

Study of Some Bacteria and Chemical Contents of Polluted Water in Baghdad City, Iraq

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الخلاصة

اجريَ هذا البحث لدراسة المحتوى البكتيري والكيميائي للمياه الملوثة في مدينة جميلة شرق بغداد (المياه الراكدة ، المياه الارضية والمياه السطحية القريبة للمنطقة). النماذج اخذت في شهر شباط ، 2006 وبتلات مكررات لكل من المياه الراكدة ، المياه الارضية والمياه السطحية القريبة (مياه قناة الجيش). معدلات الامطار ودرجة حرارة الهواء والمياه والتبخر والنتح تم قياسها ايضا. أظهرت نتائج التحليل البكتيري مثل أعداد البكتيريا الهوائية *Aerobic bacteria* وبكتريا القولون والقولون البرازية *Coliform & Fecal coliform* وبكتريا المسببات البرازية *Fecal Streptococci* وبكتريا الزائفة الزنجارية *Pseudomonas aeruginosa* أختلافات معنوية بين مواقع اخذ العينات المذكورة اعلا . نتائج التحاليل الكيميائية مثل محتوى المياه من الكالسيوم والمغنيسيوم والكاربونات والبيكاربونات والكلوريدات والملوحة وتركيز ايون الهيدروجين الفعال (pH) والكثرة لمواقع اخذ العينات كانت عالية في المياه الراكدة مقارنة بالمواقع الاخرى . معدلات الامطار (ملم) ، درجة الحرارة الهواء والماء ، والتبخر والنتح في شهر شباط ، 2006 (وقت اجراء الدراسة) كانت 25.2 ملم ، 13.4 م ، 15.5 م و 39.6 ملم للقياسات اعلاه على التوالي . وباختصار ، النتائج اظهرت امكانية تلوث المياه السطحية المجاورة لمنطقة الدراسة (الجدول والانهار) بالبكتريا المرضية في هذا الوقت من السنة مما يؤثر على صحة النظام البيئي للمياه العذبة المجاورة وعلى صحة الانسان. وعليه يتطلب حل سريع للمشكلة وايقاف الخطر المتزايد .

ABSTRACT

This investigation has been conducted to study some bacteria and chemical content of Stagnant water, ground water and streams water (army channel water) in February , 2006 . The samples have been taken from Jamelia town east of Baghdad city (three replicates of each sampling area).

The means rainfall, air temperature , water temperature and evapotranspiration were also measured .

The result of the biological analysis such as aerobic bacteria , *Coliform & Fecal coliform* , *Fecal Streptococci* and *Pseudomonas aeruginosa* have high numbers . The above microbes numbers indicate significant difference among sampling areas.

The chemical analysis result such as Calcium , Magnesium , carbonate & bicarbonate , chlorides , Electrical Conductivity (E.C.) , pH & turbidity in stagnant water chlorides and E.C. have high value in stagnant water . However, PH values have a range from 7.5 - 7.9 .

The mean values of rainfall , air temperature, water temperature and evapotranspiration in February , 2006 (sampling time) were 25.2(mm) , 13.4 (°c) , 15.5(°c) and 39.6 (mm) respectively .

In general, the results indicate that surface water in the nearby streams and rivers could be contaminated by the pathological microbes in the time of this study each year. So, quick solution is required to halt the dangers on the health of freshwater ecosystems and the human communities that rely on them for water supply.

INTRODUCTION

Considerable attention has been paid to present days pollution , particularly water pollution due to human waste water(1).The sight and smell of grossly waterways provided some of the original impetus to environment (2). The dangers of polluted water to human health drove what become known as the “sanitary revolution” in Europe and United States, emphasizing clean water supplies and sewer systems in cities (3). Today, despite progress in cleaning up waterways in some areas, water pollution remains a serious global problem, with impacts on the health of freshwater ecosystems and the human communities that rely on them for water supply(1).

