

ORIGINAL ARTICLE

Studies on Some Aspects of Morphology, Distribution and Nutritional Composition of Five Fish Species of Polynemidae Family from Vasishta Godavari Estuary

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ABSTRACT

In the current study five Polynemidae family fish species were identified from the Vasishta Godavari estuary. Keeping in view of nutritional point, in this study we have conducted experiments on the proximate composition of the recorded species belongs Polynemidae family. Minimum moisture (75.59±1.20%) in Polydactylus plebius was observed and the maximum (77.30±1.25%) was recorded in Polynemussexfilis. Minimum protein (16.78±0.45%) in Polydactylus sextarius was recorded and the maximum (18.75±0.31%) was noticed in Polydactylus plebius. Minimum carbohydrate (0.7±0.005%) in Polynemus sexfilis was recorded and the maximum (1.2±0.006%) was noticed in Polydactylus heptadactylus. Minimum lipid (1.7±0.11%) in Polynemus sexfilis was recorded and the maximum (2.1±0.15%) was noticed in Polydactylus sextarius. Minimum ash (2.04±0.15%) in Polynemus sexfilis was observed and the maximum (3.12±0.20%) was recorded in Polydactylus sextarius. It is evident from the present findings that the Polynemidae family fish species may be very good choice for protein diet, those suffering from protein energy malnutrition.

Keywords: Proximate composition, protein, lipid.

Received 11.07.2020

Revised 01.10.2020

Accepted 29.10.2020

How to cite this article:

K.Lakshmi Kantamma, T. Divakar and T. Ramesh. Studies on Some Aspects of Morphology, Distribution and Nutritional Composition of Five Fish Species of Polynemidae Family from Vasishta Godavari Estuary. Adv. Biores., Vol 11 (6) November 2020: 137-143

INTRODUCTION

Studies on the distribution and abundance of the fish fauna in Strymon estuaries, Greece was investigated by Koutrakis *et al.*, [1]. Distribution of ichthyofauna in Ponnani estuary, Kerala was carried out by Bijukumar and Sushama[2]. Kathiresan and Rajendran [3] encountered 102 fin fishes in Pichavaram mangrove, 86fishes in Parangipettai coastal waters and 76 fishes in Ariyankuppam coastal waters. Diversity of fishes in Manakudy estuary was observed by Johnson and Selvaraj [4].Fernandos and Achuthankutty [5] recorded twenty two species of fishes belonging to four orders and twenty one families in Salcete Taluka wetlands, Goa. Studies on the species abundance, distribution, spatial and temporal relation of fisheries biodiversity at Meghna river estuary, Bangladesh was carried out by Hossainet *al.*,[6]. Kumaranet *al.*,[7] correlated the fish faunal diversity with the environmental factors in the Giriampeta estuary, Puducherry. Lad and Patil[8] studied fish diversity in the Bhayandar and Naigaon estuary and recorded 53 fish species belonging to 23 families and 6 orders).In the present study an attempt has been made to evaluate the diversity and distribution of Polynemidae fish fauna from the Vasishta Godavari Estuary. Polynemidae fish species have very good nutritional components; hence in this study we have conducted experiments on the proximate composition of the recorded species.

MATERIAL AND METHODS

In the current study we have used the Polynemidae family fishes. The fishes were identified by following the identification procedures mentioned in standard books [9-11]. The Polynemidae family fishes were procured from Vasishta Godavari, Andhra Pradesh, Antarvedi. The collected fish samples were brought to laboratory of Department of Zoology, S.V.K.P. and Dr. K.S. Raju Arts and Science College (A), Penugonda, West Godavari for analysis. The identified fishes were thoroughly cleaned with deionized water to remove any adherent particles on the skin. Then the specimens were carefully dissected and muscle tissue in good condition was separated and same was used for the experimentation. Known amount of the tissue was taken for the estimation of proximate composition in fishes.

Biochemical Analysis

The moisture content of the sample was analyzed by drying the samples in a hot air oven AOAC [12]. The protein and lipid contents of the fishes were performed by following the method of Lowry *et al.*, [13] and Folchet *al.*, [14] respectively. Total Carbohydrate content was determined according to the method of Dubois *et al.*, [15]. The ash content was determined according to the method of AOAC [16].

