorine gas (Soracco *et al*, 1985). Also, recent studies have shown that different treatments using chlorination lead to an increase in the effectiveness of mutations and the emergence of resistant strains of chlorine action. Among the most important bacterial resistant species are bacteria *H. pylori*, which is called the twisted pylori and endowed with invasive bacteria that infiltrate into the stomach and settle in epithelial cells in the mucous membrane of the stomach. This germ is negative to the layer of Gram and is very common as it affects about 85% of human beings multi-drug resistance (Ali *et al*, 2010). Of all the above, recent studies have confirmed the need to search for alternatives less side-effect of chlorine (Hirata *et al*, 2000). In recent years, research has tended to obtain modern water disinfectants, which have chlorine preferences. These disinfectants are deadly to bacteria, do not react with organic impurities in water to produce toxic compounds, do not add any chemicals to water and remove all cells of live and non-living bacteria from water (Walfish and Janauer, 1979; Kaneko and Nishiguchi, 1981). Some of the ion exchange resins are expected to be the most suitable alternative to chlorine and other cleaning technologies (Kawabata *et al*, 1983; Walfish and Janauer, 1979; Kawabata *et al*, 1996).

The most important feature is that it reduces the occurrence of mutations, especially the zeolite resin, Has no toxic hazard, has strength and quality in installation and easy to use in work (Wong *et al*, 1988). Eliminates salts, substances and mineral elements from water (Smith, 1996). Effective in removing bacteria and micro-organisms generally from water (Fina *et al*, 1982).

Recent studies have shown that one of the most important and best techniques used in water purification is the ion exchange technique using ion exchange positively charged and negatively charged ion exchange is the inverse exchange of ions between the solid phase and the liquid phase. Represents the ion exchange material, and the solid phase here must have an open molecular structure in order to allow the mutual ions to move freely (Vogel, 1967).

Each ion exchangers possess some of the general characteristics that are spread among all kinds, P is containing a description of the active ions that exchange inversely with other ions in the surrounding solution without any physical limit w change in the article. The negative exchanger consists of a large negative ion surrounded by positive and small positive ions that are interchangeable with other positive ions. The positive exchanger is composed of a large positive ion surrounded by small, moving and interchangeable negative ions (Vogel, 1967; Faust and Aly, 1983).

MATERIALS AND METHODS

Water sampling

Water samples were collected from the current tap water (drinking water) in different areas of Al Rifai district, DhiQar city, Iraq, by leaving water for more than four minutes and then put the water in clean, sterilized 250 ml plastic containers in a period not exceeding four hours.

Bacterial culture

Pure cultures of *Helicobacter pylori* bacteria were obtained after cultured of water samples in two ways and diagnosis of bacterial colonies:

1. **Membrane filters** method with diameter of 0.45 ìm diameter for the purpose of calculating the number of bacterial colonies (Al Salamy and Ali, 1987).

2. **Spreading method** : About 1mL of the cultured sample in the case of the membrane filters diluted ten thousand times with distilled water then filtrate 1 ml and

lift the filter papers each time. Then papers were pressed on the surface of the NA medium. The size of 0.2 ml of each sample was also taken by clean and sterile pipettes, after being previously diluted 100 times. This volume was spread by the NA medium, three replicates in both cases (filtration and diffusion). The cultures were left for 20-10 minutes for absorption between the culture medium and the sample of the cultivated water. They were stored at a temperature of 037 m for 72 hours inverted. Sixteen samples of pure bacteria were cultured on HP media, NA and 70 samples of water cultured on NA medium only. Then the similar colonies returned to estimate the number of cells 1ml Colony Forming Unit (cfu).

Diagnosis of bacterial samples

Examination of the shape and color of the colonies, using Gram dyeing method, observation of composition or non-spore formation and microscopic examination, as well as using urease, oxides and catalytic tests, showed that the water samples contained *Helicobacter pylori* bacteria as well as other non-diagnostic bacteria.

Treatment of water with ion exchangers

Contact method

Resin Relite S100 and Resin Relite 2AS were treated with water samples inside clean and sterile glass vials with continuous manual stirring (Jorgenson, 1979). The size of the granules was 25 ml and the water samples were 25 ml during contact.

