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DETERMINATION OF METALS IN GROUND WATER FROM DIFFERENT AREAS OF DISTRICT MASTUNG, BALOCHISTAN

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ABSTRACT

This study was conducted to detect metals especially heavy metals like Cobalt, Antimony, Lead, Iron and Manganese in water samples obtained from ground water in district Mastung, Balochistan Pakistan, between 66°11'34"- 67°25'59" East Longitudes and 29°20'13"- 30°15'8" North Latitudes. Analysis of 07 water sample was done through Atomic absorption spectroscopy to look at different physicochemical parameters, for example EC, TDS, pH, and saltiness the values of TDS and saltiness were within the range of EPA and WHO limits pH of Spezant (metha) Mastung was more than EPA and WHO limits while the conductivity of Spezant (metha) Mastung and Spezant (karva) Mastung was higher than WHO limits. The study shows that the values of Co, Fe, Sb and Pb were higher than WHO and EPA limits while the values of Mn were within the range of WHO and EPA limits.

KEYWORDS: Ground Water, Atomic Absorption Spectroscopy, Metals, Physiochemical Parameters, Mastung, Balochistan, Pakistan.

INTRODUCTION

The geological territory of Mastung region is 5,896 square kilometers and it lies between 66°11'34"- 67°25'59" East Longitudes and 29°20'13"- 30°15'8" North Latitudes, officially separated into four tehsils and 13 association committees.[1] Even though often seems to be quite usual, water is the most vital substance we are around 66% of water to live life as we probably aware it couldn't have advanced without water and passes on without it. Water appears, from the start locate, to be a necessary particle, comprising of two hydrogen atoms connected to one oxygen atom. Water is dissolvable because of its polarity, high dielectric steady and little size, especially for polar and ionic mixes and salts water ionizes and permits simple proton trade between atoms, so adding to the excessiveness of the ionic relations in science. Water around atoms enables them to detect and be detected in a good manner. The hydration properties of water towards natural macromolecules (especially proteins and nucleic acids) to a huge degree decide their three-dimensional structures, and thus their capacities, in arrangement.[2]

Metals are substances with high electrical conductivity, pliability, and shine, which deliberately lose their electrons to shape cations.[3] Overwhelming metals found normally, and are available in variable amount in all biological systems. There are countless substantial metals, each shape or compound has various properties which likewise influence ecosystem. Human exercises have radically changed the biochemical cycles and equalization of some substantial metals.[4] The significance of water assets, especially surface waters (streams), in meeting the water needs of people, creatures and businesses shows the fundamental need to ensure them against mechanical and agricultural waste that enters the water, natural and compound contaminants including substantial metals likewise enter water assets. Although a portion of these metals are fundamental as micronutrients, their high fixation in the evolved way of life can cause poisonous quality and natural effects and hazardous to aquatic biological systems.[5,6] Overwhelming metals are for the most part alluded to as those metals which have a particular thickness in excess of 5 g/cm³ and unfavorably influence the earth and living life.[7] These metals are quintessential to keep up different biochemical and physiological capacities in living life forms when in low range, anyway they become poisonous when they surpass certain edge values. Substantial metals are critical natural toxins and their harmfulness is an issue of expanding importance for biological, developmental, nourishing and ecological reasons.[8,9] Substantial metals enter the earth by regular and anthropogenic methods. Such sources include characteristic enduring of the earth crust, mining, soil disintegration, mechanical release, urban runoff, sewage effluents, insecticides and pesticides applied to plants, and various others.[10]

Lead poisoning results from ingestion of lead-containing materials, for example, paint or water which has remained in lead funnels. Harm can happen from inward breath of exhaust from consuming stockpiling batteries or patch. Despite, there is no uncertainty that lead is truly toxic to individuals and proof collect that notable varying impacts bring about various human creatures that have ingested comparative sums. The vast majority of the retained lead is put away in the bones, blood or mind. Lead colic (painter's spasms) is exposed by serious stomach problem. Harm to the mind can takes place in kids it is known to cause spasms, mental impediment and even passing. It is likewise realized that lead is hurtful to the kidney and lasting neurological damage.[11]

Iron is the most inexhaustible metal in the world's covering. Naturally it is the most significant supplement for most living animals as it is the cofactor for some essential proteins and catalysts.[12] Excess of iron take-up is a difficult issue in meat eating nations and it builds the danger of disease. Laborers who are presented to asbestos that contains practically 30% of iron are at high danger of asbestosis, which is the second most significant reason for lung malignant growth.[13] It is said that asbestos related malignant growth is connected to free radicals. Free intracellular iron can likewise advance DNA harm. Iron can start disease for the most part by the procedure of oxidation of DNA particles.[14]

Antimony found normally as a sulfide mineral, stibnite (Sb_2S_3) and valentinite (Sb_20_3).[15] Antimony was related with lead intoxication, with side effects counting migraine, stomach, clogging, colic, aversion for nourishment, loss of hunger, little mouth ulcers with salivation, dazedness, loss of weight, albuminuria, and glycosuria.[16] Cobalt can accumulate by plants and creature so scattering of this component is expansive in human environment. When this component surpasses, it could be hazardous for human health.