In most developing countries, the problems of traditional pollution sources like sewage and new pollutants like pesticides have combined to heavily degrade water quality, particularly near urban industrial centers and estimated and intensive agricultural areas. An estimated 90 % of wastewater in developing countries still discharge directly to rivers and streams without any waste processing treatments (2 - 6) .

In Iraq , water pollution from wastewater became a serious problem due to the present conditions that occurs in the country .Wastewater contain some components .The concentrations of these components may be toxic hazardous problems, depending on their concentrations, differences in climate conditions and soil properties.

Therefore, this study has been conducted to study some bacteria and chemical content of stagnant water, ground water and streams water in Baghdad city in Iraq .

MATERIALS AND METHODS

Samples were taken from Jamelia town (the investigated area) east of Baghdad city with (50 samples) three replicates for each of the Stagnant water, ground water and army channel water .

The following measurements have been done:

1–Bacteriological analysis: Water samples were collected in sterile Whirl-Pac bags. Keep at 4°C until processed. Process samples within 6 hours.

Isolates of aerobic bacteria , *Coliform* & *Fecal coliform* , *Fecal Streptococci* and *Pseudomonas aeruginosa* were identified according to Al –Hadithi *etal.*(7), Forbes *etal.*(8) and Greenwood *etal.* (9) by Classical

Microbiological methods , Serological tests and API 20-E system. (Analyze sample for fecal coliform on mFC agar by membrane filtration method . Pick isolated colonies from mFC plates with a sterile toothpick. Streak for isolation onto MacConkey agar plate. Patch onto a ChromAgar ECC plate. Incubate MacConkey and ChromAgar plates at 37°C for 24 hours).

2–**Chemical analysis** : The chemical analysis such as calcium , magnesium , carbonate & bicarbonate , chlorides , Electrical Conductivity(E.C.) , pH & turbidity have been done according to the procedure used by Golterman *etal.* (10).

3-Mean rainfall, air temperature , water temperature and evapotranspiration in February were combined by the author using the information from IMO(11).

4- Statistical analyses :Analysis of quantitative data was done using t-test and ANOVA (analysis of variance).Acceptable level of significance was considered to be below 0.05.

RESULTS AND DISCUSSION

Figure(1) Shows the mean numbers aerobic bacteria , *Coliform* & *Fecal coliform* , *Fecal streptococci* and *Pseudomonas aeruginosa* (No ./ 100 ml x 10³) in stagnant water, ground water and army channel water of the investigated area . As it can be seen , that the mean numbers of aerobic bacteria , *Coliform* & *Fecal coliform* , *Fecal Streptococci* and *Pseudomonas aeruginosa* were 70.5 , 11.5 , 3.3 and 9.6 respectively in stagnant water but 5.3 , 7.7 , 3.4 , and 8.5 respectively in ground water .However , it was 36.0 ,17.0 , 5.6 , and 10.4 respectively (No ./ 100 ml x 10³) in army channel water .

The mean difference among the numbers of aerobic bacteria , *Coliform* & *Fecal coliform* was highly significant at 0.01 level and the difference was significant at 0.05 level in case of *Fecal Streptococci* . But it was not significant with *Pseudomonas aeruginosa* for stagnant water, ground water and army channel water of the investigated area respectively (figure 1) . Knowing the source of fecal contamination of surface water is necessary to determine the degree of risk associated with human health and to develop effective control and resource management strategies(12 -13).

The mean concentration of calcium , magnesium , carbonate & bicarbonate , chlorides , Electrical Conductivity (E.C.) , pH & turbidity contain in stagnant water, ground water and army channel water of the

investigated area are shown in table(1). These results have been taken in February , 2006 .

The mean values of rainfall , air temperature, water temperature and evapotranspiration in this month were 25.2(mm) , 13.4 (°c) , 15.5(°c) and 39.6 (mm) respectively . Calcium , magnesium, carbonate , bicarbonate and turbidity have high value in ground water . However , Chlorides and EC have high value in stagnant water . pH values have a range from 7.5 - 7.9 .