A section of water samples was contacted in a glass column for each of the cationic and anionic species (Kawabata, 1992). The columns were filled with resin beads mixed with sterile distilled water in a slurry mortar. The granules were allowed to stabilize after making sure that the air bubbles were removed (Pecsok *et al*, 1988). The two columns were washed before packing with a 1% hydrochloric acid solution. Place a piece of glass wool down each column near the flow faucet to prevent granular descent (AlGesha and Saeid, 1985).

The size of the water samples used was 25 ml and the size of the granules was 25 ml for each type.

The use of cationic and ionic resin cores once after washed with distilled water in reducing the preparation of *H. pylori* bacteria suspended in the phosphate solution wash 25 ml a granules of resin cationic and ionic, but both separately with distilled water in sterile clean glass flask size 250 Cm^3 was attended by a suspension of the pure bacteria culture *H. pylori* suspended with the use of the solution 50 ML, suspended the bacterial cells into two equal volumes by 25 Ml each size, mix each volume with granulated granules in the flasks and contact times are: 1.5 minute, 15 minute, 30 Min Water collection. After each contact time, the samples were cultured before and after contact, in two ways: 1 Ml of each sample after each time of contact with clean and sterile pipettes and reduce this volume by adding 9 Ml of distilled water. After filtration, remove the filter sheets using sterile forceps and gently press on the surface of a solid, HP media, NA And the rate of three replicates for each type in the circles. Button section p another of the same samples nominated, in a way speeding using the glass by taking the size of 0.2 Ml of each sample diluted 100 thousand times by the solution of the plaster after each time of contact by clean and sterile pipettes spread on the surface of the middle of the crucifixion solid NA And the middle HP media At a rate of three replicates per centimeter. The dishes left a period 20-10 Min for absorption between the middle of the plant and the cultivated sample. The dishes are relaxed after they are put in anaerobic Jar Temperature 37 0 M for a period ranging from 5.3 The colonies were developed using a colony counting device and the cells were then calculated with the equivalent of (cfu).

Use of cationic resin granules once after treatment with hydrochloric and ionic acid solution once after treatment with sodium hydroxide solution in reducing the numbers of bacteria *H. pylori.*

Outstanding in the solution

Wash 50 Ml of cationic resin granules with hydrochloric acid solution (3%) then wash similar size granules of ionic resin, but with sodium hydroxide (3%) The granules were then washed with both distilled water and water 5 litters for each 100 Ml of the granules in order to remove the traces of acid and alkaline completely was washing with acid and alkaline and distilled water during a period not exceeding five minutes.

Culture suspended pure bacteria from *H. pylori* in a physiologically sized solution 100 Ml, dividing this volume from the suspension into two equal parts, one of these volumes was mixed with the cationic resin granules in a clean and sterile glass flask, while the other volume was mixed with ionic resin granules in another pure and sterile flask. The sample time of the sample with the two cationic and ionic resin granules is divided into three sections: 1.5 Min 15th Min 30 accurate. Collecting water after each time of contact the samples collected after contact and control samples were planted in two ways:

Method of membrane filters and method of publication using a sterile glass diffuser

Incubated cultivated dishes with a degree 37 0 M for a period ranging from 5.3 days after they were put in

anaerobic Jar. The colonies were developed using a colon counting device, and the cells were then calculated with the equivalent of (cfu).

Statistical analysis

The results obtained in this study were organized in computer-aided statistical programs, the use of variance analysis (ANOVA) and Revised Least Significance Difference (R.L.S.D) (AlRawy and Kalaf Allah, 1980).

RESULTS

The results refers that the reduction rates of bacterial numbers by resin granules vary according to the type of bacteria, type of resin used (cationic or anionic), as well as the important and effective role of the time-contact agent with bacteria and different flow rates.

Table 1 noted that the reduction rates of bacterial numbers varied according to the flow rate and thus the time of the contact (the time required for the passage of a given volume of the solution). There was also a difference between the reduction rates of bacteria resulting from the use of cationic resin granules and the use of the Ionic resin granules washed with distilled water. The reduction ratios resulting from the use of cationic resin were found to be higher than that of the use of anionic granules. The analysis of variance and R.L.S.D showed significant differences (<0.05) between reduction rates in the number of bacteria caused by the use of cationic resin granules and rates resulting from the use of anionic granules.

