EFFECT OF SAGO EFFLUENT ON THE GROWTH HORMONE LEVELS IN *CLARIAS BATRACHUS* BLOOD SAMPLE

Abstract: The aim of the study was to determine the effect of Sago effluent on the levels of growth hormone in the blood samples of the fresh water fish *Clarias batrachus.* The fish were exposed to control and different concentrations of treated sago effluents. The concentrations chosen were 25%, 50% and 75% of treated sago effluent. The levels of the growth hormone were increased in the blood sample of the experimental fish *Clarias batrachus*, when compared with that of controls.

Keywords: Growth hormone, Sago effluent, fish, *Clarias batrachus*.

Introduction

The aquatic environment is the ultimate sink for all the environment pollutants any chemical pollutant either natural or synthetic is most likely to reach the aquatic environment sooner or later. The toxicity may be either acute or chronic to all forms of biota in aquatic system and also varies to different aquatic organisms. The toxic effects may include both lethal and sublethal concentrations, which may change the growth rate, development, reproduction, histopathology, biochemistry, physiology and behavior [1]. Alterations in the physiological and biochemical parameters of toxicant treated fish have recently emerged as an important tool for the water quality assessment and to know the pathological status of fish in the field of environmental toxicology [2, 3]. The alteration in various physiological and biochemical parameters of an aquatic animal due to exposure of different toxicant has been shown to be directly or indirectly related to the behaviour, immune system, neurotransmission, energy metabolism and reproduction [4, 5]. Accumulation of the environmental pollutants and toxicants has been shown to cause alteration in the activity of many enzymes concerning to cellular energy metabolism [6, 7, 8, 9]. Alteration in enzyme activities of the fish is one of the major biomarker indicating the level of changes consequent of pollutants in the tissues, organs and body fluid of the fish that can be recognized and associated with established health impairment process [10]. Moreover, Gabriel and Akinrotimi [11] noted that enzymes can be used to confirm and asses fish exposure to toxicants, providing a link between external and internal structure and degree of responses to toxicant exposure observed between different individuals. However, the applications of enzyme determinations in fish, as an indicator of chemical intoxication seem to be promising. It is most relevant and appropriate in sublethal exposure which spans over many days [12]. Toxicants also can inhibit the activity or synthesis of enzymes[13], resulting in decreased activities in the organs.

Growth hormone is a major participant in control of several complex physiologic processes, including growth and metabolism. Growth hormone is also of considerable interest as a drug used in both human and animals. Growth is a very complex process and requires the coordinated action of several hormones. The major role of growth hormones in stimulating body growth is to stimulate the liver and other tissues to secrete IGF – 1. IGF – 1 stimulates proliferation of chondrocytes (cartilage cells), resulting in bone growth. Growth hormone has important effects on protein, lipid and carbohydrate metabolism. Growth hormone is the primary hormone responsible for stimulating tissue repair, cell replacement, brain function and enzyme production [14].

Fish are sensitive indicators of pollutants present in water. These pollutants cause various physiological and physical alterations in fishes. In the present work an attempt has been taken to study the alterations in the levels of Growth hormone in the blood sample of the fresh water fish *Clarias batrachus*.

Materials and Methods

The Sago industry effluents were collected from a private Sago industry, situated at Ponnachi near Ammapet of Erode District, Tamil Nadu, India. The effluent from the industry was collected and transported to the laboratory and used for further experiments following standard method. Fingerlings of healthy *Clarias batrachus* were brought to the laboratory and acclimatized for 15 days. The fish were well fed during the acclimatized period. Then fish were exposed to control and 25%, 50%, 75% concentrations of treated sago effluents for period of 28 days. Feeding was stopped one day before commencement of the experiment.

After the experimental period the fish exposed to sago effluent were sacrificed. Blood samples were collected from the caudal vein by using the hypodermic micro syringes pre-rinsed with heparin. Blood was centrifuged at 3200 rpm for 15 min and plasma was stored at -26°C until it was used for the estimation of plasma cortisol and growth hormone. The growth hormone level was estimated by ELISA method.

