

Impacts of Chemical Pollution in Water and Effects on the Human Body in Thi-Qar Governorate

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Abstract—In recent years, a noticeable increase in cases of chemical pollution has been observed in Iraq's river water, particularly in the Euphrates River. Industrial waste containing hazardous chemical substances, along with untreated wastewater and sewage discharges, has significantly contributed to the deterioration of water quality. This pollution has become increasingly evident across various regions of Iraq, including Thi-Qar governorate, where environmental and public health concerns are associated with water contamination. To identify and quantify the concentration of heavy metals such as lead and cobalt in selected water samples from different positions in Thi-Qar governorate to evaluate the levels of pollution in water sources, the study depended on samples taken from different water sources used in the research. Examined by atomic absorption spectroscopy (AAS). The results indicated the mean concentration of heavy elements (Pb, Cd, Co) were compared with WHO permissible limits in the samples of drinking water, the results explain the cobalt concentration was higher than the international limits in some samples taking after measuring. The results explain significant increasing the concentration of heavy metal in water near industries cities that richer in contamination.

Keywords—chemical pollution; water; heavy metals; lead; cobalt.

I. INTRODUCTION

Water is a fundamental resource that ensures the existence of all life on Earth. However, because of its scarcity and contamination, millions of people have limited access to this essential resource. Humans are the main cause of water pollution, which is triggered in many ways, but the dumping of industrial waste due to temperature rise causes the alteration of water by reducing the oxygen in its composition, or due to deforestation, which causes sediments and bacteria to seem under the soil and therefore contaminate groundwater. Furthermore, consuming and exploiting contaminated water puts people at risk of getting sick. 80% of wastewater is recycled unprocessed into other ecosystems. The least advanced countries yield 14 billion liters of wastewater daily that includes human waste and bacteria and pathogens that breed disease. This is discharged straight into the environment due to a lack of treatment infrastructure, polluting the subsurface water [1]. The interesting fact is

that two billion people worldwide drink contaminated water [2]. Moreover, 360 million people consume unsafe sources of water [3]. Wastewater originates from land (United Nations 2017). Additionally, transmission of diseases including cholera, diarrhea, hepatitis A, typhoid, and polio is correlated with contaminated water. Infections occur in 15% of hospitalized patients worldwide, with the percentage existence substantially higher in underdeveloped nations [2]. Still, now, 3.5% of earth's water is fresh; 68% of Earth's freshwater is locked up in ice and glaciers and 30% of these are located in groundwater. As pollution grows, freshwater scarcity will increase if it continues like this. It is estimated that by 2025, 52% of people will live in water-stressed areas [4]. Pollution has developed into one of the most serious problems for people in the 21st century; about 9 million people worldwide die from different diseases triggered by pollution, and in some countries one out of four people die due to diseases produced by contaminated water [5]. This problem is not just limited to humans; the entire global as well as aquatic life forms are facing melodramatic changes around them, ultimately leading to various risks to many lifestyles on the earth [6]. Many recent studies have demonstrated major environmental and public health effects of the human elements. The entry of these into the human body leads to toxic effects on human body organisms. The lead element is one of the most dangerous elements that affect the body system and cause serious damage, especially to children; lead is also a contributing factor for cancer [7]. The accumulation of cadmium within the human body when its concentration exceeds safe critical limits. Causes serious health damage and is classified as a group carcinogen. It is harmful to the kidney, liver, reproductive system, and nervous system. The chromium element has some oxidants hexavalent chromium is highly toxic [8]. Dangers of this type in the human body comprise lung cancer, skin rash, gastric disorders and ulcers, breathing disorders, weakness in the efficiency of the immune system, and others. Cumulative concentration of the copper element in the body leads to poisoning, heart problems, and jaundice, and eventually can lead to death. Although cobalt is considered a heavy metal, its consequence as an element is quite different from other heavy elements [9-11]. Research sheds light on the levels of



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chemical impurity for drinking water sources in Iraq, in Thi-Qar Governorate in particular.



Fig. 1. Explains water pollution.

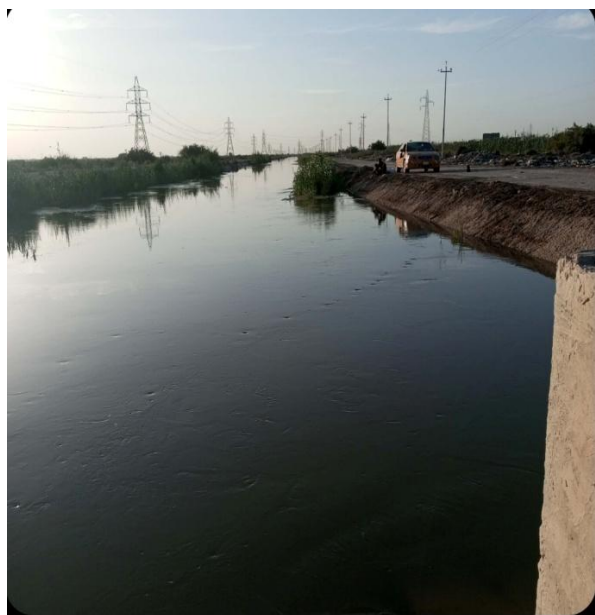


Fig. 2. Explains one of the sources for obtaining the samples in Thi-Qar Governorate.