Lethal dosages of cobalt cause terrible impact, for example, asthma, pneumonia, regurgitating, vision issues, and hearth issues.[17] Thyroid harm, brevity of breath, nodular fibrosis, permanent handicap and death. Likewise weight loss, dermatitis, and respiratory disorders are other effects of this component.[18]

Manganese (Mn) is one of the most plenteous components in the worlds outside.[19] Manganese is a cofactor for various enzymatic reactions associated with phosphorylation, cholesterol and unsaturated fat combination. In spite of its essential nature, Manganese has been known as a neurotoxin for about 150 years.[20] Manganese additionally assume a basic job in the resistant framework, in the guideline of cell vitality, in bone and connective tissue development and in blood thickening. In the cerebrum, Manganese is a significant cofactor for an assortment of chemicals, including the cancer prevention agent catalyst superoxide dismutase, and for compounds associated with synapse amalgamation and digestion.[21]

METHODOLOGY

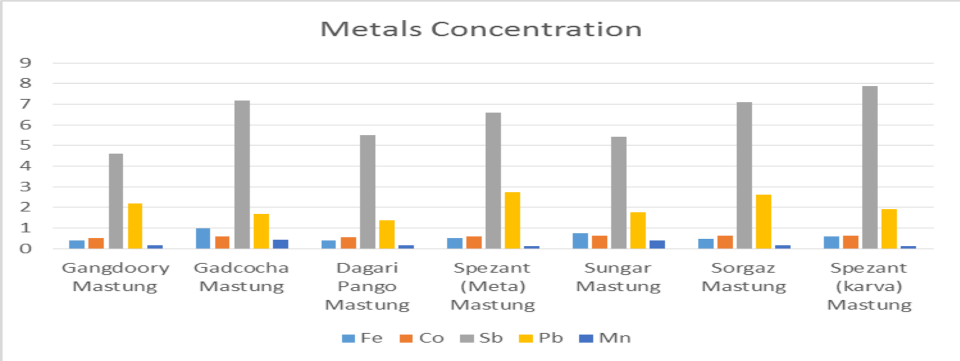
Samples were collected from different areas of district Mastung Balochistan for the analysis of metals and also to check physicochemical parameters such as TDS, salinity, pH and electrical conductivity.

The samples in the research were separated utilizing whatman No2 filter paper, 5 ml concentrated nitric corrosive (HNO_3) and 5 ml concentrated sulphuric corrosive (H_2SO_4) was mixed with one hundred milliliters of the deionized water.[22] To give the corrosive a chance to become concentrated the volume was decreased to around 15 to 20 ml by warming the mixture.[23] At room temperature the digested samples were let to cool and then filtered through filter paper (WhatmanNo2). The last volume was changed in accordance with 100 ml with double refined water and kept for examination.[22]

RESULTS AND DISCUSSION

Table of Metal concentrations.

S. No.	Samples	Fe	Co	Sb	Pb	Mn
1	Gangdoory Mastung	0.4085	0.5058	4.6036	2.197	0.1528
2	Gadcocha Mastung	1.0021	0.6131	7.1979	1.7007	0.452
3	Dagari Pango Mastung	0.4079	0.5626	5.4926	1.3601	0.1683
4	Spezant (Meta) Mastung	0.4988	0.6045	6.5907	2.7408	0.1283
5	Sungar Mastung	0.7329	0.6197	5.4282	1.7621	0.4097
6	Sorgaz Mastung	0.4946	0.6326	7.1127	2.6091	0.1582
7	Spezant (karva) Mastung	0.5898	0.6384	7.8829	1.9042	0.1332



Note

(Meta means sweet, drinkable water. Karva means sharp, non-drinkable water).

Iron concentration in water

Iron concentration in Gangdoory Mastung was 0.4085, in Gadcocha Mastung was 1.0021, in Dagari Pango Mastung was 0.4079, Spezant (meta) Mastung was 0.4988, in Sungar Mastung was 0.7329, in Sorgaz Mastung was 0.4946 and in Spezant (karva) Mastung was 0.5898 with respect to studies the concentration of iron was more than EPA and WHO limits. According to studies it was reported that free intracellular iron can likewise advance DNA harm. Iron can start disease for the most part by the procedure of oxidation in DNA particles.[14]

Cobalt concentration in water

Cobalt concentration in Gangdoory Mastung was 0.5058, in Gadcocha Mastung was 0.6131, in Dagari Pango Mastung was 0.5626, Spezant (metha) Mastung was 0.6045, in Sungar Mastung was 0.6197, in Sorgaz Mastung was 0.6326 and in spezant (karva) Mastung was 0.6384 with respect to studies the concentration of cobalt was more than EPA and WHO limits. According to studies it was reported that lethal dosages of cobalt cause terrible impact, for example, asthma, pneumonia, regurgitating, vision issues, and hearth issues.[17]

