

Pollution in Mosul City by ISIS

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Abstract: The war and armed conflicts in Iraq over last 50 years have caused many millions of deaths and injuries. And it left its scars on the Earth, water and air. Forests and farms were easy prey to the flames of conflict as were factories, oil reservoirs and natural resources, whose destruction make the pollution spread every where. The pollution resulting from the war in the city of Mosul more than 10 million cubic meters, heavily damaged buildings and structures with consequent health and environmental hazards, particularly with some unexploded ordnance. The present study assumed that there are a large pollution in air, water and soil in Mosul city by certain heavy metals like; pb, fe, Ca, Zn, Cu and this pollution effects on human health in Mosul city leading to increasing of white blood cell counts, creatinine, cholesterol, urea and decreasing of red blood cell and platelets counts.

Key words: Flames, buildings, heavy metals, white blood cell, red blood cell, Mosul city

INTRODUCTION

Atmosphere is important for life because contain oxygen and protect us from dangerous sun radiation. Atmosphere one of four basic environmental components are atmosphere, hydrosphere, lithosphere and biosphere. In all these components there are continued interactions (Jawadeker, 2009). The atmosphere layers; thermosphere, mesosphere, stratosphere and troposphere-nearest layer to the Earth surface in which weather takes place (Al-lami *et al.*, 2015).

Pollution simply means introduction of contaminants into the natural environment that cause adverse changes. Pollution can present in different forms like, chemical substances, heat, light or noise. The main types of pollution include air pollution (contaminations of atmosphere), water pollution(contaminations of water by chemicals or particulate, ...) soil pollution (contamination prevents natural growth and balance) (Klassen and Watkins III, 2010).

Heavy metals high atomic weight and high atomic number are necessary to support human and animals life but when increased by contamination heavy metals will be toxic and become hazard to health. Also, radiation pollution can cause birth defects, cancer, sterilization and other health problems for human and wild life populations. It can also sterilize the soil and contribute to air and water pollution (Xing and Chen, 1999).

In Mosul, the major city in Northern of Iraq more than 1,846,500 living persons in 2014, about 400 km Northern of Baghdad. It consist of left bank (East side) and right bank (West side), according to the flow direction of Tigris River. Mosul is rich in oil and a historical center of many religions also in Mosul exist the University of Mosul one of the largest educational and research centers in Iraq (Anonymous, 2008).

Islamic State in Iraq and the Syria (ISIS), so called "Daehs" attack Iraq and governed Mosul on 10 June 2014 about 3 years. In this period and the big war to recapture this city by Iraqi army, Mosul environments air, water and soil were highly contaminated and became very hazard to human life. Successive wars have weakened the health system in Iraq, damaged basic infrastructure and weakened environmental management and control of industrial facilities and events. Plans developed after 2003 to address these problems have not been successful in achieving their objectives for lack of resources, insecurity and widespread corruption. This has made barren environmental issues such as toxic and radioactive waste, oil pollution and the loss of agricultural land, a priority and remain largely neglected. Pollution in Iraq is very high that in 2005, more than 60 hot spots requiring rehabilitation and including five requiring immediate treatment. The cost of environmental degradation in 2008 was estimated at \$-8.7 billions. The United Nations

Environment Program (UNEP) recently issued a report on environmental issues in the areas recovered by ISIS, the city of Mosul. A Dutch organization published its report “Life Under a Black Sky” at the third meeting of the United Nations environment program, held in Nairobi in early December includes all Iraqi territory including Mosul city and its vicinity, summarized in three main areas; oil pollution, damage to civilian installations and side effects. Oil pollution has a large risk of dealing with hazardous chemicals and toxic by-products, a result of attacks by militias and local groups on oil installations, tanks, pipes and fields as well as air strikes on hundreds of oil tankers. One of the most prominent incidents of pollution in this area is the burning of twenty wells in the field of Qayara oil South of Mosul, also in more than twenty locations, most notably in Southern Mosul, Northeast Tal Afar, Hawija, the hills and along the Eastern road adjacent to the Tigris River. Where the first fires began in May 2016 and did not extinguish all fire until the end of March 2017 and estimated the amount of oil burned up to 1.4-2 million barrels, according to government sources (Anonymous, 2008).

MATERIALS AND METHODS

Many samples of soils was taken (10-20 cm) in depth from soil and kept in the sterile and clean plastic container. Also different samples of water was taken in Mosul city separately and kept in certain cleaning containers (Jackson, 1995). Collection of blood from (50) healthy unrelated persons from Mosul city; 15 mL of blood samples were collected from each person. All blood samples were shipped in a cool box.

Medically, many tests like; red blood cells, white blood cells and platelets calculated by using complete blood picture analyzer also urea and criatenine tests was performed. And all these resulted data compared with other standard data of Iraq environment (Lee *et al.*, 2004).

RESULTS AND DISCUSSION

Many cities, villages and industrial zones in Iraq have been subjected to acts of war that have led to extensive destruction in more than one place. Mosul is the center of attention in this regard as the largest city in Iraq which was under the control of ISIS about 3 years.