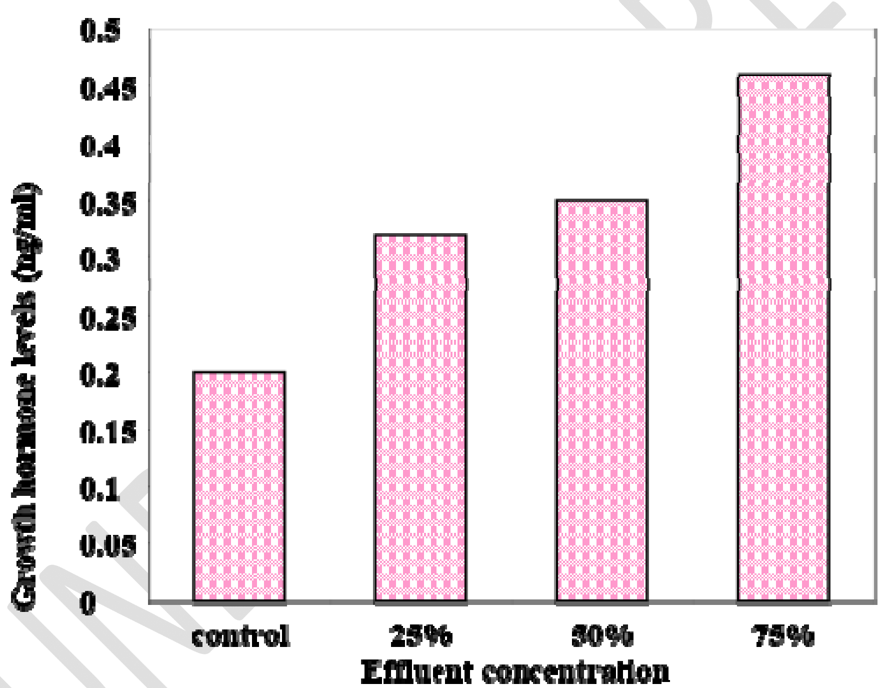
Results

The growth hormone level in the muscle of *Clarias batrachus* was increased with increase in the concentrations of treated sago effluent. The control fish were able to record 0.20ng/ml and the fish treated with the effluents recorded 0.32 ng/ml for 25%, 0.35 ng/ml for 50% and 0.46 ng/ml for 75% respectively.

Table.1. Levels of Growth Hormone in the blood sample of *Clarias batrachus* exposed to control and different concentrations of sago effluent.

Effluent Concentration	**Growth Hormone level ng/ml**
Control	0.20 ng/ml
25%	0.32 ng/ml
50%	0.35 ng/ml
75%	0.46 ng/ml

Fig.1. Growth Hormone levels in the blood sample of *Clarias batrachus* on exposure to control and different concentrations of treated sago effluent.



Discussion

Growth hormone affects almost all body tissues. Growth Hormone is considered as a master hormone which controls many organ and body function. It also regulates itself. The rejuvenating effects of Growth Hormone are all encompassing, acting on both the mind and body.

Growth hormone is the primary hormone responsible for stimulating tissue repair, cell replacement, and brain function and enzyme production. Growth hormone is the ultimate anti-aging therapy and affects almost every cell in the body, rejuvenating the skin and bones, regenerating the heart, liver, lungs and kidneys, bringing back organ and tissue function to more youthful level.

Growth hormone (GH) has multiple targets and diverse effects in vertebrates. It is a principal promoter of growth, and also influences the metabolism. During the past years, it has become clear that GH alters the behaviour of fish as it increases appetite, swimming activity, aggression, and reduces anti-predator behavior [15].

Lescroart [16] have reported that the several neurotransmitters and intraperitoneal injections induce the secretion of growth hormone and increase in plasma Growth hormone levels in the African Cat fish (*Clarias gariepinus*) by sensitive radio immuno assay.

Peterson et al. [17] have studied the effect of recombinant bovine growth hormone (rbGH) on growth rate, feed efficiency, body composition and insulin-like growth factor binding proteins (IGFBPs) in Norris.

The scientists have discovered few synthetic growth hormones like methyl testosterone and ethyl estradiol, which evidences that the synthetic growth hormone promotes weight in several fishes.

The fish *Betta splendeus* were given 17α methyl testosterone at different dietary levels under laboratory conditions for 15 days. The maximum growth was found in methyl testosterone treated fish than the control fish [18]. Higher dose of methyl testosterone induced growth in different fish species was reported by various studies [19, 20, 21].

Sumera et al. [22] have studied the changes in growth hormone and cortisol profile due to lead induced toxicity in *Labeo rohita* and according to their study; Pb acts as endocrine disruptor and has profound influence on the hormonal profiles and specific growth rate of carp. El-Shebly [23] reported that exposing fish to Pb significantly interferes with the activity of serum GH.

Moreover, exposure to toxicants disrupts hormone signaling cellular pathways favoring the findings of present study [24].

Conclusion

The above findings and the results of the present study indicates that the growth hormone levels in the fish has increased with increasing the concentrations of the effluent. This could be due to some toxicants which is present in effluent could have acted as endocrine disruptor and had profound influence on the hormone levels.

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