Study Area Description

The River Godavari is the second largest in India, flows about 1465 Km, transverses the states of Maharashtra and Andhra Pradesh and opens into the Bay of Bengal on the east coast of India. It has a catchment area of about 3, 12, 812 Sq. Km, which lies in the states of Maharashtra, Madhya Pradesh, Karnataka, Orissa and Andhra Pradesh. Originating at Triambak which is about 110 Km. north-east of Mumbai on the west coast, it receives several small tributaries and assumes imposing proportions towards its lower reaches. The river Godavari enters Andhra Pradesh and flows south-east, at Rajahmundry, it is about 3.2 Km, wide and further down at the head of the delta near Dhowleswaram, a masonry Dam (1857) and recently a barrage (1970) was constructed in four sections across the river. At Dhowleswaram which is approximately about 90 Km from the sea, the river divides into two principal branches namely the Vasistha Godavari to the west and Gowtami Godavari to the east. The Vasistha Godavari in turn branches at Ayodhyalanka into two sub-branches namely Vasistha Godavari to the west and Vainateya Godavari to the east both opening into the Bay of Bengal independently. Vasishta Godavari opens into the sea at Antervedi and Vainateya Godavari opens at Odalarevu. The Gowtami Godavari flows south-east and opens into the Bay of Bengal at two places south of Yanam, namely Kottapalem and Bhairavapalem villages. The Gautami Godavari is also connected to the big Kakinada Bay by two channels namely the Coringa arising at Yanam and the Gaderu arising at Bhairavapalem. The remaining two branches of the Godavari i.e. middle one, Vaintheya branch opens at Vodalaravu (near Amalapuram) without forming any swampy-mangrove habitats, while the southernmost branch, Vasishta opens into the Bay of Bengal at Antervedi, near Narsapur town (west bank), where good mangrove formations were seen earlier to 1980. The estuarine waters of this branch extends upto about 15 Km upstream to Narsapur.

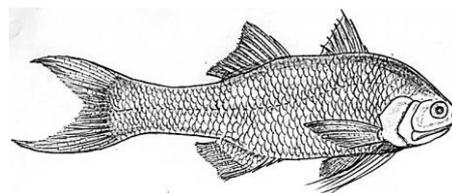
RESULTS AND DISCUSSION

Family: Polynemidae

Mouth inferior, pectoral fin with 2 sections, upper section of pectoral fin with the rays attached, the lower section having 3-7 (in *Polistonemus* with 14 or 15) long free rays. Spinous and soft dorsal fins far apart. Pelvics sub-abdominal. One spine in pelvic fin; soft rays 5. Deeply forked caudal fin. Vertebrae 24 or 25. Reaches 1.8 m maximum length, reported for *Eleutheronema tetradactylum*. Feed on benthic invertebrates of sandy to muddy bottoms. Few species near reefs. Used as food fishes.

Distribution: Mainly marine and brackish, also ascends rivers. Distributed in all tropical and sub-tropical seas.

Polynemus sexfilis (Valenciennes, 1831)



Polynemus sexfilis Valenciennes, 1831

Polyactylus sexfilis (Valenciennes, 1831)

Genus: *Polynemus*

Species: *sexfilis*

Fin Formula:

Dorsal-I	Dorsal-II	Pectoral	Pelvic	Anal	Caudal
8	1/13	15+vi	1/5	5/11	17

TL	SL	HL	Sn.L	E.D	HOB	PDL	P.D.SC	LL.SC	LL.V.SC
13.2	10.0	3.3	0.7	0.9	3.2	3.5	16	55	-

Description: Body a long and slightly compressed, the maxilla reaches half the diameter behind the orbit. The pectoral rays un-branched, the free ones reach to rather beyond the end of the ventral. Caudal deeply forked. A spine on the shoulder at the commencement of the lateral-line. Teeth viliform in jaws, body silver in colour.

Common name: Six finger thread fin

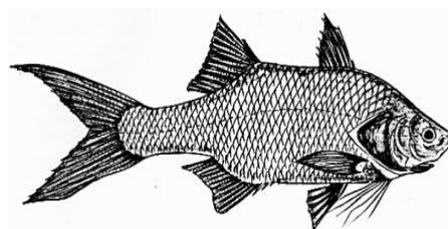
Habit and habitat: Marine, brackish, lagoon

Economic importance: Commercial

Status and Conservation: Not evaluated

Distribution: Wide spread in the Indo-Pacific.

***Polydactylus sextarius*(Bloch)**



***Polydactylus sextarius*(Bloch)**

Genus: *Polydactylus*

Species: *sextarius*

Fin Formula:

Dorsal-I	Dorsal-II	Pectoral	Pelvic	Anal	Caudal
8	1/13	14+vi	1/5	3/12	17

TL	SL	HL	Sn.L	E.D	HOB	PDL	P.D.SC	LL.SC	LL.V.SC
12.5	9.0	3.0	0.7	0.9	3.2	3.5	14	60	-

Description: Body long and slightly compressed. Eyes large, the diameter 3 times in head length. Pectoral fin in two parts, upper part with nearly all rays branch and lower part with 6 free filamentous rays, caudal fin forked, with equal lobes. Scales small and lateral lines scales 50. Body golden in colour. Inner side of operculum dusky. Fins yellowish with black spots.

