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Haematological and Biochemical studies of the Labeo rohita: Effect of *Curcuma amada.*

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Abstract
The present research is an attempt to assess the effectiveness of herbal drugs on the health status of edible fish by studying changes in haematological and biochemical parameters The results revealed an increase of 0.72 ± 0.235g\DL in the the protein content and 0.44±0.002 g\DL in Albumin in blood plasma in case of *Labeo rohita* treated with herbal feed containing *Curcuma amada* with respect to control groups but show decreased content of glucose, Cholestral, ALT and Globin. While, AST and ALP doesn't show much increase than controlled fish.

Keywords: Haematology, Curcuma amada, Labeo rohita

Introduction
Development of aquaculture mainly depended on availability of compatible and suitable diets. Nutrition and feeding play a central and essential role in the sustained development of aquaculture and, therefore, fertilizers and feed resources continue to dominate aquaculture needs Many of medicinal herbs and their chemical components are used as an immunostimulants which are used in artificial diet preparation, aquaculture research and their practices. Many of the herbal plants have the ability to inhibit the microbial pathogens and activate the immunity (Immanuel *et al*., 2004; [6] Chansue *et al*., 2000: Dugenci *et al*., 2003) [4]. Medicinal plants have been used in various traditional systems, as they have immune potential against numerous diseases (Kottai Muthu *et al*., 2005) [7]. The analysis of blood indices has proven to be a valuable approach for analyzing the health status of farmed animals as these indices provide reliable information on metabolic disorders, deficiencies and chronic stress status before they are present in a clinical setting (Bahmani *et al*., 2001) [1]. Blood biochemistry parameters can be also used to detect the health of fish (De Pedro *et al*., 2005) [3]. A small percentage of all plants species have been studied to some extent for the presence of secondary metabolites despite the knowledge of occurrence of about 100,000 plant secondary metabolites (Verpoorte *et al*., 2000) [12]. These compounds can be considered as backbone of many modern pharmaceuticals as the medicinal plants contains specific metabolites which produce a definite physiological action on the fish body. Turmeric (Curcuma longa Linn.), a medicinal plant, has been used for thousands of years in Indian Ayurvedic medicine. Components of turmeric are collectively termed as curcuminoids, which mainly include curcumin (diferuloyl methane), demethoxy- curcumin and bisdemethoxy-curcumin. However, the major biologically active component of turmeric is curcumin, which is a yellow phytochemical, hydrophobic and polyphenolic compound (Sahdeo Prasad and Bharat).

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 of dechlorinated tap water. The biostastical data were calculated as Mean ± SD/SEM.

Results
The protein content and Albumin level in the *Laboe rohita* fishes of control groups showed the level of protein (5.22±0.117) g\DL and(5.74±0.352) g\DL while in case of Labeo rohita treated with herbal feed containing *Curcuma amada* there is no significant increase in protein content and albumin (2.57± 0.098) g\DL as compare to control and (2.74±0.352 g\DL.

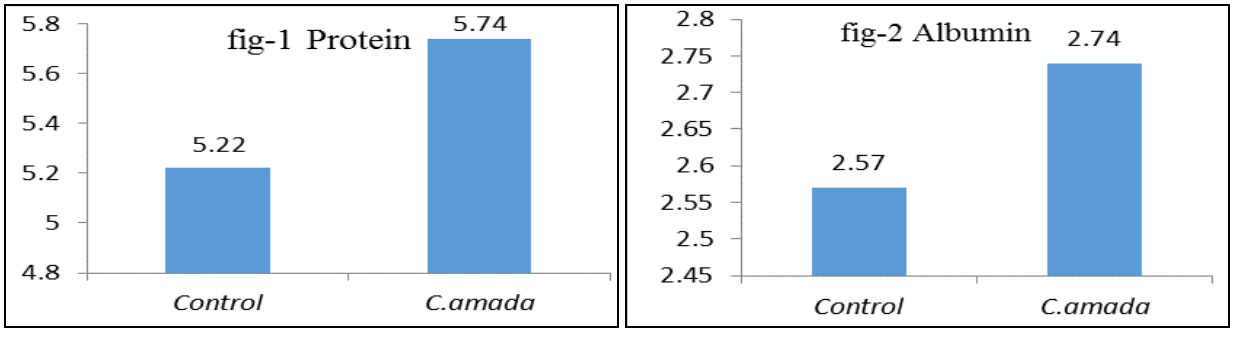

Fig 1 & 2: Protein and Albumin level in liver after treatment with herb Curcuma amada in Labeo rohita.