The analysis of variance and the RLSD test in Table 2 showed significant differences (<0.05) in the reduction rates of bacteria when using cationic resin cores or the use of acidic or alkali-based anionic granules respectively. The highest reduction rates were those resulting from the use of granules Cationic resin and the lowest reduction rates are those resulting from the use of anionic resin granules.

A comparison of the results of Table 1 with the results of Table 2 shows that there are few differences between the reduction rates of the bacteria if the cationic and anionic resin grains are washed with 3% hydrochloric acid solution for the chemical or washed with sodium hydroxide solution (3%) for ionic rate.

Analysis and testing RLSD in the Table 3 refers to the emergence of significant differences (<0.05). If the glass beaker is used or the glass column is used, the highest rate of reduction in bacterial counts is indicated in case of use of glass beaker and lowest reduction rate if glass column is used. Significant differences in bacterial reduction rates were observed after different contact times (contact of resin granules with bacteria) and contact time 30 Precise is the period in which the highest rate of reduction and duration occurs 1.5 A minute is the period in which the lowest rate of reduction occurs.

Analysis of variance and test RLSD in Table 4 indicate to the emergence of significant differences (<0.05) in bacterial preparation rates when using a glass beaker or using a glass column. Where the highest rate

Table 1 : Reduction of the numbers of bacteria in drinking water using cationic and ionic resin washed with distilled water and packed with glass columns and used once.

Flow rate (50ml/min)	No.of colony/ml of sample using anion	% Reduction	No. of colony/ml of sample using anion	% Reduction
1	25	65.7	60	17.8
2	23	68.5	55	24.6
3	17	76.7	55	24.6
4	16	78.0	49	32.8
5	16	78.8	49	32.8

Control = 73 colony, (R.L.S.D. test) p<0.05, S. (significance)

Table 2 : Reduce the number of bacteria present in drinking water using cationic resin granules washed with 3% hydrochloric acid solution and 3% anionized 3% sodium hydroxide solution and packed in glass columns.

Flow rate (50ml/min)	No.of colony/ml of sample using anion	% Reduction	No. of colony/ml of sample using anion	% Reduction
1	25	71.2	70	19.5
2	24	72.5	65	25,2
3	21	75.8	64	26.4
4	16	81.6	55	36.4
5	14	83.9	45	48.2

Control = 87 colony, (R.L.S.D. test) p<0.05, S. (significance)

of reduction of the numbers of bacteria in the case of the use of glass beaker and the lowest rate in the case of the use of glass column.

The statistical analysis also showed significant differences in reduction rates of bacterial numbers after different contact times (in the case of a medium NA) The highest reduction rates were after contact time 1.5 minutes. From comparing the results of the Table 5, results of the Table 6, we find that the differences in reduction rates are few if the cationic resin granules are used and are washed with distilled water or washed with (3%) hydrochloric acid solution.

Analysis of variance analysis and test RLSD in the Table 5 refers to a significant difference (<0.05) in reduction rates of bacteria *H. pylori* suspended in the solvent solution during different contact times with cationic resin granules in glass flasks and showed the highest reduction rate after contact time 30 Min and the lowest reduction rate after contact time 1.5 minutes.

Variance analysis and RLSD test in the table (6) indicate to a significant difference (<0.05) in reduction rates of bacteria *H.pylori* outstanding in the crystalline solution after different contact times with cationic resin granules in glass flasks. It had the highest reduction rate after the contact time 30 Min and the lowest reduction rate after contact time 1.5 minutes. Shorter rates have been increased as contact time increases. From comparing the results of the Table 5 results of the Table 6 the reduction rates appear in the Table 6 higher than theses in Table 5 this indicates that the cationic resin grains are washed with a hydrochloric acid solution (3%) were more efficient than those washed with distilled water when used to reduce bacteria *H.pylori* suspending in the physiological solution.

Variance analysis and RL SD test in the Table 7 refers to a significant difference (<0.05) in the reductionrates of the bacteria when using the granules of anionic resin in a glass flask compared to the use of the glass column. The highest reduction rates of bacteria were observed when using the glass beaker and the lowest reduction rates when using the glass column. Statistical analysis also showed significant differences (<0.05) In reduction rates of bacteria after contact times 1.5 minute of hand and time of seam 15th, and 30 minutes and there were no significant differences between the reduction rates of the two contact periods 15th and 30. The highest reduction rate was after the contact time 15 minute. Time to seek 30 Minute is not necessary.

