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Evaluation of Biochemical and Haematological Responses of Common Carp (*Labeo rohita*) after treatment with medicinal herb *Curcuma cassia*

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ABSTRACT

Curcumas are the unimaginable world of hidden gingers, which get its name from some of the varieties because they bear their flowers on short stalks amid its foliage. *Curcuma cassia* is a perennial monocot herb with fleshy rhizomes. The present study deals with the use of medicinal plant *Curcuma cassia* in fish diet to study the biochemical and haematological profile on *Labeo rohita* a common fish. The plant was extracted and processed for decoction method. The extract obtained was then mixed with 0.5 kg salt (NaCl) and 1.0 kg fish feed powder in the ratio 10:1. Required amount of sterilized water was mixed to make it paste. Haematological and biochemical studies were done after administering the extracts for 30days. Based on the results it is appropriate to conclude that the plant extract of *Curcuma cassia* incorporated in fish diet may improve the biochemical and haematological profile in blood of fish *Labeo rohita*. It was observed that the herbal diet fed fishes exhibited significant increase in RBC, WBC, serum protein and globulin and also maintained hepatics disorder enzymes (ALT, AST, ALP) which may be considered as a sign of improvement in health status. It may be due to the presence active components i.e. carbohydrates, proteins, glycosides, alkaloids, flavonoids. Phytochemicals in herbs may act as a potent gradient in improving the health of fishes as well as human beings.

Keywords: *Labeo rohita, Curcuma cassia,* Biochemical, Haematological profile, Fish

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INTRODUCTION

Curcuma cassia Roxb. (Common name, Black Tumeric) is a perennial herb of distinguishable bluish-black rhizome with a bitter and pungent smell and it is famous for its medicinal properties. In west Bengal, the rhizome of the plant is used in Kali Puja, and hence the plant is called Kali haldi. Paste made from the rhizome is used to cure dysentery and as poultice in rheumatic pain, sprains, bruises bronchitis, asthma, skin diseases and inflammation caused due to injuries[1]. Curcumas are the unimaginable world of hidden gingers, which get its name from some of the varieties because they bear their flowers on short stalks amid its foliage. Curcuma cassia is a perennial monocot herb with fleshy rhizomes. Root stock is large and sessile tubers with pale grey inside[2]. There has been great extent of work was conducted, especially in India, on the chemical constituents of *Curcuma Caecia* and reported that the oils of the plant posses antibacterial and antifungal properties. When rhizomes are cooked with mustard oil or sesame oil and the prepared paste is applied externally on rheumatism and paining part of the body[3]. Traditionally a number of herbs have been widely used in veterinary and human therapy. The World Health Organization (WHO) estimated that 4 billion people, 50% of the world population presently use herbal medicine for some aspect of primary health care. Herbal medicine is a common element in Ayurvedic, Homeopathic and Naturopathic treatments. Herbs or herbal products also have a role in aquaculture at present time[4]. Many species of these herbs are used directly as human food or as medicine. Therefore, their use mixing with fish feed would be safe for aquatic environment as well as for human beings. Considering the above, the objective of the study was to evaluate the effect of feed prepared from indigenous medicinal herbs applying on artificially and naturally bacterial infected fish maintained under laboratory and pond condition. Considering the above, the objective of the study was to evaluate effect of medicinal herb *Curcuma Caecia* in diet along with fish feed as an alternative to upgrade the status of immune system as well as to decrease the effect of other toxic metal by studying the biochemical and haematological profile of fishes under laboratory condition.

MATERIALS AND METHODS

Collection of fish

The live specimens of fresh water collection of fish *Labeo rohita* will be collected from local fisherman of Bhopal and acclimated for 7 days in lab conditions. Live fishes (irrespective of sex and almost medium size group) were taken and brought to the laboratory. Fishes would acclimatize into dechlorinated water for 30 days and treated with 0.01% of potassium permagnate ($KMnO_4$) solution to avoid dermal infection. They were fed dried pellet feed every day and water was renewed an alternate days, leaving no fecal matter, unconsumed food or dead fish in aquaria. Water in all aquaria replaced by freshwater at every 24h.The fishes were examined for any bruise, lesions or external infections.

Preparation of fish feed containing herbs

The feed containing herbs for therapy was prepared according to the method described by [5] with minor modification. 2 kg powder of herb *Curcuma cassia* was extracted and processed for decoction method. The extract obtained was then mixed with 0.5 kg salt (NaCl) and 1.0 kg SABINCO fish feed powder in the ratio 10:1. Required amount of sterilized water was mixed to make it paste. Then pellet feed was prepared from this paste using feed preparation hand machine and air dried at room temperature with the help of an electric fan.

Experimental treatments

Fish would divide into 4 groups of 12 fishes each and would be kept in glass aquaria; each containing 20 liters stored dechlorinated tap water.

In the present study, Group 1 was treated with standard pellet feed and Group 2 was treated with herbal extract curcuma cassia along with standard diet.

