Journal of the Indian Fisheries Association
25, 1995 (Proc.Nat.Symp. Aquacrops), 113-117

EFFECT OF FERTILIZER CARBAMIDE ON PROTEOLYTIC ENZYMES OF FISH *LABEO ROHITA*

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Specific activities of acid, alkaline and neutral proteases in liver, muscle, brain, and gill of fish exposed to 50 ppm ambient carbamide for 15, 30 and 60 days and in control were estimated. It was observed that carbamide even at low concentration of 50 ppm inhibited proteolysis and favoured protein synthesis.

Proteolytic enzymes of animal tissue have been a subject of interest and research since many years. Proteases are mainly of acidic, alkaline and neutral based on their specificity in action with reference to optimum hydrogen ion concentration. The degradation involved in the continuous turnover of cellular proteins which are mediated by proteases is not clear (Young, 1970; Schimke, 1973). Information on catheptic enzymes from tissues of mammals (Barrett, 1977) is voluminous but scant on those of aquatic species. Lysosomal proteases show main role in cellular protein degradation (Ballard, 1977; Marzella *et al.*, 1981). A cell when exposed to new environment alters the protein composition. Proteolysis indicates tissue degeneration resulting in cellular and biochemical functions. The protease activity of tissues is known to increase in various physiological and pathological conditions. Hence, an attempt has been made to study the effect of carbamide on different proteases of *Labeo rohita*.

Labeo rohita (20±2 g) brought from local fisheries department and maintained in the laboratory at 28±2°C and photoperiod of 12hr darkness and 12 hr light, were used in the present investigation. They were fed with 1:1 ratio of ground nut oil cake and ricebran, the quantity being 2% of the body weight. Carbamide at a concentration of 50 ppm was selected as an experimental dose after due standardisation. Proteases were assayed by the method of Davis and Smith (1955). Statistical significance of the difference between control (c) and experimental (E) values was calculated using Students 't' test (Pillai and Sinha, 1968).

The specific activities of acid, alkaline and neutral proteases was found to decrease in different tissues of fish exposed to 50ppm of carbamide for 15,30 and 60 days (Fig. 1,2 and 3). Acidic protease during the initial 15 days showed an increased activity but on exposure to carbamide for 30 and 60 days de-escalation was observed in all tissues (Fig. 1). Carbamide exposure decreased

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the specific activity of alkaline protease in all tissues during the entire period of exposure (Fig. 2). The responses of neutral protease to carbamide, exhibited slight elevation on 15 days but subsequent decrement in liver, gill, muscle and brain tissues in 30 and 60 days was observed (Fig. 3).

Proteases in *L. rohita* were estimated for assessing the possible involvement of tissue proteases in the regulation of protein metabolism under carbamide stress. Inhibition of proteolytic activities is a regulatory step towards inhibiting the tissue proteolysis (Rajyasree, 1984). The observed trends in the activity levels

