

Effect of *Curcuma longa* extracts on haematology and biochemical characteristics of *Labeo rohita*

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Abstract

The present work “Haematological and biochemical study for the “Effect of *Curcuma longa* Extracts on *Labeo rohita*.” is an effort to assess the efficacy of herbal drugs on the health status of edible fish by studying the overall changes in haematological and biochemical parameters. The results revealed an increase of 1.78 ± 0.265 g/DL in the protein content and 0.44 ± 0.002 in Albumin in blood plasma in case of *Labeo rohita* treated with herbal feed containing *Curcuma longa* with respect to control groups. An increase in glucose, Cholestral, and Globin was also recorded in fishes fed with the *Curcuma longa*. While ALT, AST and ALP doesn't show much increase than controlled fish.

Keywords: *Curcuma longa*, cholesterol, globin, *Labeo rohita*

Introduction

Turmeric (*Curcuma longa*) belongs to Zingiberaceae family, possessed rhizomes, which been used as an additive with pharmaceutical characteristics and widely distributed in warm areas of Asia (i.e. India, Pakistan, Indonesia, southern part of China), Africa, and south America. It has been extensively exported from India, Indonesia and China. The turmeric powder contains of 6.3% protein, 5.1 % lipid, 3.5% mineral, 69.4% carbohydrate, 13.1% moisture and 5% curcuminoids, 50-60% of which are a mixture of curcumin (diferuloylmethane), monodesmethoxy curcumin and bis desmethoxy curcumin (Chattopadhyay *et al.*, 2004; Innocent, 2008; Sivagurunatan *et al.*, 2011) [5]. The anti-inflammatory, cholesterol reducing, and anti-oxidation characteristics of Turmeric have been reported by Chattopadhyay *et al.* (2004) [5]. Moreover, the anti-carcinoma and antibacterial and antifungal functions of this herbal additive have been expressed through previous researches (Banerjee and Nigam 1987; Apisariyakul *et al.*, 1995; Kumar *et al.*, 2001) [2, 1]. Turmeric affected liver and stimulates the secretion of bile, Lipase, Maltase, Amylase, Trypsin and also stimulates activity of the pancreas, and protecting the RBCs (Bhavani shankar *et al.*, 1979; Platel and Srinivasan 1996 & 2000; Srinivasan, 2005) [4]. The effect of Turmeric has been evaluated on Immune stimulatory response of fish *Labeo rohita* as an effective compound (Behera *et al.*, 2011) [3]. Manju *et al.* (2011) [11] Reported that curcumin had a protective effect on Bloch tissue and increase the growth performance. In this regard, the consumption of turmeric by fantail guppy (*Poecilia reticulata*) caused the reduction of FCR and improvement of growth performance (Mukherjee *et al.*, 2009 [12], Bahr and Saad (2008) [6] evaluate the effect of turmeric on hematological and immunological parameters of *Mugil cephalus* vaccinated with *Aeromonas hydrophila* bacterin; this synergistic effect were also investigated on Japanese flounder (*Ji et al.*, 2007) and Nile Tilapia fingerlings (El-Maksoud *et al.*, 2002) [7] fed by diet supplemented with turmeric. The aim of the present study was to evaluate the hematological and biochemical effect of *Labeo rohita* by turmeric powder (*c.longa*). Hematological techniques are

regularly used for assessment of the health of fish and for diagnosis of disease and other conditions. Houston *et al.* 1971 reported changes in the blood parameters of fresh water fish.

Material and Method

The live specimens of fresh water fish *Labeo rohita* were collected from local fisherman of Bhopal and acclimated for 7 days in lab conditions. 24 live fishes (irrespective of sex and almost medium size group) were taken and brought to the laboratory. Fishes were divided into 2 groups of 12 each and were kept in glass aquaria; each containing 20 liters stored dechlorinated tap water.

Biostatistical Analysis

All data were calculated as Mean \pm SD/SEM.

