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Research Paper

THYROID HORMONAL (T_4) EFFECT ON THE GROWTH OF YOUNG TOAD OF *Bufostomaticus*

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Abstract

The present study deals with the effect of thyroxine on the young toads of *Bufostomaticus.* The Toads were collected from a small pond in Ramniwas garden at Jaipur, they were exposed to two different doses of thyroxinei.e. 10^{-2}thyroxine and 10^{-4}thyroxine.The was experiment was conducted at room temperature (28°C- 32°C) for 15 days. The young toads were examine for various morphometric parameters viz:- Snout to Vent Length (SVL), Head Length (HL), Hand Length (HAL), Foot Length (FL) and Tibea Length (TL).The results were statistically analyzed and significant changes were observed in groups.Thyroxine treatment affects the growth of body in young toads.10^{-2}thyroxine concentration was more effective and there were a significant correlation between different Morphometric parameters.

Key words: T_4 ,Morphometry, Toad, Metamorphosis.

INTRODUCTION

Amphibians have been utilized in scientific research, both as model for the elucidation of physiological and developmental process. Amphibian derive their name from Greek “Amphibious” which means “double life”. Most begin life as aquatic larva and through the process metamorphosis, emerge as terrestrial adults (1). During metamorphosis, marked alteration in hormonal factors occurs, as well as dramatic structural and functional changes in larval tissues. There are a variety of mechanism determining thyroid hormone balance or disruption directly or indirectly. Directly acting agent can cause change in thyroxine synthesis or secretion in thyroid , thyroidal iodide uptake , deiodinase and proteolysis. Indirect action may result from biochemical processes such as sulfaction and deiodenation. Thyroxine treatment definitely affected growth of toad (2).

Thyroxine is arguably the most important hormone in anuran development and affects development through exogenous and endogenous means (2). Bufostomaticus lives in low water surface ,moist soil and mud. They appear only in monsoon season. Present study deals with the statistical relationship between morphometric parameters. The morphometric information available on Indian anuran is mainly based on size analysis

from systematic description (3,4). Study of thyroxine on some digestive enzymes of the adult male toad, Bufomelanostictus already done(5).
Thyroid hormone induced gene expression programme that orchestrate amphibian metamorphosis .in many salamanders eg. Maxican axolotl (Ambystomamexicanum)induced metamorphosis by using thyroxine(6) . The effect of thyroidal hormone on the absorption process of the isolated rat intestine was done (7). Present study has been designed to study the statistical relationship between morphometric parameters of Bufostomaticus.

EXPERIMENTAL SET UP

1) Collection of sample: -Young toads of Bufostomaticus were collected from water near Albert hall in Ram Niwas garden at Jaipur. They were brought to the laboratory in polythene bags and kept in large and deep glass troughs ,coveredwith wire net to prevent them from jumping out.
2) Experiment: - These young toads divided into three groups of 25 animals . Group I (Control), Group II (10-2 Thyroxine) and Group III (10-4 Thyroxine) for 15days. The experiments were carried out at room temperature (280C-320C). The rearing medium was changed on alternate day and the animals were fed with chironomouslarvae, snails,small insects and algae.
3) To study the changes:- Theanimals were anaesthetized with diethyl ether and fixed in bouin`s fixative preserved in 70% alcohol and examined under stereoscopic binocular microscope for morphpmetry. The parameter used were – Snout to went length (SVL),Head length (HL),Hand length (HAL) ,Foot length (FL) and Tibia length (TL). All the parameters were measured with the help of calipers and ocular and stage micrometer scale. Morphometric variables were statistically calculated.

RESULT AND DISCUSSION

It was observed that in Group I (Control) percentage of survivality was 100% and no mortality was noticed, all the animals were normal in all aspects. Table -1 represents mean length of the body which increase upto 12.15 mm. (SVL). Snout pointed, nostrils nearer to tip of the snout than the eyes. The upper surface was dark with patches on the body.
In case of Group II (10-2 Thyroxine) mean length of the body was less than the control, it was 11.15 mm. foot length more than the control (Table- 1). In case of Group III (10-4 Thyroxine) mean length of the body was more than Group II but less than the control. Foot length was more than the control in Group II (Table -1).
Development of the hyperthyroid state in vertebrates elevates basal metabolic rate due to increment in the rate of oxygen consumption in target tissues. Normal thyroid gland activity is concerned mainly with energy metabolism in nearly all tissues of the body (8). The amount of thyroxine acts on metamorphic tissues during development. Direct effect of thyroxine on mature rats can be considered as a part of its overall catabolic action. The different responseof immature rats to thyroxine compared to older animals could be attributed to the differences in thyroxine metabolism and also followed by developmental pattern (8), (9). Thyroxine treatment initially inhibited growth of the body in young toad in Group II, it was decreased (Table- 1).The morphometric relationship between SVL with TL, TL with FL and SVL with HL were analysedstastically. There was positive correlation between differentmorphometric parameters in toads (Graph…). Head length was highly significant in 10-2 thyroxine and 10-4 thyroxine concentrations (Graph…).

In amphibians metamorphosis can be precisely induced and studied in juveniles or adults(10),(11),(12). Thus T_4 concentration is known to affect gene expression and mortality in anurans. A low concentration of T_4 affects morphological period. At last we can say that thyroidal hormone treated animals being slower development than the control animals (13),(14),(15).