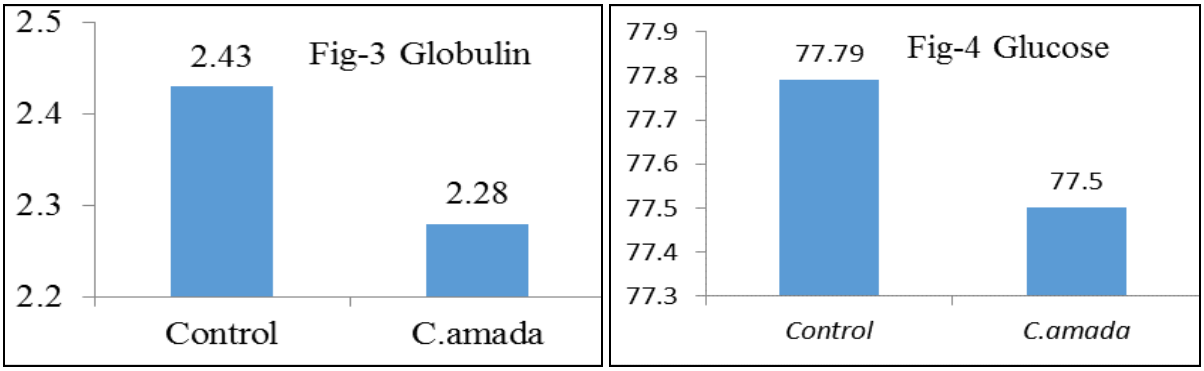

Fig 3 & 4: Globulin and Glucose level in liver after treatment with *Curcuma amada* in *Labeo rohita.*

The globulin level of *Curcuma amada* treated group slightly decreases(0.15 g\DL)as compared to the controlled value likewise the glucose level(0.29 g\DL) in the treated group and the controlled group also decreased as indicatve in fig. 3 & 4

Where the globulin level in the controlled group was reported as 2.43 g\DL and in the treated group was 2.228 g\DL, and in case of glucose these values were 77.79 g\DL and 77.5 g\DL respectively in controlled and treated groups.

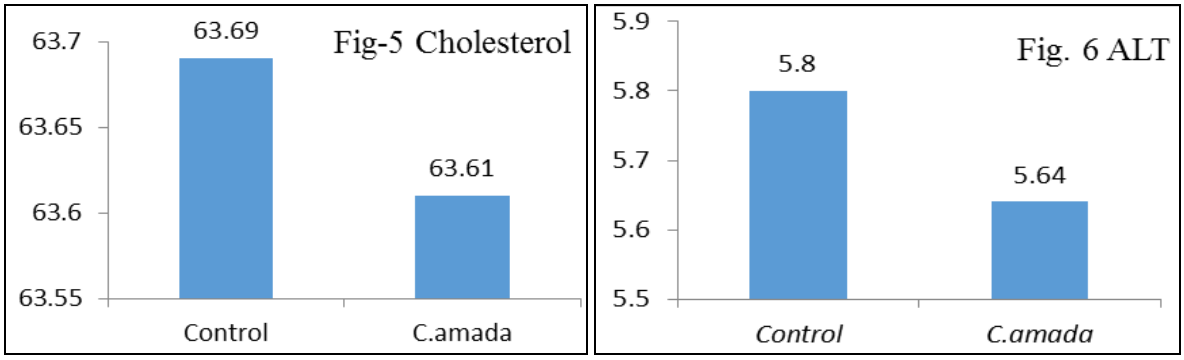

Fig 5&6: Cholesterol and ALT level in liver after treatment with herb Curcuma amada in Labeo rohita.

The ALT and cholesterol level in *Labeo rohita* treated with, *Curcumin amada* did not show much significant change as compared to control group (Fig 5 & 6). The ALT count slightly decreased (0.16 g\DL) in treated fish likewise the cholesterol count (0.08 g\DL) as compared to controlled fish.

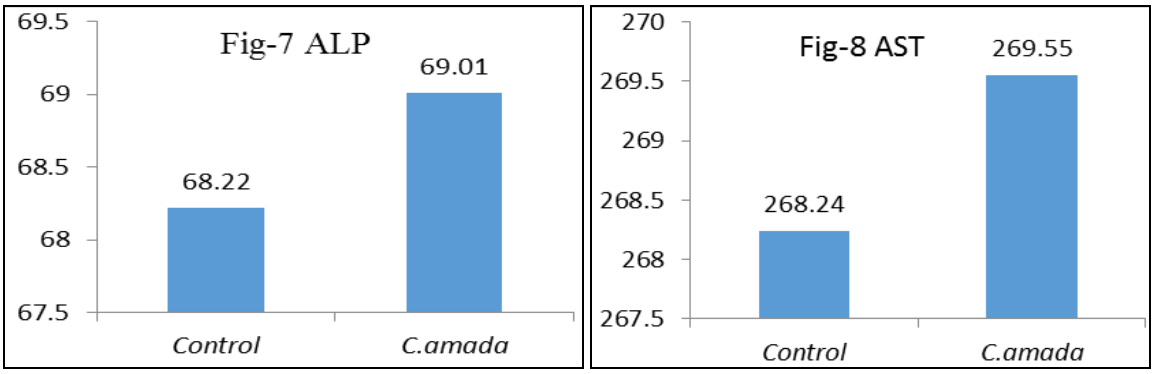

Fig 7 & 8: ALP and AST level in liver after treatment with herb Curcuma amada in Labeo rohita.

