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Research Article

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Biochemical changes during gonadal maturation in *Poecilia reticulata* due to Natrum muriaticum

C. Sudha*
Research Scholar, Department of Zoology, National College, Trichy, Tamilnadu, India
*Corresponding Author E-mail: sudhagoutham@gmail.com

ABSTRACT

Poecilia reticulata were sampled to ascertain the effect of natrum muriaticum of 30c potency of three different dilutions of 0.05%, 0.03% and 0.025% for a period of 96 hrs and 168 hrs. The amount of protein and lipid was determined in the ovary of the fishes. There was a significant difference in the protein and lipid at 0.025% dilution when the fishes were exposed to 96 hours duration.

Keywords: *Poecilia reticulata, Natrum muriaticum 30c potency, 0.05%, 0.03% & 0.025% concentrations, Biochemical changes.*

INTRODUCTION

Ornamental fish keeping is becoming popular as an easy and stress relieving hobby. About 7.2 million houses in the USA and 3.2 million in the European Union have an aquarium and the number is increasing day by day throughout the World. Ornamental fish farming is also growing to meet this demand[1]. In order to meet this demand many modern techniques are used. Now- a-days fish culturists who wanted to induce breeding with hormones[2]. The cost of modern medicine which is rising higher on account of progressive specialization, sophistication of diagnostic techniques and apparatus has increased its popularity. Natrum muriaticum is one of the oldest medical sciences and utilizes indigenous drugs of either plant or mineral origin for treatment of diseases. Natrum muriaticum is a homeopathic medicine of mineral origin. It is effectively used to treat lack of vitality in certain diseases[3]. The present study is aimed to ascertain the effect of natrum muriaticum on biochemical changes during gonadal maturation of female fishes.

MATERIAL AND METHODS

Poecilia reticulata (guppies) a carnivorous ornamental fish. It inhabits freshwaters and successfully establishes in a variety of environmental conditions. It grows to a maximum of 6 cm. *Poecilia reticulata* females were purchased from Trichy Golden Aquarium. About 56 healthy individuals approximately ranging from 2.8cm to 3.2 cm in length were selected. The fishes were housed in 14 troughs holding 4 female fishes in each trough. They were acclimatized to laboratory conditions of temperature and light. They were fed with artificial fish feed “Kijaro basic”. The water was changed at 8 am and the feeding was carried at the same time. The period of acclimatization was 10 days prior to the commencement of the experiment.

N.muriaticum solution of 30 centesimal potency was brought from Trichy Homeo Medicals. The above mentioned dilutions were preferred as it has peculiar potenizing effect on human beings. Out of 56 fishes, 14 fishes were kept as control. The other 42 were treated as experimental individuals. In control group, 4 fishes were sacrificed for analysis of protein in the ovary after 96 hours. 3 fishes were sacrificed for the analysis of lipid. Similar one was done after 168 hours. The 42 experimental fishes were grouped into 3, each group consisting of 14 individuals. The three groups were separately exposed to 3 varying concentration of n .muriaticum 30c of dilutions 0.05%, 0.03% and 0.025% for duration of 96 hours and

168 hours. The various dilutions were prepared by the following method. 0.1 ml of n.muriaticum 30 c potency was diluted to 0.05% by adding 200ml of water. Other dilutions were prepared by adding 300ml, 400ml of water to 0.1 ml of n.muriaticum respectively. After 96 hours of treatment from each concentration 4 fishes were sacrificed for the analysis of protein and 3 individuals were sacrificed for lipid analysis. A similar one was carried out after 168 hours.

RESULTS

The present study describes the effect of oral administration of Natrum muriaticum 30 c on *Poecilia reticulata* for different durations. The drug chosen with 30 c was diluted to 0.05%, 0.03% and 0.025%. Female guppies were exposed to each of the above concentrations for 96 and 168 hours. Their ovaries were biochemically analysed for protein and lipid. The results were tabulated in Tables 1-2 and figures 1-2.

