BIOCHEMICAL ANALYSIS OF PROTEINS IN THE ANDROGENIC GLAND OF EYESTALK ABLATED ANIMALS IN BARYTELPHUSA GUERINI

Abstract

Androgenic gland is a part of male reproductive system situated at the terminal portion of vas deferens. It secretes hormones responsible for the differentiation of the male and female genital apparatus and the secondary sexual characteristics. The proteins of androgenic gland exhibit variations in relation to the reproductive cycle, on eyestalk ablation and eyestalk extract injection. This was studied in Barytelphusa guerini. It showed the signs of increased secretory activity on eyestalk ablation.

INTRODUCTION

Androgenic gland is a part of male reproductive system situated at the terminal portion of vas deferens. It is widely accepted that the AG of decapod crustaceans secretes hormones responsible for controlling the differentiation of the male and female genital apparatus and the secondary sexual characteristics in *Orchestia gammarellus* (Charniaux-Cotton, 1954, 1964); *Paratelphusa hydrodromous* (Adiyodi and Adiyodi, 1970; Fingerman, 1997); *Pontastacus leptodactylus* (Payen, 1973); *Procambarus clarkii* (Taketomi *et al.*, 1990, 1996; Taketomi and Nishikawa, 1996); *Cherax destructor* (Fowler and Leonard, 1999); *Cherax quadricarinatus* (Khalaila *et al*., 1999, 2001).

To elucidate the chemical nature, AGH was isolated and the investigations encompassing ultrastructural and histological studies suggested that AGH was a protein and supports the possibility of a peptidergic proteinaceous secretion, *Pachygrapsus crassipes* (King, 1964); *Oniscoldes superieurs* (Malo and Juchault, 1970); *Porcellio scaber* (Radu and Craciun, 1976); *Procambarus clarkii* (Miyawaki and Taketomi, 1978; Taketomi, 1986); *Macrobrachium rosenbergii* (Sagi, 1988; Awari and Dube, 1999; Piera *et al*., 2000; Zhang *et al*., 2000; Okumara and Hara, 2004; Ventura *et al*, 2009, 2011); *Portunus trituberculatus* (Qing *et al*., 2010) and *Cherax quadricarinatus* (Rosen *et al*., 2013).

The protein content was studied in the testis and androgenic gland in normal and eyestalk ablated prawns in *Portunus pelagicus* and *Portunus sanquinolentus* (Radhakrishnan, 1979); *Scylla serrata* (George and Gopakumar, 1987); *Macrobrachium rosenbergii* (Sheen and Amaro, 1991; Anonymous, 1999); *Charybdis smithii* (Balasubramanian and Suseelan, 2001) and *Scylla tranquebarica* (Thirunavukkarasu, 2005); *Macrobrachium rosenbergii* (Revathi *et al*., 2013).

The total protein content in testis and androgenic gland shows variation in relation to the reproductive cycle and seasons in both normal and eyestalk ablated crabs. The eyestalk ablation induced the biochemical changes in different reproductive tissues such as testis and androgenic gland in *Macrobrachium rosenbergii* (Revathi *et al*., 2013).

Effects of eyestalk ablation was studied in *Carcinus menas* (Demeusy and Veillet, 1958; De Meusy, 1967), *Pandalus platyceros* (Brockenbrough-Foulks and Hoffman, 1974); *Portunus pelagicus* and *Portunus sanquinolentus* (Radhakrishnan, 1979); *Scylla serrata* (George and Gopakumar, 1987; Prasad and Neelakantan, 1989); *Macrobrachium rosenbergii* (Sheen and Amaro, 1991; Anonymous, 1999); *Armadillidium vulgare* (Okuno *et al*., 1997, 1999; Martin *et al*., 1999; Sagi and Khalaila, 2001); *Charybdis smithii* (Balasubramanian and Suseelan, 2001); *Cherax quadricarinatus* (Khalaila *et al*., 2001, 2002); *Parapenaeopsis hardwickii* (Kulkarni *et al*., 1984); *Scylla tranquebarica* (Thirunavukkarasu, 2005); *Macrobrachium rosenbergii* (Revathi *et al*., 2013).