Common name: Blackspot threadfin

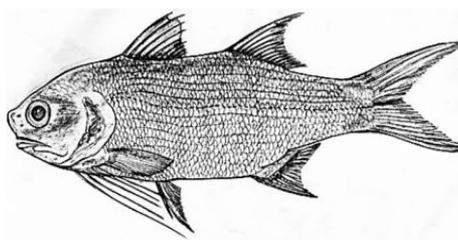
Habit and habitat: Brackish water, freshwater, marine

Economic importance: Commercial

Status and Conservation: Least concern in IUCN red list

Distribution: Indo-West pacific.

***Polydactylus plebius*(Broussonet, 1782)**



*Polynemus plebius*Broussonet, 1782,

Polydactylus plebius (Broussonet, 1782)

Genus: *Polynemus*

Species: *plebius*

FIN FORMULA:

Dorsal-I	Dorsal-II	Pectoral	Pelvic	Anal	Caudal
8	1/13	17+v	1/5	3/11	17

TL	SL	HL	Sn.L	E.D	HOB	PDL	P.D.SC	LL.SC	LL.V.SC
16.6	14.5	3.1	1.1	0.9	3.6	3.9	-	-	-

Description: Body long and slightly compressed. There are thin longitudinal stripes on body. Height of the head equals its length excluding the snout, the maxilla reaches to about a diameter behind the posterior side of the eye. Angle of pre-opercle produced. Teeth villiform. Second dorsal rather higher anteriorly than the first dorsal. Pectoral rays unbranched its length equals $\frac{3}{4}$ the height of the body. Ventral reaches the vent.

Common name: striped thread fin

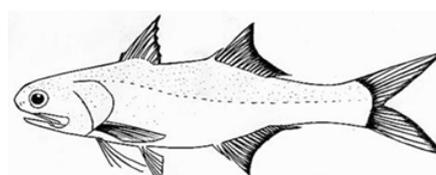
Habit and habitat: Marine, brackish water, demersal

Economic importance: Minor commercial

Status and Conservation: Not evaluated in IUCN red list

Distribution: Indo-Pacific

***Eleutheronema tetradactylus* (Shaw, 1804)**



Polynemus tetradactylus Shaw, 1804,

Eleutheronema tetradactylus Shaw, 1804

Eleutheronema tetradactylus (Shaw, 1804),

Polynemusteria Hamiton, 1822

Genus: *Eleutheronema*

Species: *tetradactylus*

FIN FORMULA:

Dorsal-I	Dorsal-II	Pectoral	Pelvic	Anal	Caudal
8	1/14	17+iv	1/5	2/16	17

TL	SL	HL	Sn.L	E.D	HOB	PDL	P.D.SC	LL.SC	LL.V.SC
23.5	22	2.9	1.2	1.3	4.1	5.2	16	53	-

Description: Body elongated and slightly compressed. Snout prominent and projecting, eyes very large. Mouth very wide, with small teeth. Pectoral fin in two parts, upper part with all rays simple and lower part forked, with equal lobes. Silvery green above, yellowish white on side and belly, dorsal and caudal yellowish with dusky edges, pectoral filamentous rays white.

Common name: Four finger thread fin.

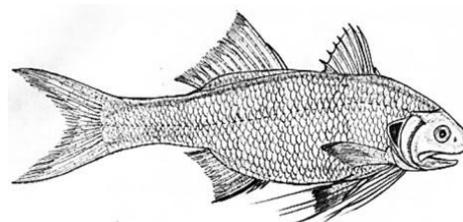
Habit and habitat: Marine, freshwater, brackish

Economic importance: Highly commercial

Status and Conservation: Not evaluated in IUCN

Distribution: Persian Gulf, Pakistan, India, Sri Lanka.

***Polydactylus heptadactylus* (Cuvier 1829)**



Polynemus Heptadactylus Cuvier, 1829

Genus: *Polydactylus*

Species: *heptadactylus*

FIN FORMULA:

Dorsal-I	Dorsal-II	Pectoral	Pelvic	Anal	Caudal
8	1/12	15+vii	1/5	3/11	20

TL	SL	HL	Sn.L	E.D	HOB	PDL	P.D.SC	LL.SC	LL.V.SC
12.3	8.5	2.2	0.6	0.8	3.2	1.9	18	53	15

Description: Body long and somewhat compressed. Pectoral fin in two parts, upper part with all rays simple and lower part with 7 free filamentous rays. Caudal fin forked with equal lobes. Eyes large, the diameter about 3.5 times in head length. Pectoral fin black in colour, lateral line scales 50. Teeth–villiform in jaws, vomer, and palate. Anal highest anteriorly where it equals the first dorsal, its lower edge straight, caudal deeply lobed.

