

**Study of the bacteria isolated from sewage water and treated by using the chlorin in Erbil city**

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**Abstract**

In the current study there are sewage water before treated and sewage waer after treated with chlorin from 50 sample collection in different places in our city, eight bacterial isolated from the sewage water were (*Staph. intermedis, Staph.lentus, Streptococcus agalactiae, Staph.epidermidis, E.coli, Vibrio,cholera, Klebsiella pneumonia,and Pseudomonas spp*.) That diagnosis of those isolated bacteria by using macroscopic and microscopic examination in addition of Vitek 2 system. After treatment by using chlorin as a (10 mg/L) they causes to reduce of number of isolated bacteria and lethal to destroyed some of the isolated bacteria.

**Keywords:** Chlorin, Vitek 2 system, bacteria

**Introduction**

 Sewage: It is essentially the water supply of the community after it has been fouled by a variety of uses.From the standpoint of sources of generation, waste water may be defined as a combination of the liquid (or water) carrying wastes removed from residences, institutions, and commercial and industrial establishments, together with such groundwater, surface water, and storm water as may be present. Sewage is water-carried wastes, in either solution or suspension that is intended to flow away from a community. Also known as waste water flows, sewage is the used water supply of the community.(Zhang, 2010).

The presence of indicator-microorganism in water is evident that the water is polluted with fecal material from humans or other warm-blooded animals.(Adams and Moss2000).

Fish microflora is strongly affected by natural occurring factors, such as environment, human made factors such as farming, indus- tries and sewage treatment plants that are in contact with marine habitats.(Hatha et ai.,1993;Miranda and Zemelman2001).

Water is essential to life. An adequate, safe and accessible supply must be available to all. Improving access to safe drinking-water can result in significant benefits to health. Every effort should be made to achieve a drinking water quality as safe as possible (João,2008).

 Microbial waterborne diseases also affect developed countries. In the USA, it has been estimated that each year 560,000 people suffer from severe waterborne diseases, and 7.1 million suffer from a mild to moderate infections, resulting in estimated 12,000 deaths a year (João,2003).

 The goal of this chapter is to provide an overview of the literature available on the persistence/ survival of pathogens and indicator organisms in sewage,(Ahmed et al.,2014).

Pathogens in sewage sludges EPA and others have compiled lists of various path- ogenic bacteria, viruses, protozoa, and parasitic worms potentially found in sewage sludges.Municipal wastes from any large metropolitan area are likely to include a wide variety of pathogens from every corner of the world.(David and David ,1993).

Degradation of the biological and chemical com- ponents of sludge in the field can produce various volatile irritants, including inorganic and organic sul- fides, volatile fatty acids, alkyl amines, and ammo- nia. Emissions of these compounds may cause eye and mucus membrane irritation and respiratory prob- lems, thus affecting host susceptibility.([David and David ,2000).

**Material and methods**

In this study there were two groups (sewage water and treated sewage water) fifty sample collecting of sewage water from different place (our college, shaqlawa, soran, masef, bahar,roshinberi, mantkawa…)

by using serial dilution method for each of sample then growth on two types of media (Nutrient agar,Macconky,agar)

Nutrient agar:is a general purpose liquid median supporting growth of awide range fo non- fastidious organisms.

Macconky agar: is a differentid medium for the selection and recover of Entero bacteris cade and related enters Gram -negative rods (Atlas et al ., 1995).

Serial dilutton method: Using the five test tube each of them contain equal of distilled water (9ml) take 1 ml from original water sample to the first tube then from the first tube transfer 1ml to another tube respectively from 10^-3 and 10^-5 transfer 1 ml by using Micropipette into the Media(Nutrient agr and Macconkey agar) incubated for 24 hr. at 37°c incubation

Also for treated water with chlorin about (10 mg/L) according to the research (Alice and Alexanora, 2020). the same method used (serial dilution method after adding chlorin) and from 10^-3, 10^-5 grow on both media (Nutrient agar and Macconkey agar)inculated at 37'c for 24 hr.

Diagnosis macroscopic :

Obeserving of colony forming on the media and study of properties of colony.

Diagnosis microscopic :by using Gram stain is a technique test separated bacteria into two groups Gram positive and Gram negative (Benson, 2001),then identification of bacteria using Vitek 2 system.

