



**Investigating the Impact of Higher Acclimation
Temperatures on Growth Process through the
Expression of *hsp70*, *hsp90* and *ghrelin* Genes in Nile
Tilapia (*Oreochromis niloticus*)**

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Roll No: 0122/02

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Session: 2021–2022

**A thesis submitted in the partial fulfillment of the requirements for the degree of
Master of Science in Fish Biology and Biotechnology**

Department of Fish Biology and Biotechnology

Faculty of Fisheries

Chattogram Veterinary and Animal Sciences University

Chattogram-4225, Bangladesh

JUNE 2023

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Joya Chakrabarty

June 2023

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**This is to certify that we have examined the above Master’s thesis and have found
that is complete and satisfactory in all respects and that all revisions required by the
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TABLE OF CONTENTS

CHAPTER	TITLE	PAGE NO.
	Authorization	ii
	Signature page	iii
	Acknowledgements	iv-v
	Table of contents	vi-vii
	List of figures	viii
	List of tables	ix
	Abstract	x
1	INTRODUCTION	1-5
	1.1 Objectives of the study	5
2	REVIEW OF LITERATURE	6-12
	2.1 Heat shock proteins	6-7
	2.1.1 History of HSP discovery	6-7
	2.1.2 Nomenclature and functions of HSPs	7
	2.2 Molecular mechanisms related to of HSP expression	7-8
	2.3 Isolation of <i>hsp70</i> and <i>hsp 90</i> genes from fish	8
	2.4 Temperature induced gene expression of <i>hsp70</i> and <i>hsp90</i> in fish	8-9
	2.5 Ghrelin	10
	2.6 Ghrelin gene in fish	10-11
	2.7 Temperature induced expression of <i>ghrelin</i> gene in fish	11
	2.8 Ghrelin in Nile Tilapia	11-12
3	MATERIALS AND METHODS	13-20
	3.1 Experimental fish	13

	3.2 Experimental design	13-14
	3.3 Sample collection	14-15
	3.4 Growth performance analysis	15
	3.5 Blood glucose measurement	15
	3.6 Water quality parameters measurement	16
	3.7 Extraction and quantification of RNA	16-18
	3.8 Preparation of cDNA	18-19
	3.9 Real time PCR assays of <i>hsp70</i> , <i>hsp90</i> , and <i>ghrelin</i> mRNAs	19-20
	3.10 Statistical analysis	20
4	RESULTS	21-25
	4.1 Variations in the expression of <i>hsp70</i> in the brain of Nile tilapia at different acclimation temperature	21
	4.2 Variations in the expression of <i>hsp90</i> in the brain of Nile tilapia at different acclimation temperature	22
	4.3 Variations in the blood glucose level of Nile tilapia at different acclimation temperature	22-23
	4.4 Variations in the expression of <i>ghrelin</i> in the brain of Nile tilapia at different acclimation temperature	23-24
	4.5 Growth performance of <i>O. niloticus</i> at different acclimation temperature	24-25
	4.6 Variations in the water quality parameters of rearing tank at different temperature exposure	25
5	DISCUSSION	26-28
6	CONCLUSIONS	29
	Recommendations and future perspectives	30
	References	31-42
	Brief biography of the author	43

LIST OF FIGURES

FIGURE NO.	TITLE	PAGE NO.
1	Experimental fish (<i>O. niloticus</i>)	13
2	Aquarium set up for different experimental temperature	14
3	Measurement of body weight	14
4	Collection of brain sample from fish	15
5	Measurement of blood glucose level	15
6	Measurement of water quality parameters	16
7	Extraction and quantification of RNA from <i>O. niloticus</i> brain sample	17
8	Preparation of cDNA	19
9	Procedure for real time PCR assay	19
10	Variations in the mRNA levels of <i>hsp70</i> in the brain of <i>O. niloticus</i> subjected to different acclimation temperature (31, 34 and 37°C) for a duration of 15 days	21
11	Variations in the mRNA levels of <i>hsp90</i> in the brain of <i>O. niloticus</i> subjected to different acclimation temperature (31, 34 and 37°C) for a duration of 15 days	22
12	Variations in the blood glucose level (mg/ dl) of <i>O. niloticus</i> exposed to different acclimation temperature (31, 34 and 37°C) for a duration of 15 days	23
13	Variations in the mRNA levels of <i>ghrelin</i> in the brain of <i>O. niloticus</i> exposed to different acclimation temperature (31, 34 and 37°C) for a duration of 15 days	24

LIST OF TABLES

TABLE NO.	TITLE	PAGE NO.
1	Equipment and reagents required for RNA isolation	18
2	Primer for <i>O. niloticus</i> , temperature induced experiment	20
3	Growth response of <i>O. niloticus</i> at three different acclimation temperature for a duration of 30 days	24-25
4	Water quality parameters (mean \pm SD) at three different temperatures during the study period of 15 days	25

ABSTRACT

The physiological response, metabolic rate, and growth of aquatic organisms can be influenced solely by water temperature. To know the impact of increased acclimation temperatures governing the stress response, feed intake, and growth, juvenile Nile tilapia (*Oreochromis niloticus*) were acclimated to three different temperature conditions (31°C, 34°C and 37°C) for a duration of 30 days. The quantitative real- time PCR method was used to quantify the relative expression levels of genes associated with heat shock proteins (HSPs) (*hsp70* and *hsp90*) and *ghrelin* from the brain of Nile tilapia. The findings indicated a significant elevation in the expression of *hsp70* in the brain of *O. niloticus* subjected to a temperature of 37°C. The relative mRNA level of *hsp90* mRNA in the brain of Nile tilapia was higher at 34°C and 37°C compared to the 31°C acclimation temperatures with no statistically significant differences among the three acclimation temperatures. In contrast, a lower expression of *ghrelin* in the brain was observed at higher acclimation temperature (37°C) actuating lower feed intake and decreased appetite. Higher acclimation temperature (37°C) also led to a reduction in weight gain (WG) and specific growth rate (SGR) with a significant increase in the blood glucose level. Conversely, an increase in WG and SGR was observed at 34°C in contrast to fishes at 31°C and 37°C. The present study implies that a slight elevation in temperature can enhance the physiological processes and growth of juvenile *O. niloticus* and the higher acclimation temperature induces stress response, decrease appetite and hinder their overall growth performance.

Keywords: Heat shock proteins (HSPs), ghrelin, acclimation temperature, growth, blood glucose, Nile tilapia.