Haematological study[6]

Blood samples were collected on 30th day. During sampling, care was taken to minimize stress in the netted fish and fish remaining in the tank. All fishes were netted within 20 seconds. Blood samples were collected from the caudal tail vessels with 21 or 23 gauze needles and 1 or 3 cc syringe before ventilator response was noticeably depressed. To prevent repeated sampling, fish were not returned to the same tanks after blood collection.

Biochemical study[7]

Blood was collected as described for biochemical analysis in dry and sterilized centrifuge tubes by cutting the caudal peduncle of living fish with a sharp sterilized dry knife. Before cutting the caudal peduncle the fish was blotted with blotting paper to avoid haemolysis. The blood was allowed to clot for 10 minutes and centrifuged at 3000 rpm for 20 minutes. The serum was carefully taken out with the help of pipette and stored at 4^{0}C. All the tests were performed within 72 hours.

RESULTS

Biochemical investigation

The blood glucose level is used in the research of fish farming as an efficient indicator of stress, since glucose is the main source of energy used by fish to withstand unfavorable conditions. Cholesterol and triglycerides are lipids that appear in the blood connected to proteins, forming a complex called lipoprotein. Cholesterol is mainly synthesized in the liver, which plays an important role not only in the synthesis, but also in the catabolism and excretion of this lipid. Cholesterol is used in the synthesis of steroid hormones and as a component of cell membranes. The concentration of cholesterol in the blood can be influenced by the nutrition, the activity level, the hepatic activity, and can be changed by the sexual cycle of fish. The ALP is a lysosomal enzyme present in cells from various tissues, especially in the liver and bone cells (osteoblasts), which participates in the skeleton mineralization of the aquatic animals, and performs membrane transport activities. The increase of ALP concentrations in blood may result from increased osteoblastic activity, cholestasis and chronic disease. It is believed that the highest values of ALP in fishes could be a result from increased fish growth rate Fig 1-3.

Blood chemistry profile

Blood parameters are considered pathophysiological indicators of the whole body and therefore are important in diagnosing the structural and functional status of fish. A number of hematological indices such as haematocrit (Hct), hemoglobin (Hb), red blood cells (RBCs) and so on, are used to assess the functional status of the oxygen carrying capacity of the bloodstream and have been used as indicator of pollution in the aquatic environment Table 1.

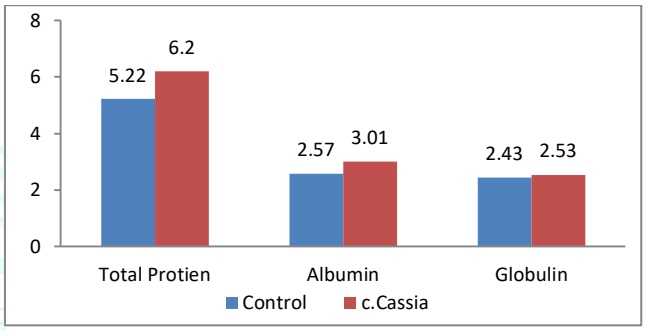

Figure 1: Variation in total protein, albumin and globulin in control and after treatment with *C. cassia*

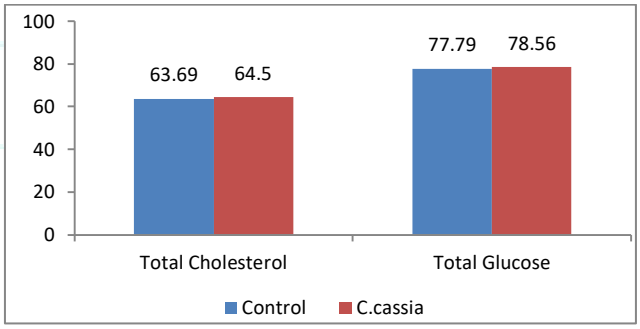

Figure 2: Variation in total cholesterol and total glucose in control and after treatment with *C. cassia*

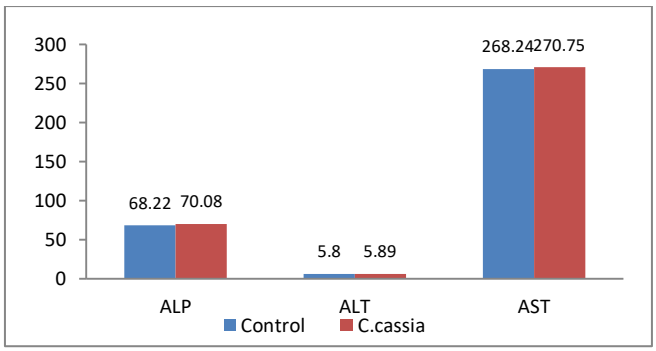

Figure 3: Variation in liver enzymes assay in control and after treatment with *C. cassia*

Table 1 Heamatological profile of control and *C. cassia*

Bloods Parameters	Control (Mean ±S.D.)	*C. cassia* (Mean ±S.D.)
RBC	2.77±0.662	316±0.560
WBC	2.67±0329	2.79±0326
Hb	10.30±0141	11.20±0.218
Hematocrit	29.10±0703	29.55±0.699
MCH	25.54±0.017	26.04±0.442
MCHC	37.06±0135	37.34±0.029
MCV	109.83±1.941	110.96±1.157