The protein content increased in the androgenic gland in ablated prawns in *Portunus pelagicus* and *Portunus sanquinolentus* (Radhakrishnan, 1979); *Scylla serrata* (George and Gopakumar, 1987); *Macrobrachium*

rosenbergii (Sheen and Amaro, 1991); *Charybdis smithii* (Balasubramanian and Suseelan, 2001) and *Scylla tranquebarica* (Thirunavukkarasu, 2005); *Macrobrachium rosenbergii* (Revathi *et al*., 2013).

The main objective of the present investigation is to determine quantitatively the variation in the protein content in the androgenic gland in the three periods of annual reproductive cycle of the eyestalk ablated animals of fresh water male crab *Barytelphusa guerini*.

MATERIALS AND METHODS

Total proteins were estimated by Biuret method (Gornall *et al*., 1949) in the three periods of the annual reproductive cycle, in the androgenic gland of eyestalk ablated animals.

RESULTS

Table : 1

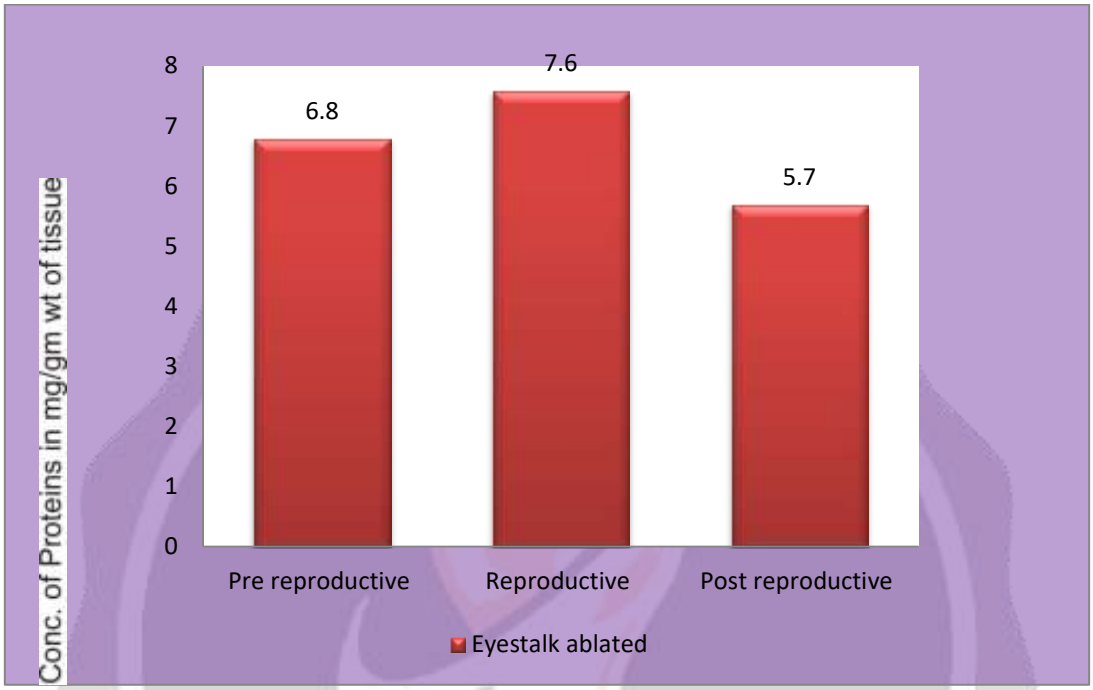
Showing the concentration of Proteins in the Androgenic Gland in mg/gm wt. of tissue in different periods of the annual reproductive cycle in Eyestalk ablated animals

