RESEARCH ARTICLE

Impact of temperature variations on RNA content of Freshwater fish *Oreochromis mossambicus*

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ABSTRACT

The present work deals with the effect of temperature on RNA content of Fresh water fish *Oreochromis mossambicus*. The fishes were exposed to different temperature such as 20°C, 24°C, 28°C, 32°C, 36°C & 40°C for 24, 48, 72 and 96 hours exposures respectively. The RNA Content were decreased at low temperature and at high temperature as compared to control set. The values of RNA content were expressed in mg/gm wet wt. of tissue and plotted graphically.

Key words – Temperature, RNA, *Oreochromis mossambicus.*

INTRODUCTION

Aquatic biota is affected by the temperature of the surrounding water which influences the biochemical and physiological activities including food intake, growth rate, body temperature and other body functions. Temperature is an important factor which affects the chemical compositions of various tissues of aquatic organisms (Prosser & Brown 1961). Several variations in biochemical constituents of tissues have been associated with differences in environmental temperatures. In the natural process of temperature acclimation, most of the poikilotherms adjust their metabolic rates to maintain physiological activity at constant level, thus these animals attain a measure of independence of temperature (Prosser and Brown 1961).

Nucleic acids are the nitrogen containing compounds of higher molecular complexes associated with protein in cell. The alterations in the DNA content reflect the changes in RNA and protein synthesis, lead to variation in protein profile (Raj & Selvarajan 1992). The biochemical parameters i.e. nucleic acid plays a significant role in physiological mechanism. Hence the aim of present study was to examine the effect of temperature on RNA content of fresh water fish *Oreochromis mossambicus.*

MATERIAL AND METHOD

The fresh water fish *Oreochromis mossambicus* were collected from Godavari River, Nanded (MS) with the help of local fisherman for the present investigation. They were acclimated for 07 days prior to experimentation. The varying sizes of fishes ranging from 50-55 gm were selected for experiment. The tissue like liver and muscle were selected for present study. The estimation of RNA content was determined by the method of Orcinol (Bial, 1962).

RESULT AND DISCUSSION

In the present investigation, the fresh water fish *Oreochromis mossambicus* were exposed to variable temperature up to 96 hours. The significant changes in RNA content were recorded in table 01 and 02. The results were graphically represented by bar charts.

The present investigation showed that the maximum amount of RNA content observed at 32°C and 36°C i.e. 2.50 and 2.52 mg/gm wet wt. of tissue respectively and minimum at 20°C & 40°C i.e. 2.11 and 2.12 mg/gm wet wt of tissue respectively. Nucleic acid plays the key role in protein synthesis, it is considered as an index capacity of an organism for protein synthesis (Mali and Kadam, 2010).

In the present investigation the RNA Content at low temperature i.e. at 20°C and high temperature i.e. at 40°C were found to be decreased as compared to control set. Similar observations also reported in *Oncohynchus mykiss* Currie et. al., (2000). The decrease in RNA content in the tissue of fish observed at high temperature as compared to control set. The concentration in a cell is related to metabolic function of tissue (Bulow et. al., 1978). The fall in RNA content can be attributed to the reduced rate of protein synthesis due to temperature stress. The present study showed that maximum amount of RNA content observed at 32°C & 36°C as compared to control set. Jayprakash and Sambhu (1996) suggested that increased RNA content in the hepatopancreas and muscle of *Penaeus indicus* correlated with enhanced protein synthesis and growth. The increased rate of protein synthesis directly correlates with the available

Table 1: Effect of temperature on RNA content in Liver of Freshwater fish, *Oreochromis mossambicus* at 20°C, 24°C, 32°C, 36°C and 40°C.

Sr. No.	Exposure Hours	Exposure of Animals Temperature variations in °C					
		20°C	24°C	28±1°C (control)	32°C	36°C	40°C
1	24	2.39±0.031	2.27±0.025	2.34±0.016	2.53±0.024	2.55±0.033	2.37±0.029
2	48	2.36±0.016	2.25±0.019	2.33±0.017	2.53±0.024	2.54±0.033	2.35±0.033
3	72	2.34±0.016	2.28±0.022	2.32±0.020	2.52±0.017	2.52±0.017	2.32±0.020
4	96	2.32±0.020	2.22±0.036	2.32±0.020	2.50±0.024	2.52±0.017	2.28±0.020

(Each Value is mean of six observations ± SD)