From the above results , it can be concluded that the surface water in streams and rivers could be contaminated by the pathological microbes such as *Coliform & Fecal coliform* , *Fecal streptococci* and *Pseudomonas aeruginosa* in this time of the year. This phenomenon may cause many health hazards to the population in the area .

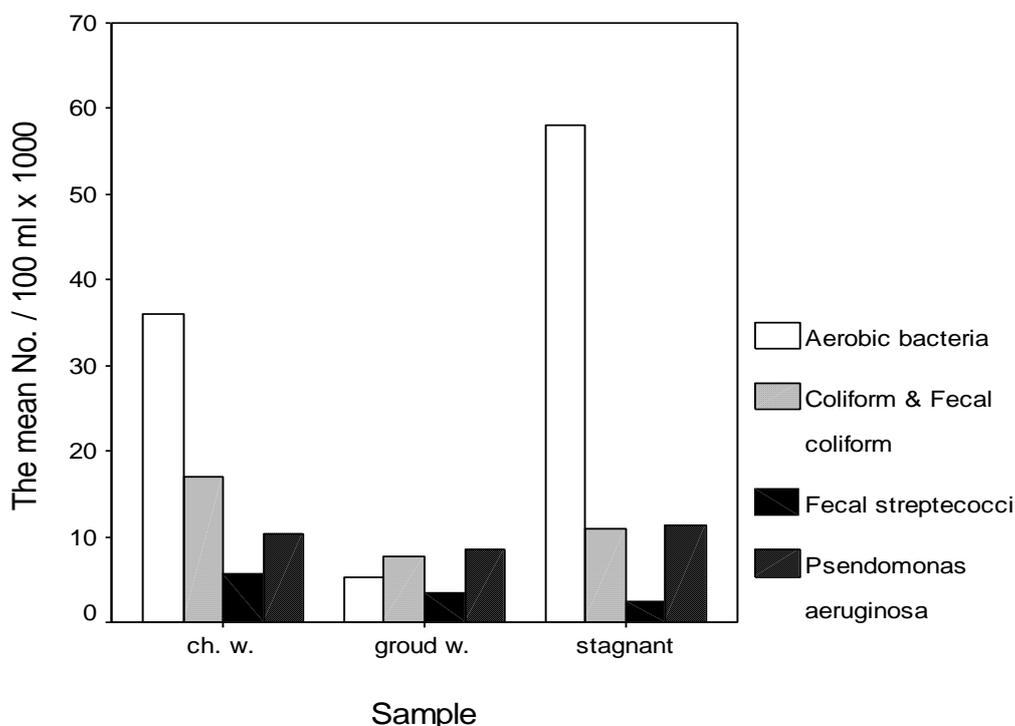


Figure-1: Mean Aerobic bacteria(*Staphylococcus* , *Micrococcus* and *Acinetobacter*) *Coliform & Fecal coliform* , *Fecal Streptococci* and *Pseudomonas aeruginosa* (NO./ 100 ml x 10³) in stagnant water, ground water and army channel water of the investigated area .

Table -1: Calcium , Magnesium , Carbonate&_bicarbonate , Chlorides , E.C. , pH & turbidity in stagnant water, ground water and army channel water of the investigated area .

	Calcium	Magnesium	Carbonate& bicarbonate	Chlorides	E.C.	pH	Turbidity
	(ppm)				mmhos / cm		(NTU)
Stagnant water	73.6	20.5	248	196	1505.5	7.5	6.5
Ground water	85.3	44.8	274	167.9	1409.5	7.8	10.6
Army channel Water	78.5	21.3	250	187.7	1205.5	7.9	7.8
P -Value	0.019*	0.000**	0.978 NS	0.006**	0.000**	0.021*	0.083 NS

*The mean difference is significant at the 0.05 level .

**The mean difference is significant at the 0.01 level.

NS The mean difference is not significant .

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