



A STUDY ON CONTAMINATION OF HEAVY METALS CAUSED BY IMMERSION OF IDOLS IN THE RIVER KALIYASOT SPECIALLY IN MANDIDEEP REGION IN BHOPAL, MADHYA PRADESH, INDIA.

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ABSTRACT: Environmental pollution is the burning problem of many developing countries including India. Out of all environmental issues water pollution is becoming more and more dangerous day by day, because of human activities. Water resources are very requisite for extant of life on the planet Earth. Water resources are compact close system and in any stretch of time when human population are rising, the per capita amount of water suited is surely decreasing. Water quality of river and lakes are normally get adulterated everywhere by human waste, sit's organic matter, industrial waste, lodgment of sediments, but in developing countries like India various types of religious activities like idol immersion are taking place every year which is a matter of concern. The water source selected for the investigation is river Kaliyasot of Bhopal in Madhya Pradesh. The prime source of sedimentation and contamination in the water source is the immersion of idols of Goddess Durga and Lord Ganesh during Navratri and Ganesh Chaturthi. These idols are manufactured of thermocol, cloth, wood, plaster of paris, clay, paper, jute, synthetic paints and adhesive materials etc. Out of waste thermocol is non- biodegradable and paints contain harmful heavy metals like mercury, cadmium, lead and chromium. The present investigation was done to evaluate heavy metal contamination. The finding of the research work manifest increased level of heavy metal concentration because of immersion of idols, Nickel, Mercury, Lead may magnify in their concentration at different trophic levels including fishes and birds which ultimately reaches the human through food chain.

KEYWORDS: Environmental pollution, water resource, industrial waste, idol immersion, contamination, heavy metals, non-biodegradable.

INTRODUCTION: Water is one of the most plausible and key wealth on our planet [1-7]. Life and water may be ably said to be two faces of the same coin [8]. "Bhopal" the capital city of M.P. also famous as "City of Lakes". The city has river Kaliyasot arises from Kaliyasot Dam as a result of its overflow and flows in south-east direction and joins the river Betwa near Shiv temple Bhojpur. Approximately its length is 29 kms. "Van Vihar National Park" is also situated in the river's catchment area. Various developmental practices, anthropogenic activities and extended townships are concentrated around the river Kaliyasot which has a negative impact on its water quality [9]. The idols of Lord Ganesh and Goddess Durga are immersed during Ganesh Chaturthi and Navratri every year, also during Muharram festival, Taziyas are being immersed by Muslims in the Mandideep region of Kaliyasot river [10]. Heavy metals like lead and chromium also put on through "Sindoor" in the water source, are very toxic even in very minute quantity for human beings [11]. These chemicals when immersed, dissolve slowly leading to remarkable alteration in the parameters of water quality. All these religious practices are responsible for adding pollution load in the water source. Water source play a deciding role in Bio-geochemical cycle of Earth, so that they are an important part of Biosphere. They give food, shelter and habitat for biodiversity. The human activities may induce changes in sensitive water sources, ecosystem and ecological conditions of many water sources in countries are destroying as a result of population explosion, intensified agricultural practices, change in land use pattern, and increase industrialization are affecting natural condition of water body [13,14].



Due to heavy anthropogenic pressure and negligence by local people who never do things for the betterment of water body so the quality of water body is deteriorated day by day. Because of different factors which can give threat not only to the biodiversity of the water body but also to the people which are directly or indirectly depends on the water sources and aquatic life also [15-19]. The present research work is undertaken for the study of heavy metal contamination in river Kaliyasot river specially in Mandideep region due to idol immersion activities.

MATERIALS AND METHODS: Mandideep area is selected for sampling in October 2021. Surface water was select collected from the idol immersion site at various interval of time i.e., pre-immersion, during immersion and post-immersion. Pre-immersion samples were collected a week before the starting of the immersion practices. During second sampling, samples were collected during idol immersion practices. During Post- immersion sampling, samples were collected 15 days after the ending of idol immersion activities. The water samples were taken to the laboratory for the analysis of heavy metals according to standard methods described in American Public Health Association (APHA 1995).