Table: 1 Amount of protein (mg %) present in the ovary of *poecilia reticulata* after the treatment of n.muriaticum 30c dilutions of 0.05%, 0.03% and 0.025% for a duration of 96 hours and 168 hours

Sample	Dilutions of n.muriaticum	Amount of protein in mg%	
		96 hours	168 hours
Control	0	7.4± 1.417	7.4± 1.417
Experimental	0.05%	8.52 ±1.25	3.39± 0.04
	0.03%	9.0± 0.277	2.29 ±0.78
	0.025%	10.23± 0.514	1.55 ±0.34

Fig-1

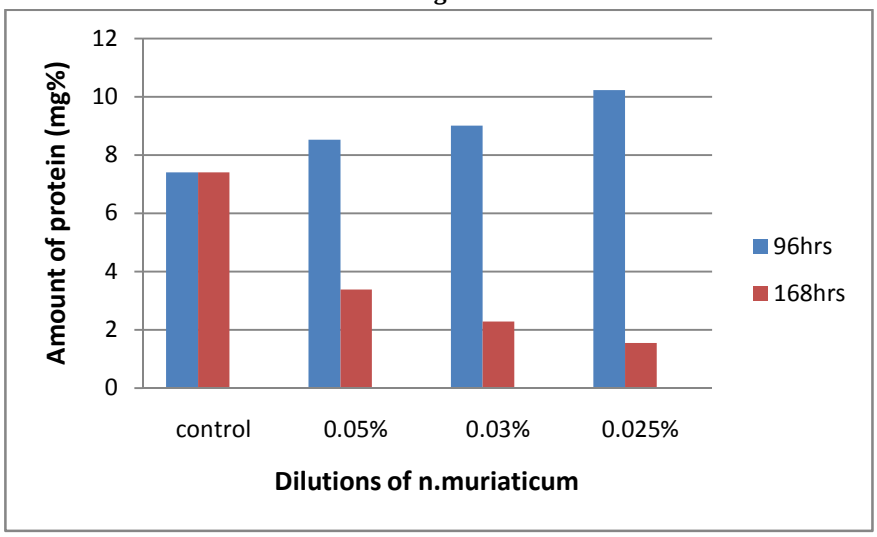
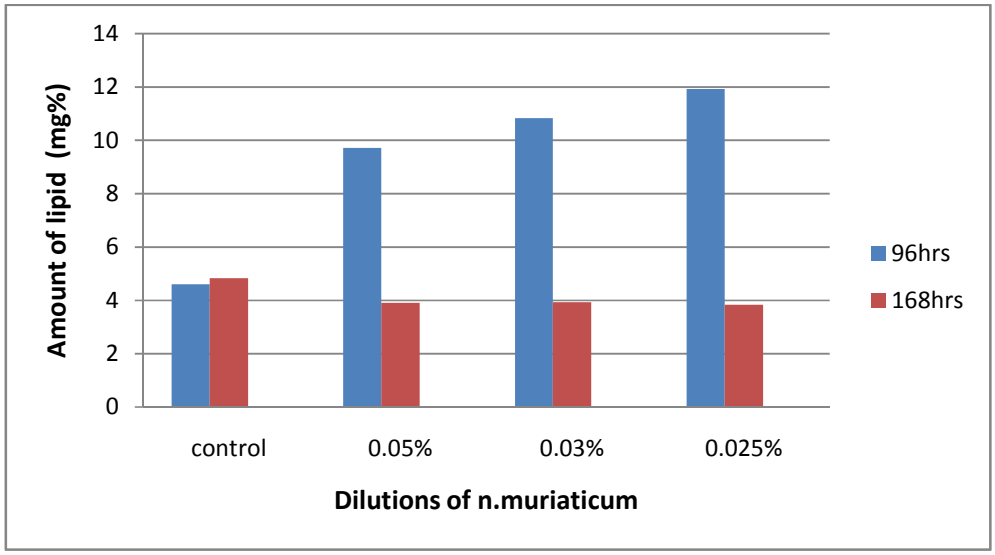


Table: 2- Amount of lipid (mg %) present in the ovary of *poecilia reticulata* after the treatment of n.muriaticum 30c dilutions of 0.05%, 0.03% and 0.025% for a duration of 96 hours and 168 hours