Calculating the number of bacteria by using this

Formula:

Number of bacterial colony CFU of water (ml) =1/dilution factor \* number of colony

The Vitek 2 Compact identifies bacteria and other microorganisms based upon analysis of substrate utilization patterns. Selection of cards to be used depends upon the Gram stain results and growth conditions of the organism to be tested.

Vitek 2 automation provides same-day, clinically relevant identification and susceptibility test results for the majority of organisms encountered in the laboratory (figure 1)

Figure 1: The Vitek 2 system

Principle of the test:

A suspension of 24 hours pure culture were prepared, standardized suspension density with the DensiCHEK™to (0.5-0.9 McFarland), the appropriate card selected and the card and suspension were placed into a cassette.

The cassette were then placed into the instrument's Fill Chamber. After the cards were filled, the cassette were loaded into the Autoloader/Reader Incubator and the cards automatically scanned by an internal bar code reader, sealed and loaded into the Carousel/Reader Incubator of The Vitek 2 Compact, then the card analyzed and generated a printable report.

 The advantages of using automated analysis by Vitek 2 Compact to identify organisms to species level compared with other traditional biochemical test kits such as API are faster turnaround time and eliminating visual interpretation of colorimetric results.

Diagnosis of bacteria:

All isolated on Nutrient agar and Macconkey agar were identified on the basis of colonial, morphological,Gram stain and Vitek 2 system test.

**Results**

In the present study, eight isolates of bacteria were identified among about

50 sewage water

samples were collected from different places, The samples were processed using serial dilution method then cultural techniques.and vitek test show in (figure 2), the results showed that, eight isolates of bacteria were obtained 4 Gram Positive which were included

*1-Streptococcus agalactiae G+ve*

*2-E-coli G-ve*

*3-staphylococcus intermedius G+ve*

*4-Staphylococeus lentus G+ve*

*5-Stu phylococcus epidermidis G+ve*

*6-Klebsiella sp premmonide G-ve*

*7-Vibno cholerae G-ve*

*8-pseudomonds spp G-ve*

Show in (Figure 3 )The name of all isolated bacteria.



Figure 3: All isolated bacteria in sewage water .(A-*Streptococcus agalactiae*,B- *E-coli*,C- *Staphylococcus intermedius*, D-*Staphylococeus lentus*,E- *Staphylococcus epidermidis*,F- *Klebsiella pneumoniae*,G-*Vibrio cholera*,H- *pseudomonds spp*).

After treated the sewage water by using chlorine about (10mg/L) the number af bacterial Colony

decreased which were no growth occure in some types of bacteria like (*E. coli,* *Klebsiella pneomoneae* , *Vibrio cholera* and *pseudomonas spp* and *Streptococcus agalactiae*).Show in (table1).

Table 1: The number of bacterial isolated colony of water (ml).

|  |  |  |
| --- | --- | --- |
| Bacterial isolated  | Swage water without treatment | Sewage water after treated with chlorin (10 mg/l) |
| *Strep.agalaciae* | 30 | 0 |
| *E.coli* | 25 | 0 |
| *Staph.intermedis* | 23 | 10 |
| *Staph. Lentus* | 27 | 8 |
| *Staph. Epidermedis* | 20 | 3 |
| *Klels.pneumoniae* | 18 | 0 |
| *Vibrio. Cholera* | 21 | 0 |
| *Pseudomonas.spp* | 17 | 0 |

**Discussion**

 In our study, the highest number of bacteria appeared in sewage water than the sewage water treated with chlorin. This is due to affect of chlorin material on structure of bacteria and destroyed the cells then due to decreasing in numbes of bacteria because Chlorine is lethal to microorganisms due to its oxidising properties. Chlorine also oxidises a large number of organic molecules such as lipids and proteins.The affective of using chlorin as a disinfectant for treated sewage water according to the standard doses used (Alice and Alexanora, 2020).

**Conclusion**

 Sufficiently treating our wastewater is not only important to the environment its important to human well being. There are numerous new renewable energy ideas that potentially can help alleviate our current predicaments. By pairing wastewater treatment with biofuel production we are solving two issues simultaneously.

Wastewater treatment removes contaminants and suspended solids from wastewater; this treated, potable water can then be dispatched back into the ecosystem free from man-made contaminants.

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