Heavy metal analysis: The samples were collected for the investigation are preserved by adding 5 ml of 1N HNO₃ and dropping down the pH near about 4 and analyzed using AAS 100 (Perkin Elmer Analyst).

RESULTS AND DISCUSSION:

Heavy metals: Increasing consciousness of ecological hazard of toxic metals from Industrial and urban sources have intricately significant interest in the study of levels and fate of heavy metals in the aquatic ecosystem.

Toxicity of heavy metals in air, water and soil are universal concerned that are growing threat to humanity. Metals, a large category of universally distributed pollutants are natural elements extracted from earth and harnessed for human, industry and products for thousands. Metals are significant for their wide environmental dispersion, tendency to accumulate in particular tissues of humans and plants and their overall potential to be toxic even in minute quantity. Mercury and Lead are toxic even at trace levels of exposure. Even those metals which are essential having the potential to turn harmful at high levels of exposure; a reflection of very basic doctrine of toxicology - the dose makes the poison.

Calcium: Excessive amount of calcium can cause nausea, stomach upset, vomiting and constipation. Hypercalcemia in blood leached from bones and weakens them results in bone pain and muscle weakness.

Magnesium: Magnesium toxicity causes hypertension, nausea, facial flushing, vomiting, retention of urine, ileus, depression and lethargy.

Cadmium: Long-term exposure of cadmium by water, air, soil and food leads to cancer and organ system toxicity like urinary, skeletal, reproductive, cardiovascular, Central and peripheral nervous and respiratory systems.

Chromium: The most significant toxic effects after contact, inhalation or injection of hexavalent chromium compounds are dermatitis, skin and mucosal ulceration, eczematous skin reaction, perforation of nasal septum, allergic asthmatic reactions, bronchial carcinomas and gastroenteritis.

Manganese: Manganese toxicity causes permanent neurological disorders, tremors, difficulty in walking, facial muscle spasm, irritability, aggressiveness and hallucination.

Lead: Lead toxicity causes anemia, weakness, kidney and brain damage. Very high exposure to lead causes death. It can cross the placental barrier, means pregnant women who got exposure to lead also expose their Unborn child.

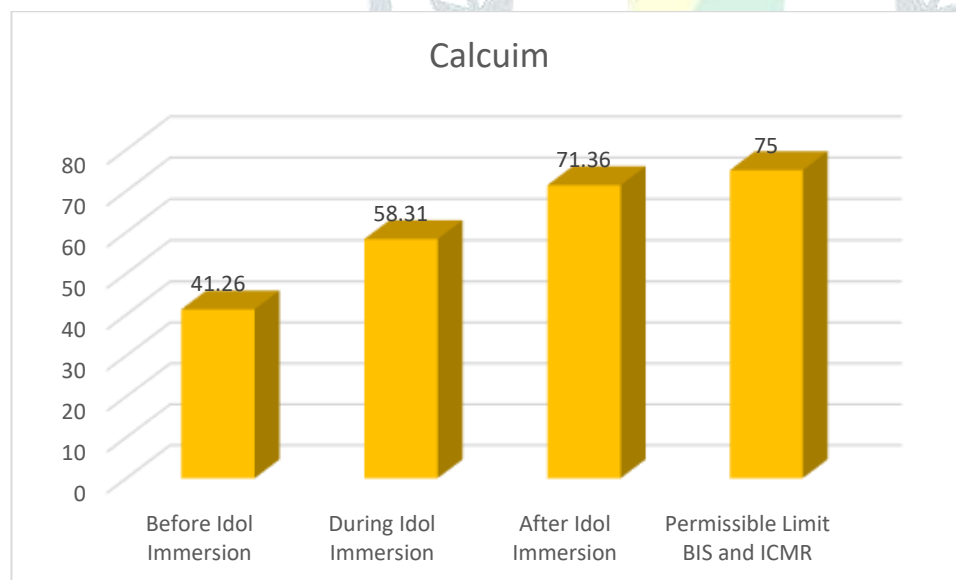
Arsenic: Immediate symptoms of arsenic toxicity is vomiting, abdominal pain and diarrhea. These symptoms followed by numbness and tingling of the extremities, muscle cramping and death causes in extreme cases.

