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Effect of physico-chemical variables on mercuric chloride induced toxicity on *Labeo rohita*

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Abstract
The aim of the present study deals with the effect of Physico-chemical variables on mercuric chloride induced toxicity on *Labeo rohita*. In mercuric chloride induced toxicity studies, essential physico-chemical variables like ammonia nitrogen, DO and TH contents were also determined; results showed a significant diverge dissimilarities in diverse mercuric chloride status on *Labeo rohita.* Sampling, experiment and finding were calculated in triplicate. In 0.15 (mg/L) mercuric chloride status, maximum TH 9.15±0.16 (mg/L) were found, similarly maximum DO, 9.18±0.22 (mg/L) were recorded with 0.54 mercuric chloride level. Another eliminating ammonia nitrogen (mg/L) parameter shown maximum 0.58±0.31 (mg/L) values with reference to 0.24 (mg/L) mercuric concentrations.

Keywords: physico-chemical, mercuric chloride, toxicity, *Labeo rohita*

Introduction
The aquatic systems are represented toward numeral of contaminants with the intention of liberated or disposed from of effluents. The discharge waste matter, which free from the industries, sewage treatment plants, drainage from urban and agricultural vicinity. Environmental infectivity by means of metals is a prevalent phenomenon. Seeing as heavy metals are not obliterated in living organisms from end to end biological degradation, they have capability to accumulate in an assortment of organ tissues and still be biomagnified in concern to food chain (Saaba, 2015) [1]. Qualitative features of toxicology are imperative since they are primary to security assessment progress in which, firstly determination of toxicological profile of substance take place then creates or draw a relation that how chemical can be utilized carefully to avoid damage. When amount of heavy metals in average achieve to additional than a certain limit, it become contaminated intended for those animals that exist in environment (Alkarkhi *et al.* 2009) [2]. They pose severe exposures to freshwater fish resource for their toxicity furthermore long persistence. Toxicants are also injurious to humans who are transmitting lying on aquatic products as food sources.
Metals are substances with high electrical conductivity, malleability, and luster, which voluntarily drop their electrons to shown appearance as cations. Metals are established through natural way in earth's crust along with their compositions diverge among dissimilar localities, ensuing in spatial differences of adjoining attentions. The toxic and nontoxic metal distribution or circulations in the environment is investigated through the features of the taken metal and by means of various associated factors of environmental (Khlifi and Hamza 2010) [3]. Heavy metals are generally referred to as individuals' metals which possess a specific density of more than 5g/cm^3 furthermore harmfully influence the living organisms and concern environment (Jarup, 2003) [4]. These metals are quintessential to retain various biochemicals in addition to physiological purposes in living organisms when it is found in very low concentrations; however it become noxious when they go above positive threshold attentions
The toxic pollutant effects water quality, feeding and swimming behaviour of fish and also delay the hatching, on the maturation period (Atif *et al.* 2005) [5]. Even though some heavy metals are essential for aquatic animals in low concentrations. However, at high concentration levels, they accumulate in different organs, damage tissues and interfere with the normal growth and proliferation (Alkarkhi *et al.* 2009) [2]. *Labeo rohita* is a commercial fish and widely preferred as edible fish in India and it is very important to evaluate edible organisms. The objective of the present work was to observe the behavioural changes and survival rates of fresh water fish *L. rohita* on exposure to mercuric chloride.

Materials and Methods
Labeo rohita (Hamilton) species is an omnivore with specific food preferences at different life stages. During the early stages of its lifecycle, it eats mainly zooplankton, but as it grows, it eats more and more phytoplankton, and as a juvenile or adult is a herbivorous column feeder, eating mainly phytoplankton and submerged vegetation. It has modified, thin hair-like gill rakers, suggesting that it feeds by sieving the water.
Rohu reach sexual maturity between two and five years of age. They generally spawn during the monsoon season, keeping to the middle of flooded rivers above tidal reach. The spawning season of rohu generally coincides with the southwest monsoon. Spawn may be collected from rivers and reared in tanks and lakes. Aquaculturing of rohu is an important aquacultured freshwater species in Madhya Pradesh, India. When cultured, it does not breed in lake like ecosystem. During the investigation period, Son river is only one sampling sites was selected for fish sampling due to abundant availability and nearly established experimental laboratory. The collected specimens were identified. Proper identification was followed by identification and nomenclature guideline (Mazon *et al.* 2002) [6].