Air pollution due to building debris in war regions is not limited to fine particles of cement and sand but also includes toxic compounds such as heavy metals used in building materials and hazardous chemicals used in the manufacture of explosive ordnance (Table 1).

Table 1: Heavy metal concentration in air samples of Mosul

Heavy metals	Samples	Controls
Fe	165.25	30.65
Pb	32.19	21.01
Cu	1.95	0.49
Cr	-	-
Zn	411.82	349.60

Table 2: Heavy metal concentration in soil samples Mosul

Heavy metals	Samples	Controls
Fe	0.0672	0.0381
Pb	0.2017	0.1551
Cu	0.0379	0.0125
Cr	0.1998	0.1319
Zn	0.1923	0.0630

Table 3: Heavy metal concentration in water samples

Heavy metals	Samples	Controls
Fe	0.0381	-
Pb	0.1224	0.0545
Cu	-	-
Cr	0.9170	0.616
Zn	0.0330	-

Air contaminations occur generally in the environment of Iraq. It contaminated with these metals, gases for many reasons like wars, terrors, weak governmental controls and lows (Liu *et al.*, 1999) but in Mosul city air pollution was very high, caused by the burning of oil wells in regions of “Qayarah” and “Mashraq” plant South of Mosul and the leakage of persistent organic compounds used as condoms and cooling materials in power plants. ISIS burned 30,000 tons of sulfur piles in the Mashraq plant, causing the people in neighboring areas to suffer serious health problems that killed many of them. About 2 million tons of sulfur waste remains in the factory as a time bomb unless sufficient safeguards are provided (Janathan *et al.*, 2000; Santra, 2010).

According to these results in Table 2, the accumulation of these toxic elements in soil samples is found in the order of Pb > Cr > Zn > Fe > Cu. The presence of certain heavy metals (Pb, Zn, Fe) related to war process and abnormal petroleum activities in this region (Goyer and Clarkson, 2011; Arkusz *et al.*, 2005; Dietert *et al.*, 2004).

Table 3, Pb, Fe, Cr, and Zn found in most of Mosul water samples. According to WHO data for waters non safe limits (Ajmi *et al.*, 2018; Argun *et al.*, 2007; Pinta, 1975). In addition, the oil spill which spoils the soil and reaches the surface and ground water used for irrigating agricultural land and as a source of drinking water is contaminated with organic compounds and heavy metals (Davis and Cornwell, 2012).

The presence of oily water and acidic rains serious consequences of the use of water facilities as a weapon of war and the dumping of land by dam water, the creation of long-term social and economic problems (Davis and Cornwell, 2012).

Table 4: Hematological and bio chemical tests the studied samples

Tests	Sample	Control
Red Blood Cells (RBC)	4.27+0.96	6.02+1.56
White Blood Cells (WBC)	13.65+2.14	5.85+1.21
Platelets (PLTs)	145.72+12.61	206.06+21.53
Cholesterol	6.24+1.42	4.32+0.85
Creatinine	93.33+9.72	74.51+7.87
Urea	7.25+1.87	4.16+0.93

According to the results of Table 4, red blood cells values were (4.27+0.96) in studied sample and (6.02+1.56) in control sample. White blood cells value were increased in the studied sample as compared as with control sample (13.65+2.14, 5.85+1.21), respectively that indicate an infection cases (Mottlerlini and Otterbein, 2010) or due to heart disorder (Nikolic *et al.*, 2008) while platelets values (145.72+12.61) in studied sample and (206.06+21.53) in control sample. According to these results, RBC and PLTs. decreased in the studied sample that may indicate gas pollutions may effect on blood measurements as mentioned (Ishani *et al.*, 2011; Seth *et al.*, 2003; Carey *et al.*, 2006). While creatinine values increased highly in studied sample may due to hard working low activity of kidneys or because of blood deficiency. Urea readings also increased in studied sample also due to blood deficiency that come to kidneys (Skoczynska *et al.*, 2002) in cholesterol values, a slightly increasing in studied sample may be due to hard muscle stress (Pervez and Pandey, 1994; Zelikoff *et al.*, 2002).

Finally, the present study conclude that pollution in Mosul city is more dangerous, pollution of air, water and soil. Because of the extensive oil spills that occurred in Qayyarah and Jabal Hamrin field and several areas including pumping crude oil into the Tigris River and irrigation canals and agricultural land, offering the main line for the export of Iraqi oil to Turkey to the frequent bombings. In 2014, the explosion of a pipeline close to the Tigris River spilled a 70-km-long oil spill. In order to reduce pollution in the river, this spot was ignited, black clouds and thick fog formed and many cities including Baghdad were forced to stop supplying water beyond the crossing. Oil fires with the release of dangerous substances such as sulfur oxides, nitrogen, persistent organic compounds and heavy metals that damage the environment and public health have been a contaminant of the Iraqi environment during that conflict (Chuang *et al.*, 2010; Thomas, 1996; Shafi, 2017).

CONCLUSION

The present study try to measure the degree of contaminations in Mosul city by ISIS war includes air pollution, water and soil pollutions by many heavy metals as a results of war process and their effects on human health.

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