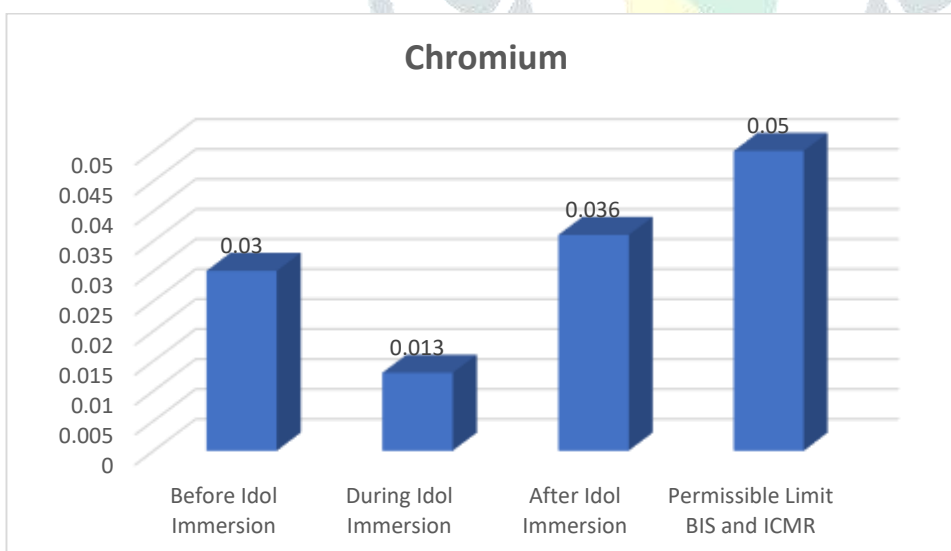
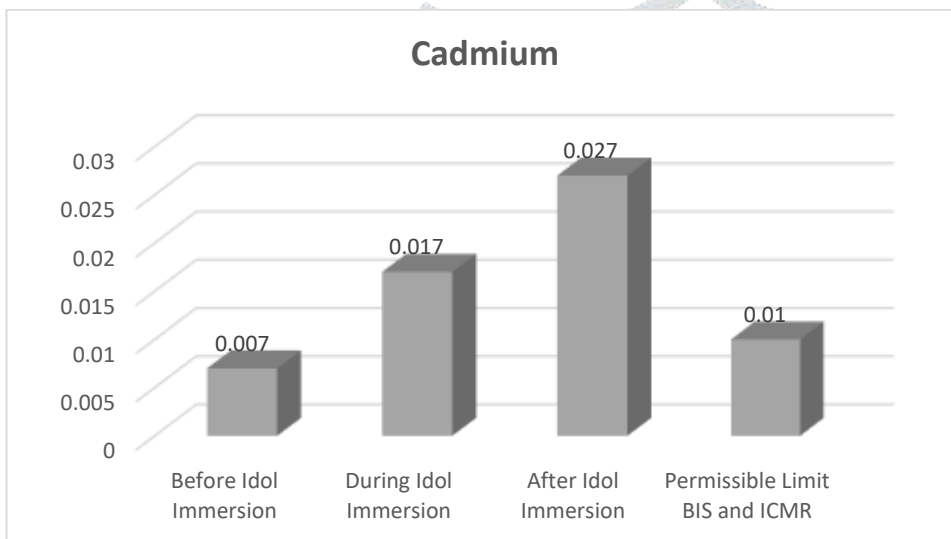
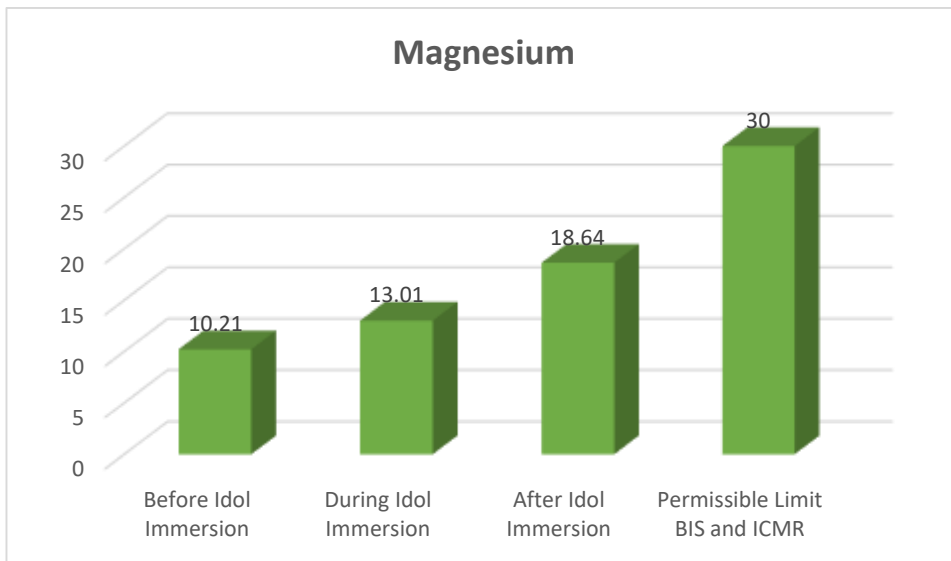
Mercury: Mercury toxicity causes neurological and behavioral disorders after inhalation, injection or dermal exposure of Mercury compounds. Other symptoms include tremors, Insomnia, memory loss, neuromuscular effects, headache and cognitive and motor dysfunction.