Antimony concentration in water

Antimony concentration in Gangdoory Mastung was 4.6036, in Gadcocha Mastung was 7.1979, in Dagari Pango Mastung was 5.4926, Spezant (metha) Mastung was 6.5907, in Sungar Mastung was 5.4282, in Sorgaz Mastung was 7.1127 and in Spezant (karva) Mastung was 7.8829 with respect to studies the concentration of antimony was more than EPA and WHO limits. According to studies it was reported that antimony was related with side effects counting migraine, stomach, clogging, colic, aversion for nourishment, loss of hunger, little mouth ulcers with salivation, dazedness, loss of weight, albuminuria, and glycosuria.[16]

Lead concentration in water

Lead concentration in Gangdoory Mastung was 2.197, in Gadcocha Mastung was 1.7007, in Dagari Pango Mastung was 1.3601, Spezant (metha) Mastung was 2.7408, in Sungar Mastung was 1.7621, in Sorgaz Mastung was 2.6091 and in Spezant (karva) Mastung was 1.9042 with respect to studies the concentration of lead was more than EPA and WHO limits. According to studies it was reported that higher concentration of lead in water causes damage to the kidney and lasting neurological damage.[11]

Manganese concentration in water

Manganese concentration in Gangdoory Mastung was 0.1528, in Gadcocha Mastung was 0.452, in Dagari Pango Mastung was 0.1683, Spezant (metha) Mastung was 0.1283, in Sungar Mastung was 0.4097, in Sorgaz Mastung was 0.1582 and in Spezant (karva) Mastung was 0.1332 with respect to studies the concentration of manganese was less than EPA and WHO limits. According to studies it was reported that manganese is a significant cofactor for an assortment of chemicals, including the cancer prevention agent catalyst superoxide dismutase, and for compounds associated with synapse amalgamation and digestion.[21]

Table for physicochemical parameters.

S. No.	Samples	pH	TDS (mg/L)	Salinity	Conductivity (µS/cm)
A	Distel water	7.1	0.004	0.01	0.37
B	Blank (Tap)	8.0	0.471	0.42	825
1	GangdooryMastung	7.6	0.28	0.23	591
2	GadcochaMastung	7.8	0.23	0.14	482
3	DagariPangoMastung	8.3	0.24	0.19	57
4	Spezant (Meta) Mastung	9.1	0.73	0.24	1124
5	SungarMastung	8.6	0.26	0.15	541
6	SorgazMastung	8.2	0.22	0.21	483
7	Spezant (karva) Mastung	8.3	0.81	0.43	1200

pH of water samples

pH in Gangdoory Mastung was 7.6, in Gadcocha Mastung was 7.8, in Dagari Pango Mastung was 8.3, spezant (metha) Mastung was 9.1, in sungar Mastung was 8.6, in Sorgaz Mastung was 8.2 and in Spezant (karva) Mastung was 8.3 with respect to studies the pH of Spezant (metha) Mastung was more than EPA and WHO limits.

TDS of water samples

TDS in Gangdoory Mastung was 0.28, in Gadcocha Mastung was 0.23, in Dagari Pango Mastung was 0.24, in Spezant (metha) Mastung was 0.73, in Sungar Mastung was 0.26, in Sorgaz Mastung was 0.22 and in Spezant (karva) Mastung was 8.1 with respect to studies the TDS of all water samples were within the range of EPA and WHO limits.

Salinity of water samples

Salinity in Gangdoory mastung was 0.23, in Gadcocha Mastung was 0.14, in Dagari Pango Mastung was 0.19, in Spezant (metha) Mastung was 0.24, in Sungar Mastung was 0.15, in Sorgaz Mastung was 0.21 and in Spezant (karva) Mastung was 0.43 with respect to studies the salinity of all water samples were within the range of EPA limits.

Conductivity of water samples

Conductivity of samples in Gangdoory Mastung was 591, in Gadcocha Mastung was 482, in Dagari Pango Mastung was 57, Spezant (metha) Mastung was 1124, in Sungar Mastung was 541, in Sorgaz Mastung was 483 and in Spezant (karva) Mastung was 1200 with respect to studies the conductivity of most water samples were within the range of WHO limits while Spezant (metha) Mastung and Spezant (karva) Mastung conductivity was higher than WHO limits.

CONCLUSION

It was concluded from the above studies that physicochemical parameters of water samples such as TDS and salinity were within the range of EPA and WHO limits pH of Spezant (metha) Mastung was more than EPA and WHO limits while the conductivity of Spezant (metha) Mastung and Spezant (karva) Mastung was higher than WHO limits. Analysis of heavy metals was conducted for water samples located in the district Mastung Balochistan, Pakistan. The studies revealed that different sampling sites have different concentrations of the metals. The level of certain substantial metals was alarmingly higher in the zones which were considered for testing. Keeping in view the health risk the significant levels of metals when enter the human digestion, measures ought to be taken to limit these levels in the spotless waters to reduce the upcoming dangers.

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