Common name: Seven finger thread fin.

Habit and habitat: Brackish water, coastal waters

Economic importance: Commercial

Status and Conservation: Not evaluated in IUCN

Distribution: Pakistan, India, Sri Lanka.

Proximate Composition

Table 1. Proximate composition of Polynemidae family fish species (mean \pm SD; average value of three determinations)

S. No.	Name of the species	Moisture	Protein	Carbohydrate	Lipid	Ash
1	<i>Polynemus sexfilis</i>	77.30 \pm 1.25	18.26 \pm 0.28	0.7 \pm 0.005	1.7 \pm 0.11	2.04 \pm 0.15
2	<i>Polydactylus sextarius</i>	77.00 \pm 1.01	16.78 \pm 0.45	1.0 \pm 0.003	2.1 \pm 0.15	3.12 \pm 0.20
3	<i>Polydactylus plebius</i>	75.59 \pm 1.20	18.75 \pm 0.31	1.1 \pm 0.002	1.9 \pm 0.12	2.66 \pm 0.21
4	<i>Eleutheronema tetradactylus</i>	77.05 \pm 1.12	17.61 \pm 0.42	0.8 \pm 0.004	2.0 \pm 0.11	2.54 \pm 0.18
5	<i>Polydactylus heptadactylus</i>	76.54 \pm 1.05	17.83 \pm 0.35	1.2 \pm 0.006	1.8 \pm 0.14	2.63 \pm 0.27

Moisture content

In the present study the average moisture contents of the fishes ranged from 75.59 \pm 1.20% to 77.30 \pm 1.25% (Table 1). Palani Kumar *et al.*, [17] studied on the proximate composition of 23 medium sized marine fin fishes from Thoothukudi Coast of India. They have reported the moisture content in Serranidae family fish i.e. *Epinephelus areolatus* (78.99 \pm 0.23), which was slightly higher than the average moisture content reported in this study. Harinth [18] recorded more or less a similar variation in the moisture contents in *M. rosenbergii* and *M. malcomsoni* were ranged from 77.29 \pm 1.24 to 79.01 \pm 1.75%.

Protein content

In the present study the average protein contents of the fishes ranged from 16.78 \pm 0.45% to 18.75 \pm 0.31% (Table 1). The recorded values are well in agreement with the findings of Palani Kumar *et al.*, [17] who reported the protein content in Serranidae family fish *Epinephelus areolatus* was 16.84 \pm 0.35. Similar trends of protein content (18.25%) in *Heteropneustes fossilis* was reported by Salam [19] and LudiyaPodili Rani [20].

Carbohydrate content

In the present study the average carbohydrate contents of the fishes ranged from 0.7 \pm 0.005% to 1.2 \pm 0.006% (Table 1). The findings of the present study are well in agreement with Mohanty and Nayak [21] who recorded the carbohydrate contents were ranged from 0.11 \pm 0.07 to 0.6 \pm 0.57. Radhakrishnan and Natarajan [22] recorded the carbohydrate content in the muscle tissues were varied from 0.3 to 0.63% in *P. vigil*. More or less similar trends of carbohydrate contents were recorded by several researchers in different species (Radhakrishnan [23], Dinakaran *et al.*, [24]; Dinakaran *et al.*, [25].

Lipid content

In the present study the average lipid contents of the fishes ranged from $1.7 \pm 0.11\%$ to $2.1 \pm 0.15\%$ (Table 1). Darwin *et al.*, [26] reported the lipid content in *P. bufo* ($4.56 \pm 0.54\%$) which were slightly higher than the average values of lipids recorded in the present investigation. More or less similar values of lipid contents were recorded by Mohanty and Nayak [21]. Similar trends of lipid contents were reported by various workers in different species Thirunavukkarasu [27]; Murugesan *et al.*, [28]; Sudhakaret *et al.*, [29].

Ash content

In the present study the average ash contents of the fishes ranged from $2.04 \pm 0.15\%$ to $3.12 \pm 0.20\%$ (Table 1). The recorded values are well in agreement with the findings of Islam *et al.*, [30] who reported the ash content in *Odontamblyopus rubicundus* was 2.035 ± 0.16 . Oyase Anthony *et al.*, [31] recorded the ash contents in five different fishes were ranged from 3.7390 ± 0.21 to 5.4210 ± 0.16 from river Niger in Edo State, Nigeria. Similar trends of ash content (3.79 ± 0.16) in *Epinephelus areolatus* was recorded by Palani Kumar *et al.*, [17].

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