Analysis of variance analysis and test RLSD test in the Table 8 showed significant differences in reduction

Table 3 : Reduce the number of bacteria found in drinking water using cationic resin granules washed with distilled water and packed in single-use glass shafts or flasks.

Contact time (min)	No.of colony/ml of sample from flask & % of red. on		No. of colony/ml of sample from column & % of red. on	
	NA	%red	NA	%red
0.0	300	Nil		
1.5	15	95	65	78.4
15	Nil	100	40	86.7
30	Nil	100	25	91.7

(R.L.S.D. test) P<0.05 S. (significance)

Table 4 : Reduce the number of bacteria in drinking water using cationic resin granules washed with 3% hydrochloric acid solution and packed in glass shafts or flasks.

Contact time (min)	No.of colony/ml of sample from flask & % of red. on		No. of colony/ml of sample from column & % of red. on	
	NA	%red	NA	%red
0.0	300	Nil		
1.5	15	95	65	78.4
15	Nil	100	40	86.7
30	Nil	100	25	91.7

(R.L.S.D. test) P<0.05 S. (significance)

Table 5 : Effect of time period on reduction of numbers of *H. pylori* suspended bacteria in cystic resin solution with distilled water and in glass flasks.

Contact time (min)	Cfu/ml	% red.
0.0	142500	Nil
1.5	122400	14.1
15	112200	21.4
30	102330	28.1

(R.L.S.D. test) P<0.05 S. (significance)

Table 6 : The effect of the time period on reducing the number of *H. pylori* bacteria suspended in the physiological solution by using cationic resin granules washed with hydrochloric acid solution (3%) and in glass flasks.

Contact time (min)	Cfu/ml	% red.
0.0	500000	Nil
1.5	200000	60
15	60000	88
30	10000	98

(R.L.S.D. test) P<0.05 S. (significance)

rates of bacteria when using anionic resin granules in a glass flask compared with the use of the glass column. The highest reduction rates were shown when using the beaker and the lowest reduction rates were shown when using the glass column. The results of the statistical analysis showed significant differences in reduction rates of bacteria after different contact periods. Moral

Table 7 : Reduction of the number of bacteria in the drinking water using anionic resin granules washed with distilled water and packed in glass shafts or flasks.

Contact time (min)	No.of colony/ml of sample from flask & % of red. on		No. of colony/ml of sample from column & % of red. on	
	NA	%red	NA	%red
0.0	265	Nil		
1.5	198	25.2	220	16.9
15	143	46.0	180	32.0
30	142	46.4	185	30.1

(R.L.S.D. test) P<0.05 S. (singificant)

Table 8 : Reduction of the number of bacteria in the drinking water using anionic resin granules washed with sodium hydroxide solution (3%) and packed in glass shafts or flasks.

Contact time (min)	No.of colony/ml of sample from flask & % of red. on		No. of colony/ml of sample from column & % of red. on	
	NA	%red	NA	%red
0.0	43	Nil		
1.5	29	32.5	30	30.2
15	15	65.1	28	34.8
30	15	65.1	17	60.4

(R.L.S.D. test) P<0.05 S. (singificant)

differences appeared clear after the time of solicitation 1.5 compared to the rest of the contact time, and no significant differences were observed between the two contact periods 15th and 30 minutes this indicates no need to increase the time to seek 30 accurate and satisfied 15th accurate.

For the reduction in the use of the beaker, either when the column was used, the differences were clear after all the contact times. The reduction rates were observed with increasing time of contact with the bacteria.

From comparing the results of the Table 7 and these in Table 8, we find reduction rates in the Table 8 were higher than those in the Table 7. This is due to the fact that anionic resin granules are used in a Table 8 had been washed before use with sodium hydroxide solution (3%) While not washed in the Table 7, this is evidence of the efficiency of the granules in reducing the bacteria when washed with the base more than if washed with distilled water only, when comparing the results of the Tables 8 and 7. Results of the two Tables 3 and 4, we find that the reduction rates of bacteria when the use of cation resin is much higher than when the use of granulated ionic resin until it arrived in the first at some times to 100%.

Analysis of variance analysis and RLSD test in the Table 9 indicate a significant difference (<0.05) reduction in bacterial numbers *H. pylori* after different contact

Table 9 : Effect of time period on reduction of *H. pylori* suspended bacteria in physiological solution using resinized ionic resin granules in distilled water and in glass flasks.