The complete body size of selected fish and species is moderate deep along with round abdomen structure. The anatomy of head fairly large, area of snout is partially more and less swollen along with rounded projection which saturated just behind the mouth. Mouth of *Labeo rohita* is moderate jaws are inferior with a sharp margin and with soft movable horny covering. Barbels always present. Dorsal fin inserted above anterior to origin of pelvic fins. Anal fin are short. Caudal fin deeply forked. Scales are large. Lateral line complete or little curved in structure.

Labeo rohita (Hamilton) Fin formula - D. 16(3/13); P.17; A.7(2/5); C.19; L.I.40-41; L.tr. 6½/ 9; Bar 1 pair.

Labeo rohita is a species of fish of the carp family, found in rivers in Madhya Pradesh India. It is a large omnivore and extensively used in aquaculture. The rohu is a large, silver-colored fish of typical cyprinid shape. Adults can reach a maximum weight of 45 kg and maximum length of 2 m or aprox 6.6 ft in length, but average around ½ m or 1.6 ft. *Labeo rohita* fish belonging to the Carp family were selected for the present investigation based on the following criteria.

The hydro biological aspects for instance pH, dissolved oxygen, temperature, total alkalinity (TA), total hardness (TH) and salinity, were examined intended regarding to each set of experimentation as these factors have a considerable persuade on toxicity of pollutants and their biodegradability. Tap water free from the chlorine was used for the present study.

Daily monitoring of control and experimental tanks were performed for the basic parameters. Water temperature, pH, alkalinity, hardness, calcium and dissolved oxygen were measured regular basis in triplicate. All collecting samples pH values were determined by portable pH meter (Electronic India Ltd, India). Dissolved oxygen content was estimated by Winkler's method using starch indicator. Total alkalinity (TA) was determined using methyl orange as an indicator. Two indicators were employed for hardness investigation basically these are Erichrome Black - T indicator and calciwn level was determined using murexide indicator. Other parameters measurement was also possible including no. of other parameters salinity, fluorine, silicate and dissolved organic carbon. These were estimated weekly basis during the study. All essential needful physico-chemical measurement of fish medium water make use of during present testings was carried as direction of APHA guideline (1992) [7]. The investigative information intended for a solitary set of experimentations for the on top of parameters are prearranged in the same as the value varied negligibly designed for the waters employed meant for the additional sets of conduct experiments.

Results and Discussion

Seasonal variation of physico-chemical factors of Son river also collected by the courtesy of pollution control department. This information was very essential along with the sampling of fish. During the aqua culturing of fish in laboratory these available parametric values, appropriately inform about fish adaptation and their behavior and physiological changes studies or evaluation.

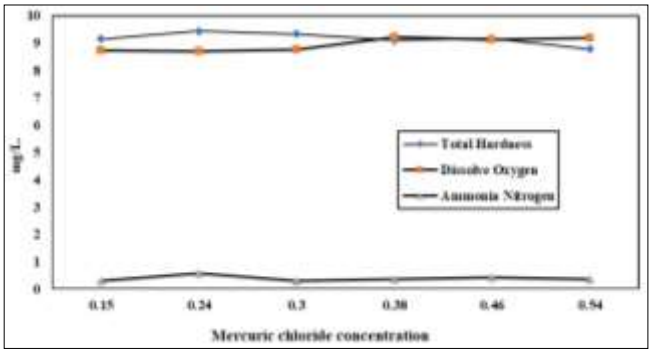
Table 1: Seasonal variation of physico-chemical factors of Son River.

