

Investigation on the Impact of Different Idols Immersed In Natural Water

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ABSTRACT:- Water pollution is the contamination of natural water bodies by physical, chemical processes and microbial activities. In the recent time, Hindu devotee make idols of deities by non-biodegradable materials such as plastic, cement and plaster of paris and are painted with enamel paints rich in toxic dyes containing harmful and toxic metals. Natural water bodies are polluted by idol immersion during festivals being celebrated. The degradable materials and synthetic polymeric paints are frequently used for making these idols which are dangerous threat to environmental issues.

Present investigation was conducted in view to observe the impact of clay idols without colour (CIWC) and idols with multi-colours (IWMC) on natural water after complete dissolution for 55 hours of immersion. Water sample was collected from Assi Ghat, a immersion point of idols A significant variations in physico-chemical parameters of water revealed decrease in the amount of dissolved oxygen (DO), whereas biological oxygen demand (BOD), free CO₂, alkalinity, hardness, calcium, chemical oxygen demand (COD), temperature and concentration of toxic metals increased. However, there was negligible change in pH in CIWC sample water.

Both idols completely dissolved after 55 hours of immersion. It was concluded that there was marked variation in above parameters and the values significantly increased. IWMC compare to CIWC after immersion.

KEYWORDS:- Idol immersion, physicochemical parameters, water pollution, heavy metals toxicity.

I. INTRODUCTION

India is a multi-cultural country of myriad festivals. We participate in the celebrations of various deities round the year and it seems quite impossible to remain aloof from the accompanied pomp and show while paying homage to the Gods with full hope and dedication for new horizon in our life. Some of these festivals involve 'idol immersion' in water as the celebrations finale. Beautifully carved and decorated idols are drowned into natural water bodies with prayers for success, happiness and full peace. Two major festivals in India that involve idol immersion are 'Ganesh Chaturthi', dedicated to Lord Ganesha and 'Durga Puja', dedicated to Goddess Durga (Kaur, R., 2012).

In our country, idol immersion is anthropogenic activity in natural water bodies. The immersion of idols in the naturally flowing water can change physicochemical properties of water and put direct effect on the flora and fauna of the river. Generally, water pollution is also increasing due to idol immersion activities during Ganesh Puja, Durga Puja, Saraswati Puja, Vishvarama Puja etc (Gupta A.K *et al*, 2011). Idols are making using many materials like clay, wood, paddy husk, grass, bamboo and jute. After making these idols are painted with synthetic polymer based multi-colour enamel paints which contain large amount of toxic metals (Bhattacharya, S., *et al*, 2012).

On the other hand, polymeric paint materials containing toxic metals like cadmium, cobalt, copper, nickel, chromium, arsenic etc cause health hazards in the long run. Pollution of natural water bodies is a major concern in present scenario. Idol immersions during certain occasions of festivals may add pollution load on the natural water bodies. The synthetic paint materials used for making these idols are dangerous threat to aquatic environment.

In the health point of view, paint materials are a greater source of hazard and most of those used for decorating idols are toxic chemicals (Bajpai A, *et al*, 2003). These metals are accumulated in microorganisms in water body that imposes threat on life of fishes and other useful aquatic fauna. Colours are known to have higher content of mercury, zinc oxide, chromium and lead. The toxic effect of these heavy metals is listed in Table 1.