DISCUSSION

Heamatological studies done by[8] reported that mercury accumulates in the fish blood. Decline in Haemoglobin and haematocrit was observed in Channa punctatus exposed to Mercury[9]. Literature survey showed that when ethyl mercuric chloride was administered subcutaneously to rats, the metal appeared primarily in red blood cells as 5-methylmercuric cysteine in the haemoglobin molecule [10]. Observed reductions in haemoglobin percentage and red blood cell (RBC) count of the fish Anabas scandens treated with mercury. Decrease in haemoglobin, RBC count and Hct was observed in fish Tinca tinca exposed to mercuric chloride and lead[11].White blood cells play a major role in the defence mechanism of the fish and consist of granulocytes, monocytes, lymphocytes and thrombocytes. Granulocytes and monocytes function as phagocytes to salvage debris from injured tissue and lymphocytes produce antibodies [12, 13]. The liver is subject to potential damage by a wide array of pharmaceutical and environmental chemicals because it is the organ responsible for xenobiotic transformations. Thus, the assessment of toxicity in animals is usually done through such surrogates as the liver function tests. Elevations in serum total and conjugated bilirubin are attributable to liver and/or biliary tract disease [14] .while elevations in ALT and AST are usually due to disruption of hepatic cells as a result of necrosis or altered membrane permeability and elevations in ALP is often elevated due to cholestasis[15]. The data from the liver function tests are corroborated by the histomorphologic changes observed in the liver sections of the test fish, relative to the control fish.

CONCLUSIONS

The present study revealed that some herbs have an important role when use mixing with fish feed to control health issue in edible fishes. The study gives further evidence that there are various chemicals released in ponds were toxic to fish organism and causes changes in biochemical and haematological indices. Therefore, the findings of this study would be of assistance in improving quality of fish feed by incorporating medicinal herbs in order to reduce the incidence of fish liver diseases.

REFERENCES

1. Angel GR, Vimala B, Nambisan B. Phenolic content and antioxidant activity in five underutilized starchy Curcuma species International Journal of Pharmacognosy and Phytochemical Research 2012; 4(2): 69-73.
2. Hooker JD, KCSL CB. The Flora of British India (Hooker) 1894; VI: 211-212.
3. Singh R, Mehta A, Mehta P, Shukla K. Anthelminitic activity of rhizome extracts of Curcuma longa and Zingiber officinale (zingiberaceae). International Journal of Pharmacy and Pharmaceutical Sciences 2011; 3:236- 237.
4. Direkbusarakom S. Application of herbs in aquaculture in Asia. AAHRI Newsletter 2002; 9(2): 3-5.
5. Liping W, Grandhi RV. Efficient safety index calculation for structural reliability analysis. Computers & structures 1994; 52(1): 103-111.
6. Blaxhall PC, Daisley KW. Routine haematological methods for use with fish blood. Journal of Fish Biology 1973; 5: 771-781.
7. Shelke AD. Effect of dietary spirulina platensis on metal distribution in labeo rohita exposed to sublethal concentration of mercuric chloride. Trends in Fisheries Research 2018; 7(3):111-115.
8. Mc KIM J, Olson GF, Holcombe GW, Hunt EP. Long-term effects of methylmercuric chloride on three generations of brook trout (Salvelinus fontinalis): toxicity, accumulation, distribution, and elimination. Journal of the Fisheries Board of Canada 1976; 33(12): 2726-2739.
9. Sastry KV, Sharma K. Diazinon effect on the activities of brain enzymes fromOphiocephalus (Channa) punctatus. Bulletin of Environmental Contamination and Toxicology 1980; 24(1): 326-332.
10. Panigrahi AK, Misra BN. Toxicological effects of mercury on a freshwater fish, Anabas scandens, CUV. & VAL. and their ecological implications. Environmental Pollution 1978; 16: 31-39
11. Shah SL, Altindag A. Hematological parameters of tench (Tinca tinca L.) after acute and chronic exposure to lethal and sublethal mercury treatments. Bulletin of Environmental Contamination and Toxicology 2004; 73: 911-918
12. Ellis EA, Roberts RJ et al. Fish Pathology. Bailliere Tindal, London. 1978; p. 318.
13. Wedemeyer GR, Mcleay DJ. Methods of determining the tolerance of fish to environmental stressors. In Pickering AD (ed) Stress and fish. Academic Press, New York, USA, 1981; 247-275.
14. Vitek L, Ostrow JD. Bilirubin chemistry and metabolism; Harmful and protective aspects. Current Pharmaceutical Design 2009; 15: 2869-2883.
15. Ejike CECC, Alumanah EO, Ezeanyika LUS, Ngene AA, Ojefua EE, Antibiotics administration and its possible liver damage. Biological Research 2008; 6: 351-354.