Factors	Summer Season	Rainy Season	Winter Season
Air temperature ºC	34.15	31.32	26.10
Waters temperature ºC	27.50	28.00	24.00
Transparency (cm)	55	10	63
Hydrogen ion concentration pH	8.88	8.22	8.50
Free CO_2 (mg/l)	-	-	1.50
Total alkalinity (mg/L)	70.23	45.00	60.00
Total hardness (mg/L)	120.00	100.00	105.20
Dissolved oxygen (mg/L)	6.50	7.00	8.00
Chloride (mg/L)	7.0	8.5	6.5

In mercuric chloride induced toxicity studies, some needful physico-chemical variables like ammonia nitrogen dissolve oxygen and total hardness contents were also determined; results showed a significant diverge differences under different mercuric chloride concentrations on *Labeo rohita.* Values represented as Mean ± SE. Sampling and experiment was carried out in triplicate. The results in terms of total hardness (Mg/L) were recorded as results of 9.15 ± 0.16, 9.44 ± 0.19, 9.34 ± 0.26, 9.11 ± 0.27, 9.16 ± 0.11 and 8.78 ± 0.23 in concern to 0.15, 0.24, 0.30, 0.38, 0.46 and 0.54 mercuric chloride (mg/L) concentration respectively. Similarly other associated parameters like dissolve oxygen (mg/L), their values were recorded as 8.72 ± 0.15, 8.71 ± 0.11, 8.77 ± 0.31, 9.23 ± 0.13, 9.14 ± 0.27 and 9.18 ± 0.22 mg/L status in followed by 0.15, 0.24, 0.30, 0.38, 0.46 and 0.54 mercuric chloride concentration in (mg/L) respectively (Table-2).

Table 2: Mean of physico-chemical parameters of test medium at different concentrations of mercury chloride.

Mercuric chloride concentration (mg/L)	Total Hardness (mg/L)	Dissolve Oxygen (mg/L)	Ammonia Nitrogen (mg/L)
0.15	9.15±0.16	8.72±0.15	0.31±0.13
0.24	9.44±0.19	8.71±0.11	0.58±0.31
0.30	9.34±0.26	8.77±0.31	0.31±0.27
0.38	9.11±0.27	9.23±0.13	0.36±0.36
0.46	9.16±0.11	9.14±0.27	0.42±0.34
0.54	8.78±0.23	9.18±0.22	0.38±0.19
Values represented as Mean±SD. Sampling and experiment was carried out in triplicate.			



Graph 1: Graphics analysis of physico-chemical parameters of test medium at different concentrations of mercury chloride.

In elimination point of view the ammonia nitrogen (mg/L) status as 0.31 ± 0.13, 0.58 ± 0.31, 0.31 ± 0.27, 0.36 ± 0.36, 0.42 ± 0.34 and 0.38 ± 0.19 were accounted and observed followed by the 0.15, 0.24, 0.30, 0.38, 0.46 and 0.54 mercuric chloride concentration in (mg/L) respectively (Table-2). Values accounted as mean ± SE in triplicate. These above mention three basic parameters incorporated under the physico-chemical variables studies during mercuric chloride induced toxicity on *Labeo rohita* fish.

Conclusion

All the observation from a nutritional outlook, *Labeo rohita* fish considered as a contemptible basis of wet and dry protein represented expected consumption of fish is believed favorable as it encloses needful acids concern to high molecular fats. As toxicological view, fish directly correlated through ecological toxicants for instance toxic elements that create possible threats to humans. As fish is accepted choice of protein through greater part of population in Madhya Pradesh, India. Study aims to determine attention of mercuric chloride in commonly consumed *Labeo rohita* fish, study side wise also adjoined with determination of influencing factors of mercuric chloride status in experimental fish. Toxic status determined through acceptable national and international guidelines.

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