Sample	Pre-reproductive period	Reproductive period	Post-Reproductive period
1	6.9 mg/gm wt of tissue	7.7 mg/gm wt of tissue	5.8 mg/gm wt of tissue
2	6.8 mg/gm wt of tissue	7.5 mg/gm wt of tissue	5.5 mg/gm wt of tissue
3	6.8 mg/gm wt of tissue	7.6 mg/gm wt of tissue	5.7 mg/gm wt of tissue
4	6.7 mg/gm wt of tissue	7.4 mg/gm wt of tissue	5.7 mg/gm wt of tissue
5	6.8 mg/gm wt of tissue	7.5 mg/gm wt of tissue	5.7 mg/gm wt of tissue
6	6.9 mg/gm wt of tissue	7.7 mg/gm wt of tissue	5.8 mg/gm wt of tissue
sum	40.9	45.4	34.2
Mean	6.82	7.57	5.70
S.D.	0.075277	0.121106	0.10954
Variance	0.005667	0.014667	0.012

The protein content was expressed as mg/ gram weight of tissue. The protein content of the androgenic gland in eyestalk ablated animals were:

Protein concentration in pre-reproductive period was 6.82 mg/gram weight of tissue, in reproductive period it was 7.57 mg/ gram weight of tissue and in post-reproductive period it was 5.70 mg/ gram weight of tissue.

Graphical representation of Proteins in the AG in the normal, eyestalk ablated and eyestalk extract injected animals during the three periods of the annual reproductive cycle



DISCUSSION

Total proteins were determined in the AG of eyestalk ablated male crabs. The protein content in the AG was maximum in the reproductive period and minimum in the post reproductive period of eyestalk ablated animals.

In *Barytelphusa guerini* the eyestalks removal tends to increase the length and size of the androgenic gland in all the periods of the annual reproductive cycle, the number, size and activity of the AGH secreting cells were also increased, AG showed hypertrophy as suggested by *Cherax quadricarinatus* (Kulkarni *et al*., 1983; Khalaila *et al.*, 2001; Khalaila *et al*., 2002; Ventura *et al*., 2009) and hyperactivity *Carcinus menas* (Demeusy and Veillet, 1958; *Potamon dehaani* (Otsu, 1963); De Meusy, 1967); *Orconectes nais* (Carpenter and De Roos, 1970); *Scylla serrata* (Rangnekar *et al*., 1971); *Rithropanopeus harrissi* and *Callinectes sapidus* (Payen *et al*., 1971); *Lysmata seticaudata* (Touir, 1977); *Macrobrachium lamarrei* (Sarojini Gyananath, 1985); *Scylla paramamosain* (Liu *et al*., 2008); *Macrobrachium rosenbergii* (Ventura *et al*., 2009, Revathi *et al*., 2013) when compared to the normal animals of the different periods of the reproductive cycle and correspondingly there was an increase in the activity of the AG.

In *Barytelphusa guerini* eyestalk ablation affects the AG, protein synthesis of specific polypeptides representing androgenic factors as in *Armadillidium vulgare* (Okuno *et al*., 1997, 1999; Martin *et al*., 1999; Sagi and Khalaila, 2001), indicated by an increase in protein content and over expression of AG polypeptides as in *Cherax quadricarinatus* (Khalaila *et al.*, 2001, 2002).

Eyestalk ablation directly stimulated the protein level in *Portunus pelagicus* and *Portunus sanquinolentus* (Radhakrishnan, 1979); *Scylla tranquebarica* (Thirunavukkarasu, 2005).

In the eyestalk ablated animals the androgenic activity is increased thereby there was an increase in the protein synthetic activity which further increased the production of the AGH.

Thus the eyestalk ablated animals showed increased androgenic gland activity in all the three periods of reproductive cycle namely, pre-reproductive period, reproductive period, and post-reproductive period with more production of AGH.

Among the eyestalk ablated animals there was a progressive increase in the protein level from pre-reproductive period to the reproductive period and decreased in the post-reproductive period.

Upon ablation the AG in both pre-reproductive as well in the post-reproductive period shows the characteristics as that of the reproductive period.

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