The level of ALP and AST in the *Laboe rohita* fishes when treated with *Curcuma amada* there is no significant increase in ALP and AST content as compare to control.The ALP and AST value increases as (0.79 g\DL) and (1.31 g\DL) as that of the controlled values (68.22 g\DL) and (268.24 g\DL).

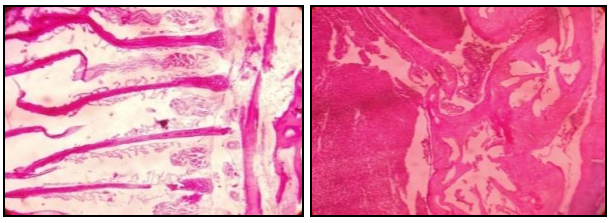

Fig 9&10: Histology of Liver in *Curcuma longa* treated group vs Control Group.

Discussion

In the present work, the formulation of fish meal with herbals extract *Curcuma amada*, in fishes was studied using various physiological, biochemical, haematological and histological parameters. Although there is no such comparative study of fish feed reported in the literature, especially with plant extracts, it does not indicate that the presence of such plant in meal is either harmful or not harmful to fish species. We hypothesized, that incorporation of herbs in feed are optimized in terms of digestibility to maintain growth performance and health status of fish compared to fish fed with a fish meal based diet. Diets were produced for the digestibility trial including Curcumin amada,. A number of a different biochemical tests have been analyzed such as cholesterol, glucose, total proteins, alkaline phosphatase, liver function tests etc, shows a significant improvement in fish treated with *Curcumin amada*, when compared to normal control group which was not very significant. Thus, changes observed after treatment with herbs indices improvement In the present study, the protein content in the Laboe rohita fishes of control groups showed the level of protein (5.22±0.117) and when feed along with the herb Curcuma amada there is no significant increase in protein content was found as compare to control (5.74±0.352) as in fig-1. The concentration of albumin in blood plasma can substantially fluctuate. The albumin in control group was (2.57± 0.098). The fluctuations of albumin level depend on the degree of treatment and other factors. While in the other treatment groups, the albumin level was found (2.74±0.176) in Curcuma amada treated group. Energy and dry matter digestibility significantly increases when feed is prepared by using herbs. It has been observed, that the nutritional quality of simple rapeseed products was below that of fish meal, mainly due to antinutritional factors present in rapeseed products (Francis *et al*., 2001) [5]. The glucose level in *Labeo rohita* treated with, *Curcumin amada*, (79.85± 0.984) 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. Blood glucose level may vary according to season and water temperature, and glucose level in fish decreased with age and size. Also, changes in blood glucose have been suggested as useful general indicator of stress in fishes. Literature reported that blood glucose appeared to be a sensitive indicator of environmental stress in fish. The faster decrease in blood glucose reflected that the glucose absorbed from feed was not only transformed into energy, but was also absorbed into energy reserves in the form of glycogen in the liver and muscles which is mediated by the hormone insulin). The present results showed that liver transaminase enzyme AST levels in *Labeo rohita* were significantly higher in comparing with control groups but ALT show slight decreased value as of controlled as in fig 6. 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 *Laboe rohita* fishes of control groups will be observed as (68.22±0.848) and when feed along with the Curcuma amada there is no significant increase in ALP content (69.01±0.696) was found as compare to control (68.22±0.848). Hematological techniques are regularly used for assessment of the health of fish and for diagnosis of disease and other conditions (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. Lymphocytes are the most numerous cells comprising the leucocytes, which function in the production of antibodies and chemical substances serving as a defence against infection In addition, the increase in values of leucocytes could probably indicate that the fish were less stressed by the increasing concentrations of tobacco dust because leucocyte profiles are altered by stress and can be directly related to stress hormone levels. 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 [9] 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

Conclusions

In the light of the present study, it is obvious that inclusion of herb *Curcumin amada*, in fish feed did not show alterations in haematological profile of *Labeo rohita* as compare to control. Hematology furnishes an index of the physiological position of fish and the use of blood picture of fish is an impressive tool for detection of alterations in the practical state of the organisms. This work provides positive evidence that herbs extract incorporated with fish meal could be an alternative to satisfy the diet requirement of fish. The composition of fish feed obtained from this study can be used as guidelines for formulation of rich quality fish feeds for all species of fishes in the future work.

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