II. METHODS

Using the Atomic Absorption Spectrometer (AAS) with different types. To determine the levels of heavy metals in water samples. The samples were collected from some positions in Thi-Qar city. The first group of sample in countryside and second group of water samples taking from center city. To evaluating the results of measuring by using AAS system. Therefore, the measurements were compared to the effects of the serious water effluent that Iraq is suffering from at present, in addition to the absence of accurate governmental statistics for the levels of water contamination of drinking water sources in reality. Thus, we decided to start an actual study to measure and evaluate

concentration for study the properties of the chemical material on the healthy system adversary human.



Fig. 3. Explains the change in water color because of pollution in the north of Thi-Qar.

Table 1. Guideline levels for certain drinking water heavy elements (mg/l)

Heavy metals	WHO	Iraqi standard	Canada	United states	European Union
Chrome Cr	0.050	0.050	0.050	0.010	0.050
Cadmium Cd	0.003	0.003	0.005	0.005	0.005
Nickel Ni	0.070	0.020	0.010	0.010	0.020
Iron Fe	0.300	0.300	0.0300	0.300	0.200
Lead Pb	0.010	0.020	0.010	0.100	0.020

III. RESULTS

The quality of drinking water is an essential influence affecting human health. Poor drinking water quality has led to the incidence of waterborne diseases. Several global organizations have established appropriate levels of concentration for heavy metals, such as the World Health Organization (WHO) and others. The heavy metals concentrations were different from place to other because many factors effected on rivers and resources of water in that city. Therefore, the research explained the dissimilar levels or ratios in the range for the metals.

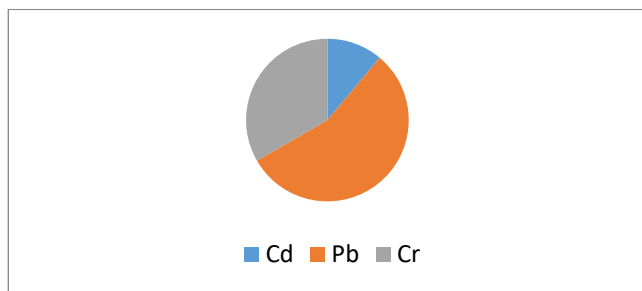


Fig. 4. Explains the concentration of heavy metals lead, chromium, and cadmium.

We can observe the concentration values of heavy metals at different levels and observe a significant increase in the value of lead elements produced from increasing contamination in industries with this element, and the lead metal caused effects on the human body and the environmental system.

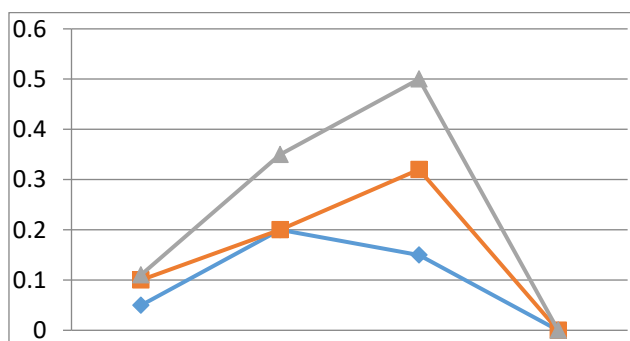


Fig. 5. Explains the concentration in of lead in three sample, the green line in sample taking from industry city and red line from center city. the blue line for sample taking from countryside.

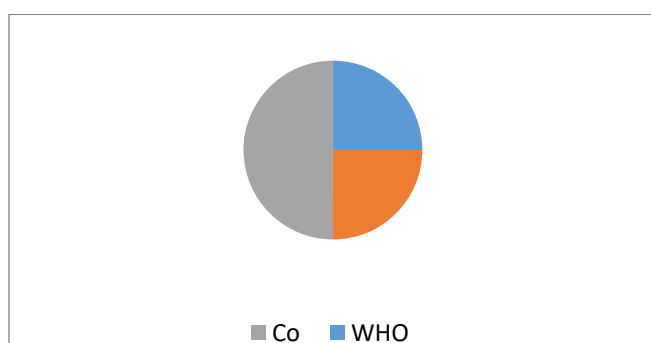


Figure (6) Concentration of cobalt in two samples over one year, with green color in the center of Thi-Qar city and blue color in the countryside.

We can observed the value of pollution different when transferred from city to countryside because less of

contaminations in countryside in above figure we observed significant value of concentration for cobalt in two samples in two position in same city because accumulation the substances produced from chemical industries and lose these pollution in countryside therefore the value of cobalt was similar to WHO value.

IV. CONCLUSION AND RECOMMENDATION

Heavy metals in water systems are an invisible threat to human health and environmental security. To reduce this phenomenon, the study recommends the following:

- Enacting stricter environmental regulations to enhance oversight of industrial facilities and wastewater treatment before discharge.
- Modernizing water distribution networks and replacing lead piping systems.
- Applying routine water quality monitoring systems utilizing advanced spectroscopic techniques.

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