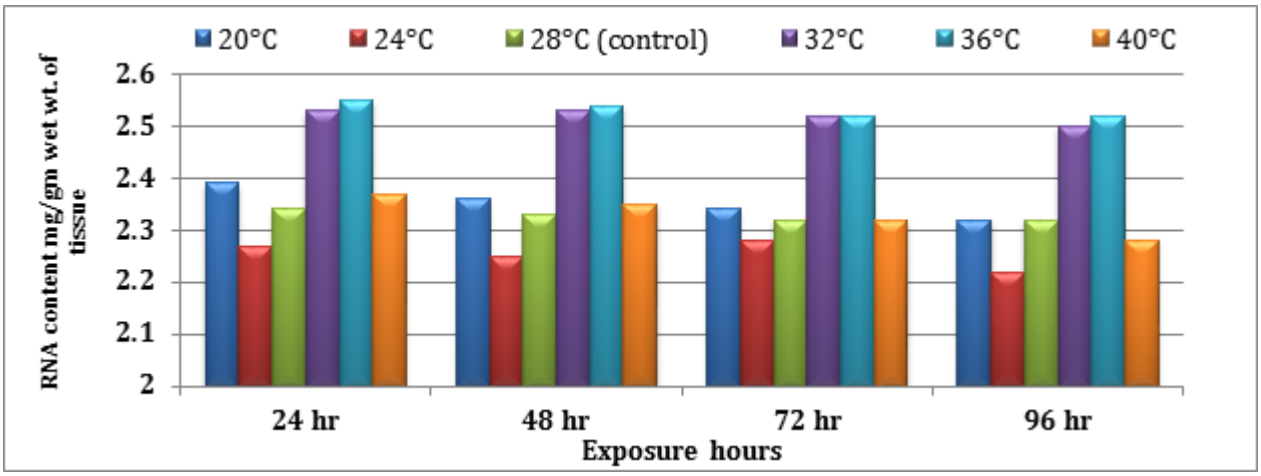

Figure 1: Effect of temperature on RNA content in Liver of Freshwater fish, *Oreochromis mossambicus* at 20°C, 24°C, 32°C, 36°C and 40°C.

Table 2: Effect of temperature on RNA content in Muscle of Freshwater fish, *Oreochromis mossambicus* at 20°C, 24°C, 32°C, 36°C and 40°C.

Sr. No.	Exposure Hours	Exposure of Animals Temperature variations in °C					
		20°C	24°C	28±1°C (control)	32°C	36°C	40°C
1	24	2.16±0.035	2.19±0.021	2.20±0.024	2.24±0.035	2.48±0.036	2.20±0.027
2	48	2.13±0.025	2.17±0.016	2.18±0.028	2.25±0.032	2.47±0.032	2.17±0.036
3	72	2.14±0.024	2.16±0.031	2.17±0.018	2.23±0.025	2.45±0.036	2.15±0.028
4	96	2.11±0.020	2.14±0.030	2.16±0.017	2.21±0.028	2.42±0.018	2.12±0.026

(Each Value is mean of six observations ± SD)

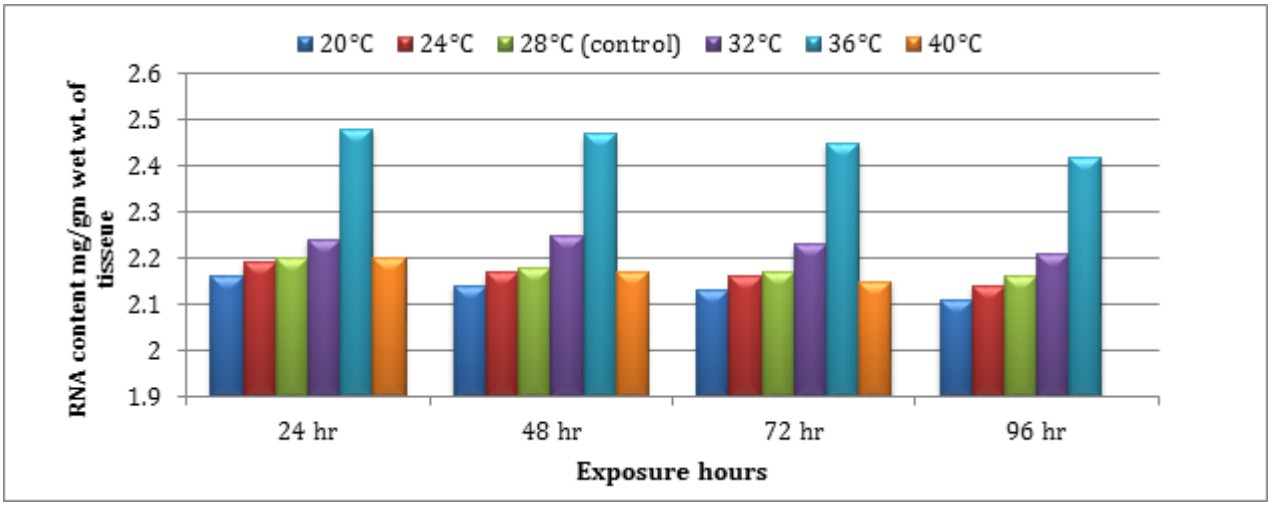

Figure-2: Effect of temperature on RNA content in Muscle of Freshwater fish, *Oreochromis mossambicus* at 20°C, 24°C, 32°C, 36°C and 40°C.

synthesis machinery (Pace et. al., 2010). The fall and rise of nucleic acid content may be due to recovery of metabolic and physiological processes to attain the normal stage. Similar results were observed in fresh water crab *Barytelphusa guirini* (Mali and Chavan 2015).

Conflicts of interest: The authors stated that no conflicts of interest.

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