Contact time (min)	Cfu/ml	% red.
0.0	142500	Nil
1.5	121500	14.7
15	112300	21.1
30	89230	37.3

(R.L.S.D. test) P<0.05 S. (singificant)

Table 10 : The effect of the time period on reducing the number of *H. pylori* bacteria suspended in the physiological solution using anionic resin granules washed with sodium hydroxide solution (3%) and in glass flasks.

Contact time (min)	Cfu/ml	% red.
0.0	500000	Nil
1.5	25000	95
15	22000	95.6
30	5100	98.9

(R.L.S.D. test) P<0.05 S. (singificant)

times with anionic resin granules. It has been the highest rate after the contact time 30 min and lower reduction rate after contact time 1.5 minutes.

Contrast and analysis RLSD test in the Table 10 showed no significant differences in reduction rates of bacteria *H. pylori* suspended in the matrix solution after different contact times with the anionic resin granules. It should be noted that the reduction rates were high for all contact times compared to the control sample.

From comparing the results of the Table 10 and these in Table 9, anionic resin granules previously washed with sodium hydroxide solution were found to be more efficient in reducing the number of bacteria *H .pylori* compared to when washed with distilled water only and this is evident by observing the high rates of reduction of the numbers of bacteria in the Table 10 compare them in the Table 9.

DISCUSSION

The results showed that the resin beads are both zeolite S100 (cationic) and zeolite 2AS (Anionic) is able to reduce the number of bacteria in the water. This ability to reduce their value varied depending on the type of resin granules (cationic or anionic) and the type of bacteria, and also the amount of time the bacteria contact the resin granules. Of the results of the two Tables 1 and 2 note that the highest rates of reduction of bacteria when the flow rate (5min/50ml) and the lowest reduction rates occur at the flow rate (1min/50ml). This means that the lower the flow rate, the reduced the reduction of bacteria and this happens because the period 5min give enough time for more resin granules to contact the bacteria and

pull them over a period of one minute. This result is consistent with what he said Kawabata *et al* (1992), as they mentioned that 90% of the bacteria in the drinking water will be reduced when the rate of their run through the resin is (1min / 10ml). They also stated that the greater the contact time of the bacteria with the anionic resin granules type (N-benzy1-4-vinyl pyridinium chloride) increase reduction rate.

The reduction rates resulting from the use of cationic resin granules were higher than those resulting from the use of Ionic resin granules. This is due to the fact that cationic resin granules have a strong ability to capture or withdraw bacteria due to the positive charge on their surface which in turn attracts negatively charged bacteria,there is a strong correlation between them. (Walfish and Janauer, 1979; Kawabata, 1992; Kaneko and Nishiguchi, 1981). What happens with the anionic resin confirms the sources of its lack of efficiency in the withdrawal of bacteria compared to cationic resin and that what happens between it and the surface of the bacteria is a water-only reaction (Ka neko and Nishiguchi, 1981; Walfish and Janauer, 1979).

The effect of cationic resin granules compared with anionic was also shown from the results of the Tables 3, 4, 7 and 8, as it was also shown that the reduction ratios of bacteria resulting from the use of cationic resin granules were higher than the percentages resulting from the use of granules of ionic resin.

It was also shown that reduction ratios due to the use of cationic resin beads washed with hydrochloric acid solution (3%) and anionic washed with sodium hydroxide solution (3%) was higher than that in the ratios resulting from the use of granules of both types are washed with distilled water only, and this is observed from the results of the tables starting from the Table 1 to the Table 10. Due to the fact that the granules of the resin in general cationic and ionic before being recharged and washed acid solutions or bases are saline (salt form). After the acid wash for the chemistry and the base for ionic, it will be acidic (acid form) For cationic and base grains (base form), meaning that the surface will be surrounded either positive or negative charge free movement after washing and by type (Muhammad, 1984). When the pellets are saline, their efficiency is less in the exchange of their ions with similar ions in the ocean because the chemical reaction at the charge is better than in the saline picture, which means that their efficiency will be low in the withdrawal of the bacteria because the bacteria carry a negative charge often.