Table 1: Toxic effects of some metals

S No	Metals	Effects
1	Mercury	Mercury pollution can be a serious health threat, especially for children and pregnant women. Humans risk ingesting dangerous levels of mercury when they eat contaminated fish. Since mercury accumulates in the body of the fish, it is not easy to detect at this trace level. Even in low levels, mercury may affect human health and cause many diseases. High dose prenatal and infant exposures to mercury can cause mental retardation, cerebral palsy, deafness and blindness. In adults, mercury poisoning also affects fertility and blood pressure regulation and may cause memory loss, tremors, and vision loss. A growing body of evidence suggests that exposure to mercury may also lead to heart disease.
2	Cadmium	Cadmium is primarily toxic to the kidney; especially to the proximal tubular cells are the main sites of accumulation. Cadmium can also cause bone demineralization, either through direct bone damage or indirectly as a result of renal dysfunction. Cadmium is primarily toxic to the kidney and especially to the proximal tubular cells, the main site of accumulation. Drinking water with very high cadmium levels irritates the stomach, leading to vomiting and diarrhoea, and sometimes death is possible. Taking lower levels of cadmium over a long period can lead to a build-up of cadmium in the kidneys. If the levels reach a high enough level, the cadmium in the kidney will cause kidney damage, and also causes bones to become fragile and break easily.
3	Arsenic	Arsenic is a most toxic element. Exposure to inorganic arsenic can cause various health effects, such as irritation of the stomach and intestines, decreased production of red and white blood cells, skin changes and lung irritation. It is suggested that the uptake of significant amounts of inorganic arsenic can intensify the chances of cancer development, especially the chances of development of skin cancer, lung cancer, liver cancer and lymphatic cancer. A very high exposure to inorganic arsenic can cause infertility and miscarriages with women. Cadmium can cause skin disturbances, declined resistance to infections, heart disruptions and brain damage with both men and women. Inorganic arsenic can damage DNA activities. Ingestion of large amounts can lead to gastrointestinal symptoms such as severe vomiting, damage to the nervous system, and eventually death.
4	Zinc	An excess amount of zinc is poisoning. The gastrointestinal complaints are usually the most common side effects of zinc toxicity. Upset stomach, vomiting and diarrhoea are most common due to zinc. These effects, especially nausea and vomiting, can start as soon as a half hour after ingesting large quantities of zinc. High amount of zinc have also been associated with decreased urine output, which is the number one reason for hospitalization associated with zinc toxicity.
5	Lead	Lead is a toxic metal. Lead damages the central and peripheral nervous system, the kidneys and the ability of bodies to regulate vitamin D. Lead negatively affects the formation of red blood cells (RBC). Very high levels of lead can cause seizures, coma and ultimately death. At lower levels of lead exposure, a child can suffer from developmental delay, lower IQ, hyperactivity, learning disabilities, and behavioural problems. Lead can cause several unwanted effects, such as- Disruption of the biosynthesis of haemoglobin and anaemia, blood pressure, Kidney damage, Miscarriages and subtle abortions, Disruption of nervous systems, Brain damage, Declined fertility of men through sperm damage, and learning abilities of children.

The present investigation was carried out in the laboratory condition to evaluate the impact of clay idol without colour (CIWC) and other idol with colour (IWMC) on immersion in water on physicochemical parameters, toxic metals test. Both idols are shown in figure 1 and 2. Two experiments have been carried out to assess the impact of idol immersion on water. The first experiment was conducted using simple clay idol

without colour (fig. 1) for immersion and the second experiment was performed using clay idols with multi-colour for immersion (fig. 2).



Figure 1: Clay idol without colour (IWC)



Figure 2: Idols with multi colour (IWMC)

II. MATERIALS AND METHODS

The present investigations were carried out in the laboratory to find out the impact of clay idols without colour (CIWC) and idols with colour (IWMC) on immersion in natural water body. First experiment set, CIWC was taken for study and in the second set IWMC taken for study.

The Idols were immersed in 10 litre of river water for 55 hours. After 55 hours the water sample was analysed for parameters such as conductivity, turbidity, pH, alkalinity, hardness, chloride, total solids, dissolved solids, suspended solids, BOD and COD, toxic metals like chromium, lead, zinc, copper, iron, mercury, nickel and cadmium by standard procedure (APHA, 2005). Toxic metals analysed by Atomic Absorption Spectroscopy (AAS).

III. RESULTS AND DISCUSSION

All physico-chemical parameters were analysed more in IWMC sample than CIWC. It is therefore; clear that idol immersion has bad effect on water quality. pH is an important factor for determining the acidic and basic condition of water. In the present investigation, pH ranges from 6.8 to 7.3 (Table 2). The physico-chemical parameters like alkalinity, conductivity, conductivity, turbidity, total hardness, chloride, total solids, dissolved solids, suspended solids BOD and COD shows higher concentration IWMC after 55 hours of idol immersion. There was negligible change in pH of CIWC after idol immersion (Table 2). The toxic metals concentration showed increase in concentration of chromium, zinc. Lead, copper and cadmium were found after 55 hours of IWMC immersion (Table 2).

When Idol was immersed in water bodies, paint materials are released along with clay which are used for making idol. Those paint materials are mixed into water. These are not removed easily from the water sample and they are not easily biodegradable. These paints contain many toxic metals such as arsenic, cadmium, chromium, mercury, lead, and zinc etc. They lead to biomagnifications and ultimately enter through food web to vegetables, and then to human body. There they cause multiple defects on human bodies (Table 1).

Dissolved oxygen (DO) is not only an important parameter for indicator of water pollution but also indicates change in physical, chemical and biological activities of water body after idols immersion.