Results

The protein content in the *Labeo rohita* fishes of control groups showed the level of protein (5.22 ± 0.117) g/DL and in case of *Labeo rohita* treated with herbal feed containing *Curcuma longa* showed much increase in protein content (7.00 ± 0.382) g/DL. while as The concentration of albumin in blood plasma substantially fluctuated in case of *Curcumin longa* treated *Labeo rohita*, the content of albumin in blood is basically (3.01 ± 0.100) g/DL higher than that of control group (2.57 ± 0.098) g/DL.

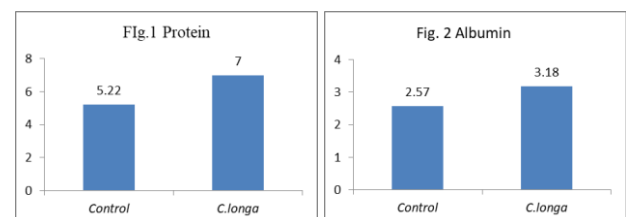


Fig 1 and 2: Protein level in liver and Albumin in liver after treatment with herb *Curcuma longa* in *Labeo rohita*.

Globulin levels in the fishes treated with the herb feed fishes does not vary with respect to the control group (Fig. 3),

however the cholesterol level in case of treated group showed slight increase with respect to that of controlled group (Fig.4).

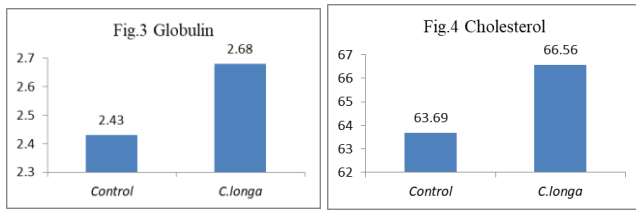


Fig 3 and 4: Globulin and Cholesterol level in liver after treatment with *Curcuma longa* in *Labeo rohita*.

The glucose level in *Labeo rohita* treated with *Curcuma longa* (77.50 ± 1.488) g/DL did not show much significant change as compared to control group (77.79 ± 0.674) g/DL. The level of ALP in the *Labeo rohita* fishes of control groups will be observed as (68.22 ± 0.848) g/DL and when *Labeo rohita* treated with herbal feed containing *Curcuma longa* showed much increase in ALP level (70.16 ± 0.251) g/DL.

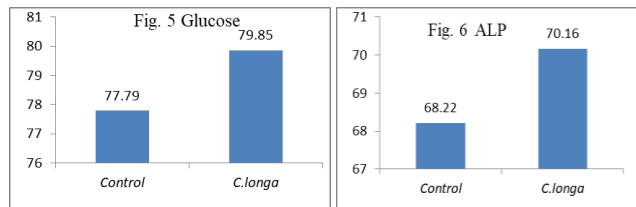


Fig 5 and 6: Glucose and ALP level in liver after treatment with herb *Curcuma longa* in *Labeo rohita*.

The ALT and AST level of *Curcuma longa* treated group (6.16 g/DL) and (274.42) showed a slight increase as compared to the controlled group (5.8 g/DL) and (268.24 g/DL). Mean corpuscular haemoglobin concentration (MCHC) was expressed in terms of g/dL. when treated *Curcuma longa* the MCHC count was found to be 37.99 ± 0.0681 . Mean corpuscular volume (MCV) was 109.83 ± 1.941 in control group and when treated *Curcuma longa* the MCV count was found to be 112.00 ± 0.894 .

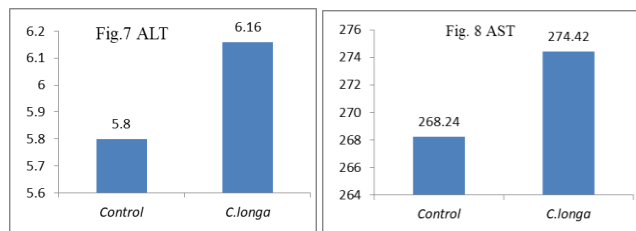


Fig 7 and 8: ALT and AST level in liver after treatment with herb *Curcuma longa* in *Labeo rohita*.