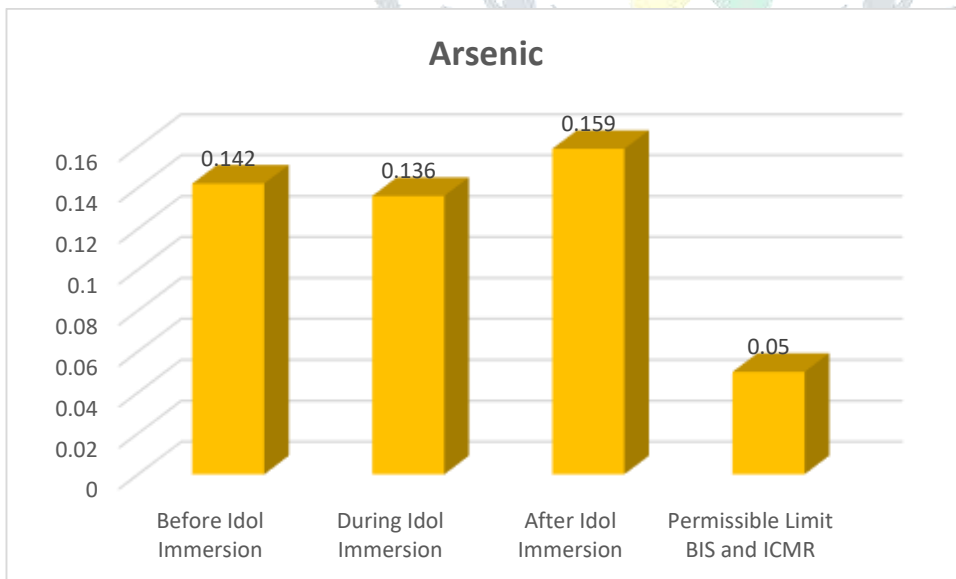
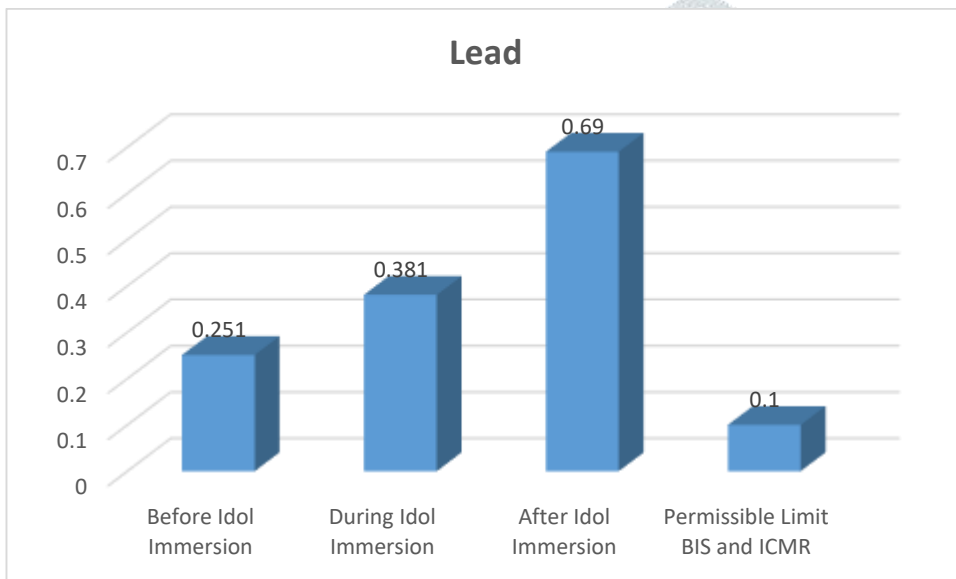
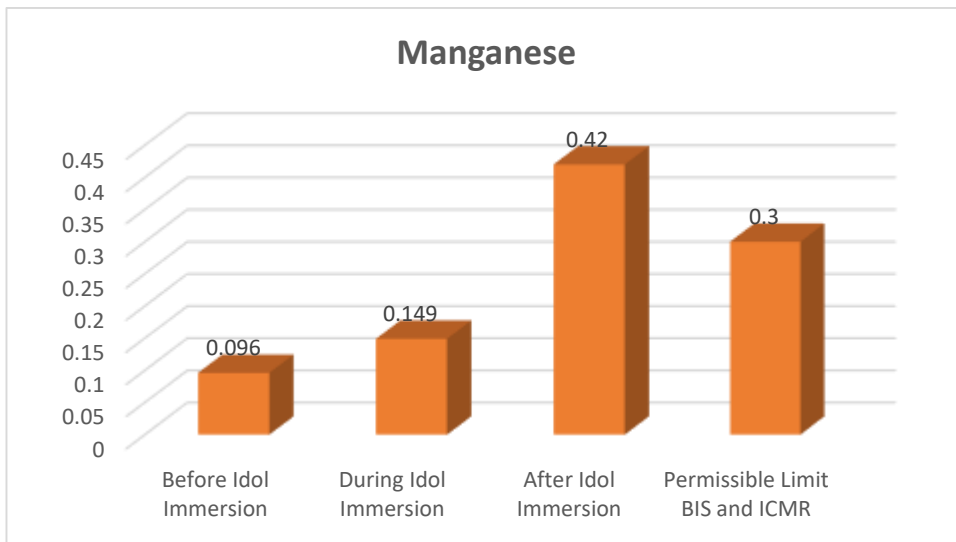
We observed that calcium concentration has increased notably in the river water after idol immersion. Nevertheless, it was below the limits of permissible standards. The mean concentration of calcium in the river water was much less compared to that at immersion site. Arsenic, Cadmium, Chromium and Magnesium concentration had also increased notably in the river water after the idol immersion [20]. Although, Magnesium is non-toxic, it increases the water hardness. Over the years, the standard concentration of heavy metals mostly Magnesium, Lead and Mercury had also increased remarkably in the river water compared to the identification of highest desirable limits as set by BIS and ICMR (1995) standards (Table 1). Abundance of this element causes skin diseases [21]. But, Chromium concentration in the river water changed much and was below the limits of standard. In comparison to the statement of highest desirable limits of BIS and ICMR standards, the Metallic concentration in sediments is much higher than in the lake water of Nainital, India [21].