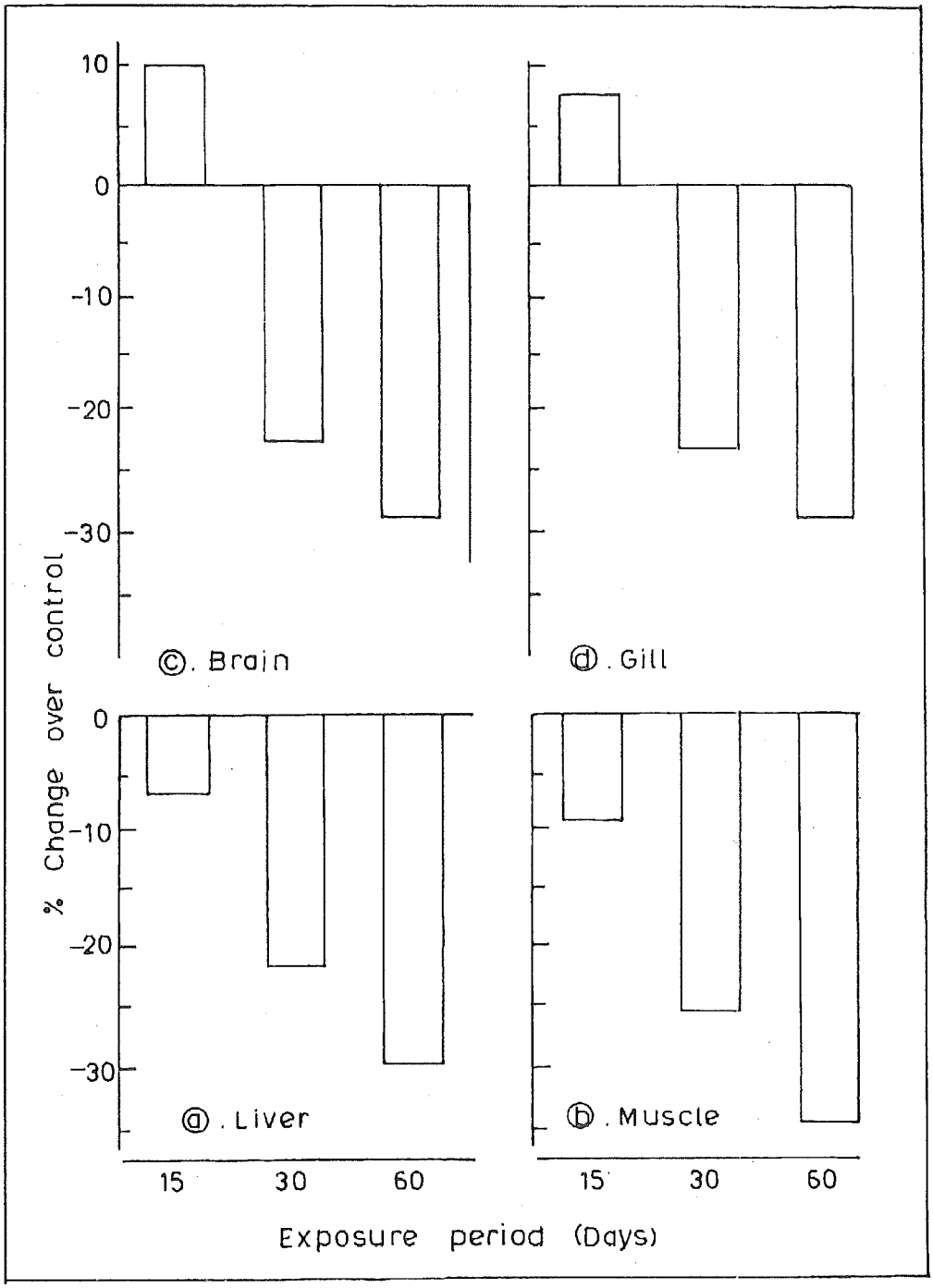

Fig. 1 : *Activity of acidic protease on different tissues of L.rohita exposed to carbamide*