Note the results of the Tables 9, 7, 5, 3, 1, the granules of the resin washed with distilled water only, both cationic and ionic, gave reduction ratios in the number of bacteria. These ratios varied between the height in the case of cationic resin grains and the decrease in the case of the anionic granules, although the grains here were saline, indicating high capacity. For this kind of granules zeolite (strong cation S100). To work well despite its saline image either after washing the granules of anionic resin with sodium hydroxide solution (3%). High reduction rates were observed in comparison to rates resulting from the use of saline image. In general, as mentioned above, reduction rates from the use of anionic resin granules (washed with distilled water or washed with sodium hydroxide solution (3%) is less than the reduction rates resulting from the use of cationic resin granules (washed with distilled water or hydrochloric acid solution (3%) This is consistent with what he said Kawabata (1992). When using resin-type Pyridinium Alanyone.

If we look at the results of the Tables 8, 7, 4, 3, we found that the reduction rates of bacteria when we use the glass beaker were higher than their rates when we use the glass column. This is because the surface area exposed to contact (between the granules and water) is larger in the case of glass beaker than in the case of glass column, the proportion of reduction here, The sample used will almost contact all the size of the resin granules in the glass beaker. Also, the beaker provides sufficient and equal time to contact either in the column. Therefore, we find the futility of dealing with resin granules in the glass columns and emphasize the need to use them in such a way that they come into contact with the solutions passing through them completely, such as the use of glass bottles, and in the applied areas can be used in large basins or in such a way as to ensure the recycling of water.

The cationic resin beads washed with distilled water only had little effect in reducing the number of bacteria *H. pylori.* This may be due to the weakness of the forces of attraction between the sites on the surface of the cells and the surface of the granules washed with distilled water, leading to the lack of efficiency of the granules if they are washed with distilled water only. We note in the Table 6 the reduction rates for bacteria *H.pylori.* This is because the cationic resin granules here were already washed with a hydrochloric acid solution (3%), which led to recharging, and that these granules as mentioned earlier are ready to use very appropriately after being washed with acid solution (Kemmer, 1988). Thus, the cationic resin granules here have a reduction power so that they cannot be bacteria the *H .pylori* resistance.

As noted from the results of the Table 9, it is clear that the anionic resin granules washed with distilled water

only showed little efficiency in reducing the number of bacteria *H. pylori*, due to the fact that the granules here were in saline form and therefore have a low efficiency in the reduction of bacteria.

Our results did not agree on the fact that the bacteria are killed when the resin granules are touched with what has been shown (Kawabata, 1992). They showed that what happens to bacterial cells is that they only stick to the surface of an ionic resin type (N-benzyl-4-vinyl pyridinium chloride) without dying, and what happens between the surface of the resin and bacterial cells is an electrical reaction between the negative charge of the bacteria and the charge of the resin and there is no relation to the ionic forces in this.

They also said that the relationship of bacterial cells with polymers varies widely according to bacterial species, and they also reported that the chemical reactions have a greater effect in extracting bacterial cells from the physiological act.

Walfish and Janauer (1979) stated that what happens is that the ammonium resin quadrature affects directly the cell envelope and metabolic events within the cell. They also stated that the strong hydrophobic interactions between the surface of the bacteria and the surface of the resin would lead the bacteria towards the corresponding face in the resin granules. They said that the negative charge of the bacterial cells would be strongly attracted to the positive charge of the active sites in the cationic resin.

It is worth mentioning that the resin used in this study has advantages over the rest of the resins and the most important are the reduction ratios that gave to prepare the bacteria compared with the rest of the types of resins, XAD-2 (A mixture of negative and positive resin), where male Kool and Vankreiji (1984). This type of resin gives a reduction ratio for the preparation of bacteria *H. pylori* Equal to 99.9%. During two hours of the contact between the bacteria and the resin. As for the resin used in this study, it is Emberlite S100 (Kationi) and 2AS (Anioni) has given a reduction ratio 100% for the preparation of bacteria *H. pylori* at the time of solicitation 1.5 Min) in the case of cationic resin washed with a hydrochloric acid solution (3%). The reduction ratio is equal to 98.5 at the time of solicitation 1.5 (In the case of cationic resin washed with distilled water only), in addition to other reduction ratios during different contact times characterized by their height.

CONCLUSION

These resins can be used in purifying drinking water instead of using chlorine, ozone or the UV-light.

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