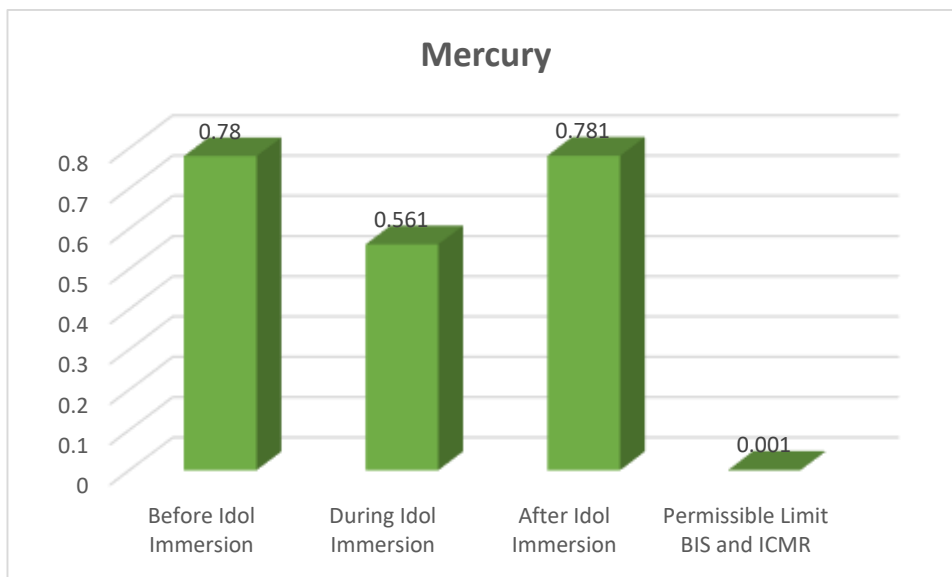
Table 1: Change in concentration (mg/l) of some heavy metals in river Kaliyasot especially in Mandideep region water before, during and after idol immersion, BIS (Bureau of Indian Standards) and ICMR (Indian Council of Medical Research) standards for highest desirable limits.