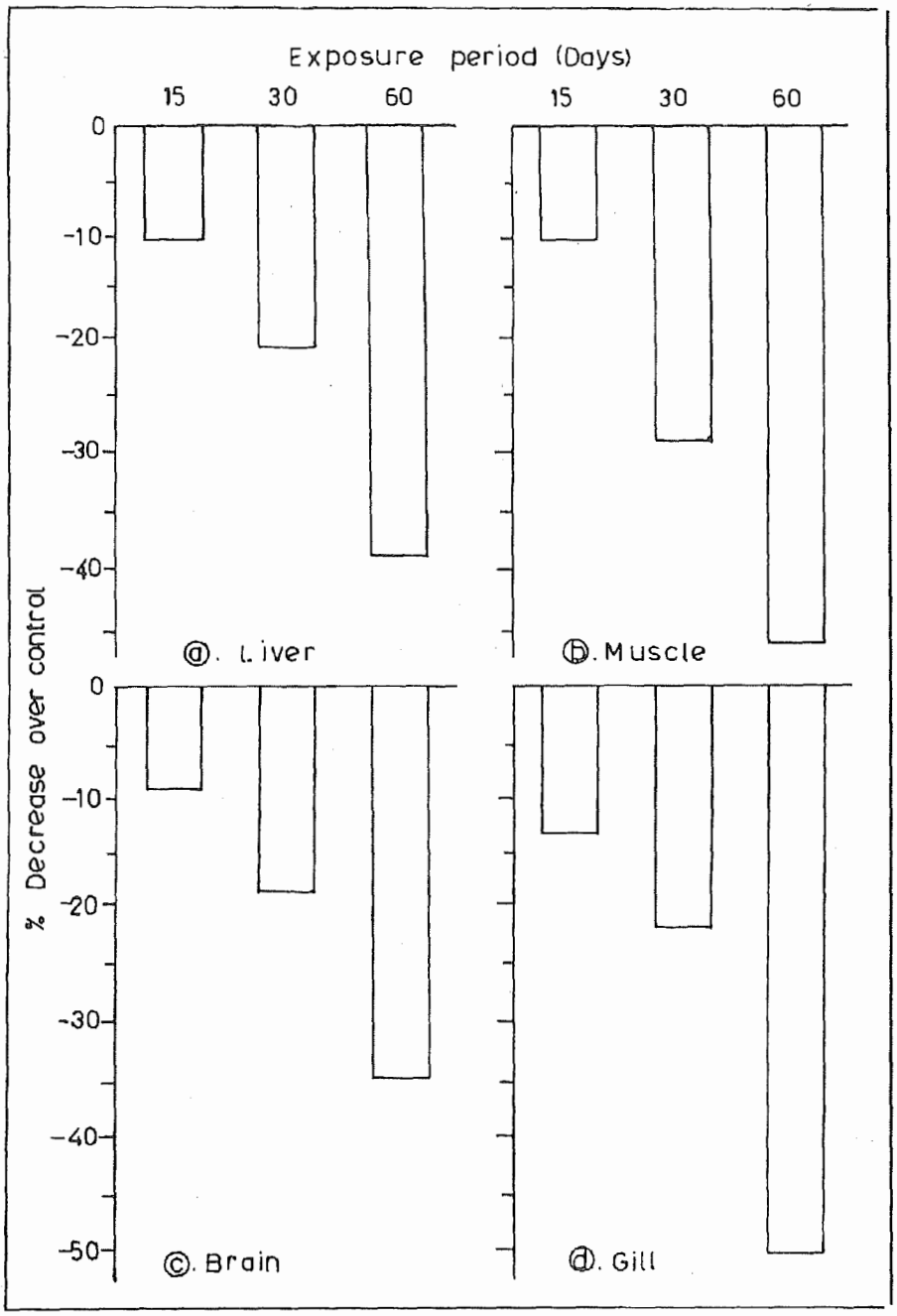

Fig. 2 : *Activity of alkaline protease on different tissues of L.rohita exposed to carbamide*

of proteases was indicative of low degree of regulation on the tissue proteolysis, probably oriented towards maintaining the integrity of the structures. Decrease in activity levels of proteases suggests decreased proteolysis thereby decrease in the extent of structural disintegrations during carbamide stress. Under normal condition the native and denatured proteins of the tissue exists in equilibrium (Surugi and Ogata, 1977). Thus initial increment in protease may be due to increased succeptability of protein content (denatured) and enhanced activity could be the result of higher protein turnover. As an acid proteases is a lysosomal enzyme decreased acidic protease might be due