Discussion

In the present study, the protein content in the *Labeo rohita* fishes of control groups showed the level of protein (5.22 ± 0.117) and when feed along with *Curcuma longa* showed much increase in protein content (7.00 ± 0.382) as shown in Fig. 1. Estimation of protein content in the blood plasma is a good indicator for the stress and pollution. Fish under stress situation may also activate protein to meet energy demand to maintain better physiological activity (Martinez *et al.*, 2004). Rivarola and Balegno, 1991

investigated that the decrease in plasma protein in animals exposed to toxicants leads to changes in protein and free amino acid metabolism. According to Shakoori *et al.*, 1990 the reduction of protein level in blood may be due to low activity of protein synthesis and degradation. The concentration of albumin in blood plasma can substantially fluctuate. Like, in the case of feed of, *Curcuma longa* treated *Labeo rohita*, the content of albumin in blood is basically (3.01 ± 0.100) higher than that of control group (2.57 ± 0.098) as shown in fig 2. The fluctuations of albumin level depend on the degree of treatment and other factors. The glucose level in *Labeo rohita* treated with, *Curcuma longa*, (77.50 ± 1.488) did not show much significant change as compared to control group (77.79 ± 0.674).

The alteration in glucose concentration is directly related to toxicants in fishes. As per the literature survey, the elevated blood glucose level i.e hyperglycemia is indicator of carbohydrates metabolism disturbance which is due to the breakdown of glycogen in liver. The increased concentration of glucose resulted in disproportion between hepatic glucose output and peripheral sugar uptake (Afaghi *et al.*, 2007).

The present results showed that liver transaminase enzyme ALT and AST levels in *Labeo rohita* were significantly higher in comparing with control groups as shown in fig 5. For example, the high ammonia levels of fish may lead to high transaminase activities; therefore, the increase in activities may be associated with liver disease or changes in plasma ammonia concentration. High activities of AST also occur in muscle of fish; therefore, elevated plasma activities of these enzymes will increase following muscle injury or strenuous muscle activity associated with capture and restraint. In the present study, the level of ALP in the *Labeo rohita* fishes of control groups was observed as (68.22 ± 0.848) and when feed along with the herb *Curcuma longa* showed much increase in ALP level (70.16 ± 0.251) The ALT and AST level in *Labeo rohita* treated with *Curcumin longa* did not show much significant change as compared to control group.

Hematological techniques are regularly used for assessment of the health of fish and for diagnosis of disease and other conditions (Blaxhall, 1972; Blaxhall and Daisley, 1973). Houston *et al.* 1971 reported changes in the blood parameters of fresh water fish exposed to various handling procedures before experiment and the effect of stress on the fish. The disrupted haematological parameters observed in the present experiment concurred with the findings of Akinbulumo, 2005 who reported that the fish showed a toxic reaction to *Derris elliptica* root powder by surfacing jaws and becoming stupefied.

Conclusion

Although Curcumin has recently gained much attention for its therapeutic potentials in traditional Indian medicine for human uses owing to low toxicity and large biological activities, the pharmacological potential of turmeric remains under investigation (Aggarwal and Aggarwal 1971). Haematological study on fish has a long and impressive history. The first contribution to the subject came from Gulliver in 1845 who reported size of the red corpuscles from various vertebrates. A great volume of literature and an equally great wealth of knowledge on the haematology of fishes have piled up for the past 150 years, yet we lack complete scientific satisfaction. Histopathological changes

in *Labeo rohita* have been widely used as biomarkers in the evaluation of the tissues exposed to contaminants. One of the great advantages of using histopathological biomarkers in assessing the health which itself expressed the organ specific morphological changes.

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