Heavy Metals	Before Idol Immersion	During Idol Immersion	After Idol Immersion	Permissible Limit BIS and ICMR
Calcuim	41.26	58.31	71.36	75
Magnesium	10.21	13.01	18.64	30
Cadmium	0.007	0.017	0.027	0.01
Chromium	0.03	0.013	0.036	0.05
Manganese	0.096	0.149	0.42	0.3
Lead	0.251	0.381	0.69	0.1
Arsenic	0.142	0.136	0.159	0.05
Mercury	0.78	0.561	0.781	0.001









After idol immersion, concentration of heavy metals increased manifolds in the water (table 1). Heavy metals are well known for its persistence behavior in the aquatic environment and little by little accumulate and magnify through the process of Bio-accumulation and Bio-magnification, while they move up in the food chain. Thus, Mercury and Lead may magnify in their concentrations at various trophic levels including fishes and birds, inhibiting the river which lastly reaches the human through the food chain [23]. Methyl mercury is an organic compound of Mercury when enters into human body gets concentrated in the Brain and destroy the brain cells, damages the CNS (Central Nervous System) and also causes ulceration and corrosion of the digestive tract [24]. Thus, when people consume contaminated fish from the water source gets affected with Mercury poisoning over a period of time.

SOLUTIONS: The Environmental Department and other Government and non-government institutions of Bhopal is planning many initiatives for making festivals an environmental friendly one.

1. Chemical dyes and paints which are non-degradable should be banned.
2. Popularizing small idols instead of bigger ones as they would dissolve faster.
3. Use of such materials should be made mandatory which are water soluble.
4. Avoid toxic paints.
5. Traditional clay should be used for manufacturing of idol of God

CONCLUSION: After analyzing the results we observe that water of river Kaliyasot is not suitable for drinking purpose but can be used for irrigation.

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