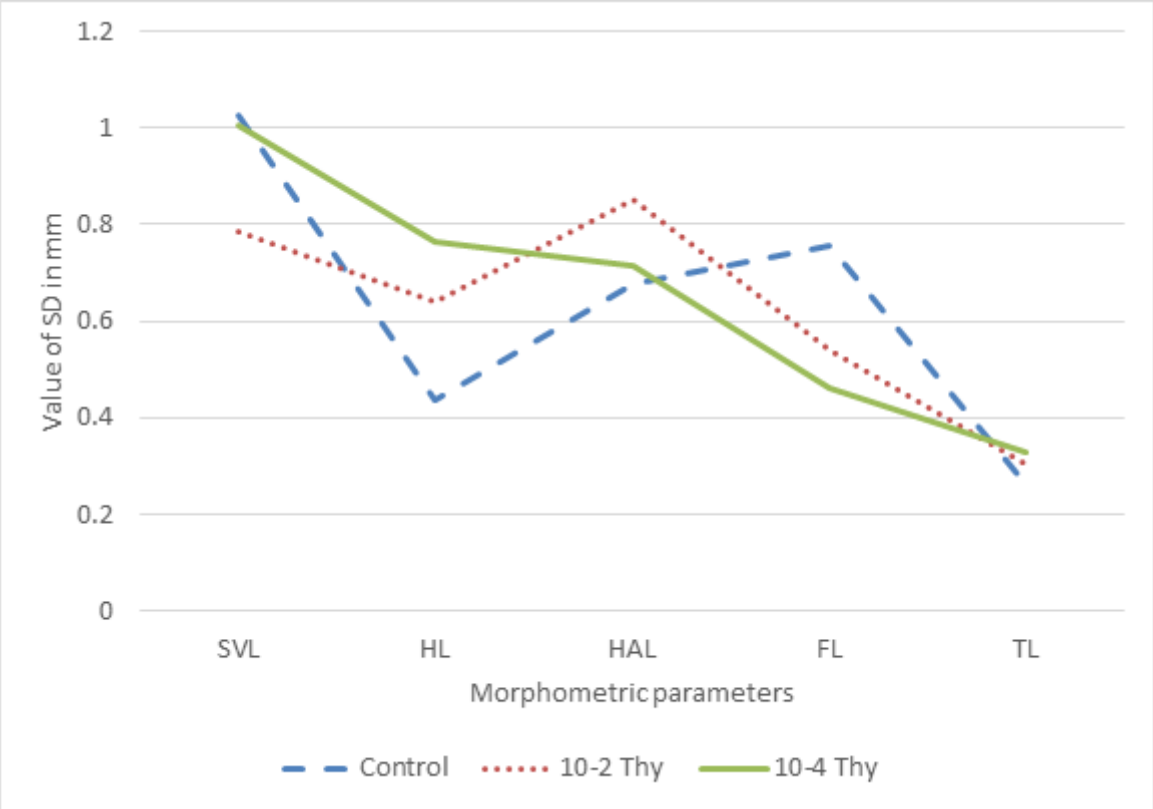

Figure 1 Change in the SD value treated with 10-2 Thy and 10-4 Thy in control

Table 1: Mean, standard deviation and standard error of morphometric measurement of young toad(*Bufostomaticus)*

Sl.no.	Morphometric Parameters	Control			10^{-2}thyroxine			10^{-4}thyroxine		
		Mean length (mm)	S.E.±	S.D. (mm)	Mean length (mm)	S.E.±	S.D. (mm)	Mean length (mm)	S.E.±	S.D. (mm)
1.	SVL	12.15	±0.325	1.028	11.15	±0.247	0.783	11.75	±0.318	1.006
2.	HL	5.45	±0.138	0.437	4.58	±0.202	0.639	4.73	±0.240	0.764
3.	HAL	6.72	±0.213	0.675	6.15	±0.269	0.851	6.25	±0.226	0.716
4.	FL	5.72	±0.238	0.754	6.25	±0.170	0.540	6.40	±0.145	0.459
5.	TL	3.73	±0.108	0.343	3.57	±0.079	0.249	3.62	±0.089	0.282

SVL= Snout vent Length
TL=Tibia length
HL=Head length
HAL= Hand length
FL=Foot length

Table 2:Statistical relationship between different morphometric parameters in young toads (*Bufostomaticus)*

Sl.No.	Morphometric Parameters	Control		10^{-2}thyroxine		10^{-4}thyroxine	
		r-value	t-value significance	r-value	t-value significance	r-value	t-value significance
1	SVL with TL	-0.486	3.922*** P< 0.001	+0.271	3.922*** P< 0.001	+0.089	3.222*** P< 0.001
2	TL with FL	+0.072	3.922*** P<0.001	+0.259	3.922*** P<0.001	+0.208	3.922*** P<0.001
3	HL with FL	-0.396	2.878** P>0.01	+0.171	2.878** P>0.01	-0.074	2.878** P>0.01
4	SVL with HL	+0.764	3.922*** P<0.001	+0.191	3.922*** P<0.001	+0.095	3.922*** P<0.001

** P> 0.01 Significant
*** P<0.001 Highly Significant

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