Sample	Dilutions of n.muriaticum	Amount of protein in mg%	
		96 hours	168 hours
Control	0	4.6± 0.513	4.83± 1.152
Experimental	0.05%	9.72±0.253	3.9± 0.4
	0.03%	10.83± 0.472	3.93 ±0.550
	0.025%	11.93± 0.208	3.83±0.208

Fig-2



There is an increase in the amount of protein and lipid content in the ovary was observed in fishes treated for a period of 96 hours at a concentration of 0.025% of n.muriaticum of 30 c potency. Fishes exposed to n.muriaticum for 168 hours duration showed gradual decrease in the amount of protein as well as lipid compared to the control. The result suggests that the effect of n.muriaticum on the protein and lipid content of the ovary is time dependent.

DISCUSSION

In the present study natrum muriaticum 30 c potency of dilution has accelerated the accretion of protein and lipid in the ovary of *P.reticulata* when exposed to 96 hrs of duration. The increase must probably due to the uptake of vitellogenin the precursor of egg yolk protein which is taken up oocytes during maturation[4]. A similar finding states that vitellogenin which is released into the blood and then transported to ovary[5,6] have demonstrated the incorporation of yolk protein precursor in the oocyte by ultra structural evidence. Chan *et al.*[7] also has reported a selective uptake of VTG by follicular receptor of VTG. Much of yolk material of eggs in fishes is synthesized by the liver under the influence of estrogen, as a complex of lipophospho-protein precursor known as vitellogenin[8].

It is a well known fact that biochemical changes in various cellular organelles of the oocytes occur during oogenesis in number of vertebrates[9]. Among the biochemical compounds analysed, lipid and carbohydrate contents showed significant variations in the different tissues of *Haliotus varia* during the progress of gonad maturation[10]. Lipid concentration increased from stage 1 to 3 and decreased in stage 4(previtellogenesis, vitellogenesis, final maturation and post ovulation) in female cobia, *Rachycentron canadum*[11].

It has been demonstrated that vitellogenin which is synthesized by liver in response to estradiol is released into the blood and then transported to ovary[5]. The biochemical changes analysis revealed the fluctuating trend of proteins and carbohydrates during different stages of maturity. However, total lipid percentage of the ovary showed a gradual increase from stage I to stage IV[12]. The protein titre increased with maturity in ovary, muscle and haemolymph whereas in hepatopancreas it registered a decrease. The lipid values of all the tissues and the haemolymph showed an increasing trend with maturation in *Portunus pelagicus*[13]. The total lipid in the ovary Liza tade increased during pre-spawning and it remain increased level up to just before spawning starts, it decreases during late period of spawning remains and low during post-spawning period[14]. Proteins are of vital utility for fish growth and metabolic activity. Protein content of the ovary of Epinephelus diacanthus increased with the maturation[15]. According to Robards *et al.*[16] protein percentage of gonads increased in the pacific sand lance *Ammodytes hexapterus* in relation to maturity. N. muriaticum means chloride of sodium obtained from rocky shore minerals. It works by increasing red blood cell production and production of protein[17].

Considering the result of the previous studies an increase in protein content in the present study might be due to uptake of VTG by fast growing oocytes from maternal serum during ovarian development.VTG is an essential precursor for the synthesis of yolk protein. Yolk is the major food reserve for the developing oocytes and aids in the growth of oocytes more efficiently resulting in the fast growth of the developing oocytes. As the medicine n.muriaticum has rapidly increase the uptake of VTG. It could be used as an agent to induce precocious maturation of oocytes.

The amount of lipid in the ovary also increased in increasing dilutions of n.muriaticum 30 c potency after 96 hrs of treatment. Liver is the main synthesizer of lipids in fishes. The drug might have influenced the liver to synthesize more lipids. The decrease in the amount of protein in the ovary 168 hours duration shows the protein and lipid promoting action is time dependent.

CONCLUSION

N.muriaticum is cheap and easily available one. The breeder in the ornamental fish culture industry can apply the technique of oral administration of the drug to induce precocious maturation of the ovary and thereby multiply more number of fishes in shorter duration. Rearing of the ornamental fishes can thus be made a profitable one.

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