Conductivity of is a parameter of the ability of an aqueous solution to carry an electric current which depends on the presence of cations and anions. Total concentration and mobility are also depending on the temperature of water bodies in which idols immersed. Electrical conductivity is found to be good indicator of water quality due to dissolution of idols materials. In the present investigation electrical conductivity value increased on dissolution of IWMC compared to CIWC (Table 2).

Table 2: Effect of different idols on water quality after immersion of 55 hours

S. No.	Parameters	Units	Control Water Sample	IWMC	CIWC
1	pH	-	7.2	6.8	7.3
2	Turbidity	NTU	1.02	37.4	34.7
3	Conductivity	Umho/cm	287.9	2321.60	764.34
4	Chloride	mg/L	14.7	117.4	65.2
5	Alkalinity	mg/L	36.3	195.7	142.7
6	Total Hardness	mg/L	376.5	1926.3	922.6
7	Dissolved Solids	mg/L	443.8	3860.8	2318.4
8	Suspended Solids	mg/L	27.9	432.8	312.3
9	DO	mg/L	7.6	3.2	5.7
10	BOD	mg/L	0.92	2.7	1.3
11	COD	mg/L	19.7	163.5	113.4
12	Zinc	mg/L	0.0578	0.0087	0.0032
13	Chromium	mg/L	0.0751	0.1472	0.0744
14	Copper	mg/L	0.0124	0.0023	0.0010
15	Cadmium	mg/L	0.00021	0.0437	0.0164
16	Lead	mg/L	0.0062	0.0437	0.0057

Biochemical oxygen demand (BOD) is the amount of oxygen required by microorganisms to cause the decomposition of organic and inorganic materials present in water. BOD gives an idea about the quantity of biodegradable organic substances present in water (Singh HP, *et al.*, 1999). The higher levels of BOD indicate the presence of more biodegradable organic matter after dissolution of IWMC in water (Table 2). In the present study maximum BOD value was observed due to increase amount of decomposition of organic matter into the water. Chemical oxygen demand (COD) is the capacity of water to consume oxygen during the decomposition of organic matter. COD helps to indicate the pollution level of water sample. In study period the maximum value 163.5mg/L was recorded after complete dissolution of IWMC (Table 2).

Increasing concentration of chloride in water acts as good indicator of pollution. Many investigators reported that chloride concentration helped in increasing the degree of eutrophication. The present study showed that chloride content was maximum 117.4 mg/L complete dissolution of immersed idols after 55 hours. Hardness is an important parameter for detecting water quality after immersion of idols. In the present investigation, the maximum hardness recorded during immersion of IWC as show in Table 1. High value of total hardness during immersion was observed by many investigators (Dhamijia *et al*, 1995; Sayewara H A *et al*, 2010; Saravanakumar A, *et al*, 2010; Vyas A *et al*, 2008).

IV. CONCLUSIONS

After 55 hours of immersion in laboratory condition both idols CIWC and IWMC were completely dissolved in water. The color of water changed after complete dissolution of IWMC. The CIWC were also dissolved completely after 55 hours of immersion resulting in the sediments increased. It could be assumed that the IWMC after immersion in the natural water bodies causing more pollution problems in comparison of CIWC.

The toxic metals concentration in the water sample after 55 hours of idol immersion increased in the concentration of all tested toxic metals in the presence of IWC which harmful to the aquatic environment as well as ground water contamination. The concentration of the sample water after 55 hours of immersion does not show any toxicity in the presence of CIWC. In IWMC samples, all parameters like physic-chemical and toxic metals have significantly increased after 55 hours the immersion period. The CIWC values of all investigated parameters are lower than the IWMC samples. The present investigation indicated less variation in DO value in CIWC. The present research indicates that the pollution load on water bodies has increased significantly during polymeric multi-colour based idol immersion.

VII. RECOMMENDATIONS

On the basis of present investigation following suggestions are recommended for immersion of idols in water bodies after completing rituals.

1. Temporary pond near river bank should not be made.
2. The idols immersion specific areas should be marked one or half km away from natural water bodies.
3. Plaster of Paris idols should be banned by appropriate authorities.
4. The immersion of IWMC should not be allowed in the natural water bodies because it slows negative impact on quality of water.
5. On priority basis, application of eco-friendly biodegradable materials for idols making should be encouraged.
6. Natural colour should be used for painting idols of deities. Government should make arrangement for the same. Idols should be constructed from clay only.
7. Regular awareness activities should be carried out to educate people who participated in these occasions.
8. After idol immersion, the contaminated pond water should be disposed appropriately.
9. The offering materials like flowers, synthetic cloths and green leaves may be manually collected in separate containers and finally dumped in appropriate pits for composting.
10. The recyclable articles may be taken out from the water bodies after immersion.

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