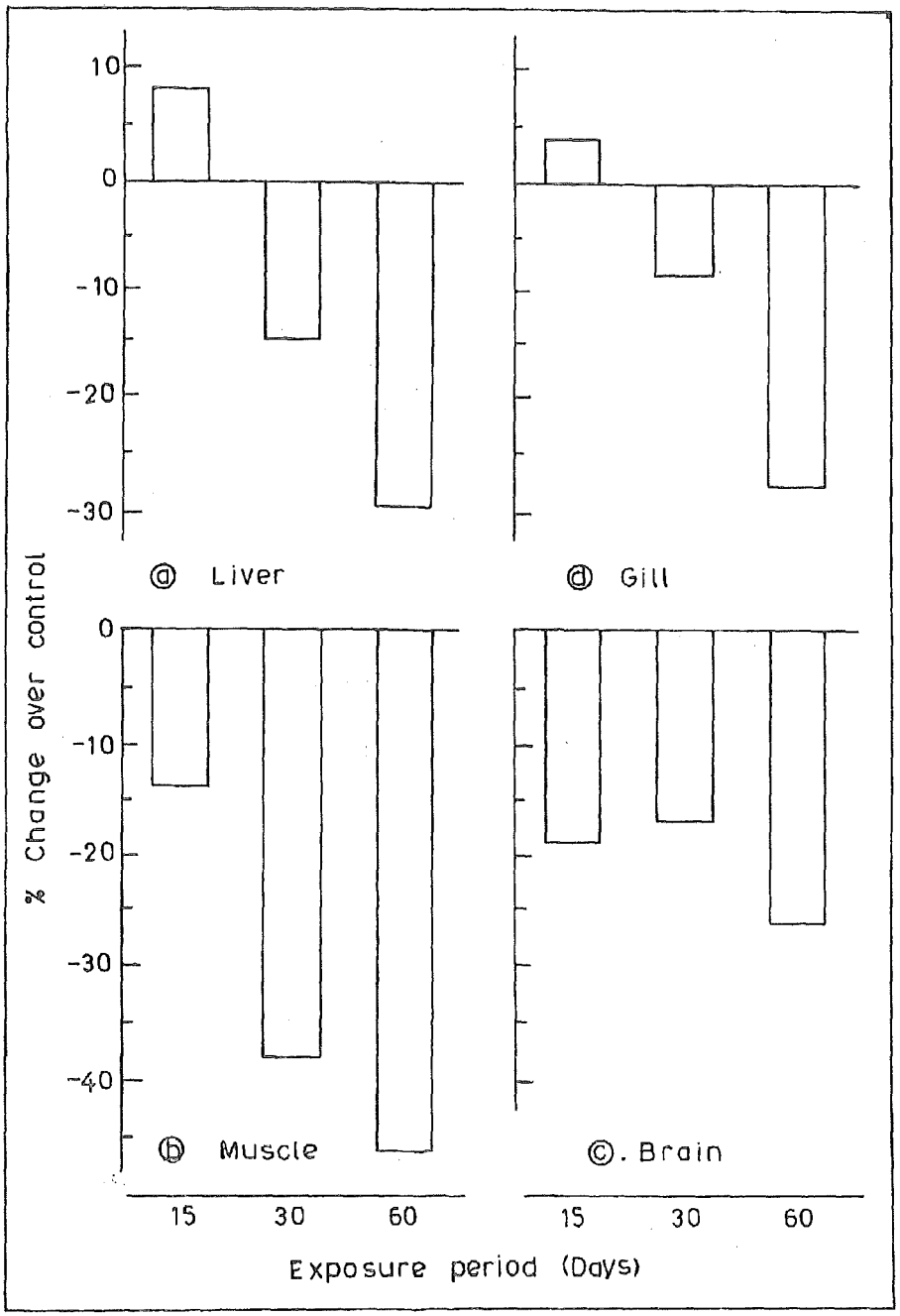

Fig. 3 : *Activity of neutral protease on different tissues of L.rohita exposed to carbamide*

to inactivation of enzyme or less effect of carbamide on lysosomal structure. Though there was initial increment in proteolytic enzyme, the decrement in prolonged exposure suggested the possibility of elevation of protein turnover to regulate both the enzyme synthesis and degradation (Martin, *et al.*, 1981). Neutral protease (or) physiological protease are ii volved in breakdown of proteins ready for the formation of Free Amonio Acids. The elevation in neutral proteases of liver and gill appeared to be advantageous to the animal since these organs remain intact without being disrupted by protease and thus maintenance of structural organisation. to a great extent i.e., the protein

breakdown was not favoured at neutral pH. Initial increment shows metabolic significance in bringing out possible physiological compensation to carbamide stress. Alkaline protease acts during process of protein degradation (Mayer *et al.*, 1974). In order to inhibit protein degradation the alkaline protease might have decreased and less contribution of alkaline proteases to increased protein metabolism is suggestive.

Thus the proteases in general showed a decreasing trend on carbamide stress suggesting greater maintenance of structural integrity and lesser degradation of the tissue protein.

ACKNOWLEDGEMENTS

The first author is thankful to The C.S.I.R., New Delhi for financial support through a Research Associateship.

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