First report on parasites occurrence and length-weight relationship of the thinspine sea catfish *Plicofollis tenuispinis* (Day, 1877) landed along Veraval centre of Saurashstra coast of Gujarat, India

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Abstract

Present study were carried out on the thin spine sea catfish Plicofollis tenuispinis (Day, 1877) along the Veraval Centre along Saurashtra coast of the India, during the year 2016-17. First time where found that occurrence of marine external parasites which can be suggested for the fish stock life stage indication, and further it will be scope for utilizing parasite as biological tag studies due to its cheap biological less harmful, larger size. The length – weight relationship of Plicofollis tenuispinis based on the total of 310 samples which is includes 143 males and 167 females in addition to 1137 samples for catch estimation. Results of present study were found that these species along the Veraval coast indicating that allometric growth.

Keywords: Thin spine sea catfish, Length – weight relationship, Biological tag.

Introduction

The Catfishes belong to one of the abundantly diverse group of species order under the Siluriformes. Species richness of Catfishes of the world are represented by at least 3,407 species in over 37 families and represents approximately 10.8% of all fishes and 5.5% of all vertebrates of the world, Jonathan[1]. Family Ariidae (Pisces Siluriformes) includes 27 genera and 153 species of tropical and sub-tropical marine catfishes (anadromous or semi-anadromous) Froese and Pauly[2]. The family Ariidae comprises of catfish distributed mostly in the hot and tropical waters of both, estuarine and marine habitats Muhammad *et al*[3]. The genus *Ariopsis* is found in north of the equator whereas the genus *Plicofollis* formerly known with *Arius* is established in the southern hemisphere Castro Aguirre *et al*[4]. The present investigation carried with objective to study on length-weight relationship and suitability of parasites for purpose of thin spine sea catfish stock identification.

Materials and methods

Location: Veraval fishing harbour (20°54'912"N, 70°21'355"E), Which is situated along the western coast of Gujarat, India.

Design: Multistage stratified random sampling.

Materials used for the study: Samples were collected by utilization of following materials were such as the *Plicofollis tenuispinis* landed at Veraval fishing harbour (Nos. 25/week) specimens identified with FAO species identification sheet of the western Indian Ocean area FAO 57, Bailly[5]. Measuring board, Electronic balance (capacity = 5 kg, sensitivity = 50 g) Electronic balance (capacity = 200 g, sensitivity = 10 mg), Insulated box (5 kg, capacity), Labels, Cloth for wiping out surface slime and wastes materials, Specimen bottles, Forceps, Scissors, Formalin (5% concentrated), Compound microscope, Ocular and stage micrometer and Vernier caliper for the various stages of the maturity ova diameter measurements studies during season of the parasitic occurrence.

Multi stage stratified random sampling method developed by CMFRI will be followed for estimating the monthly and annual catch of Thin spine sea catfish *Plicofollis tenuispinis* landed by trawlers at Veraval fishing harbor of Saurashtra coast of the Gujarat. 25 fishes will be randomly collected from different areas on a weekly basis, Srinath *et al*[6]. The fishes will be cut opened to get their gut and gonad. The gut will be cut opened for the collection, identification and recording the number of items in each category, with their weights and number. The volume of each prey category will be recorded.

Length – weight relationship will be calculated separately for both the sexes as using following equation described by Lecren[7].

$$W = aL^b$$

Where: W = weight, a = constant, L = length, b = slope

Von Bertalanffy growth parameters viz., asymptotic length (L_∞) and growth co-efficient (K) will be determined using the ELEFAN I (Electronic Length Frequency Analysis) module of FiSAT-II, Gayanilo *et al*[8].

Procedure for collection and Preservation of parasite indicator species on *P. tenuispinis*: Present study first time were observed that occurrence of external parasites on caudal peduncle region of *P. tenuispinis* infected with the external parasites were observed during month of March to May during the 2016 at Veraval. Procedure followed were as; Record the place of collection, date and specimens number on the field notes. samples of the parasite infected marine catfish host was collected from the commercial landings at Veraval and carefully identified externally only dead specimens were collected and as if live parasites may infect the handlers to prevent it by collecting them using hand gloves, forceps and other accessories can be used. collected samples were kept in thermo coal box in upper and lower layer Ice, followed by middle layer with samples were carefully brought from the landing sites to laboratory by the cycles and sometime by Auto rickshaw were used for transportation. Photos of the samples were collected and site of parasite attack, their numbers on individual samples of host, external symptoms were recorded. Identification of host and parasite at possible taxonomic level. The host were dissected for the noticing the maturity stage of the host and recording of the specific life stage at which parasite were commonly encountered. Preservation of the parasite specimens and host gonads in 4% formalin in preservation glass jar then cover with lids.

Results and discussion

Length frequency of *P. tenuispinis*: The size of monthly sample was range from 100 - 25 in number which is used as length based stock assessment during current study on *P. tenuispinis* in addition to 310 samples for biological studies. The results of length frequency of *P. tenuispinis* were given in Table-1 and Figure-2. The lowest length class observed during present study was 16 to 18 cm, which considered as length at recruitment and first capture. The highest length was recorded were is 63cm during the month of December and its estimated mean weight were using FiSAT-2 software was 2521.95g (2.52kg) and lowest length mid class was 17 mm and its mean weight 52.52 g.
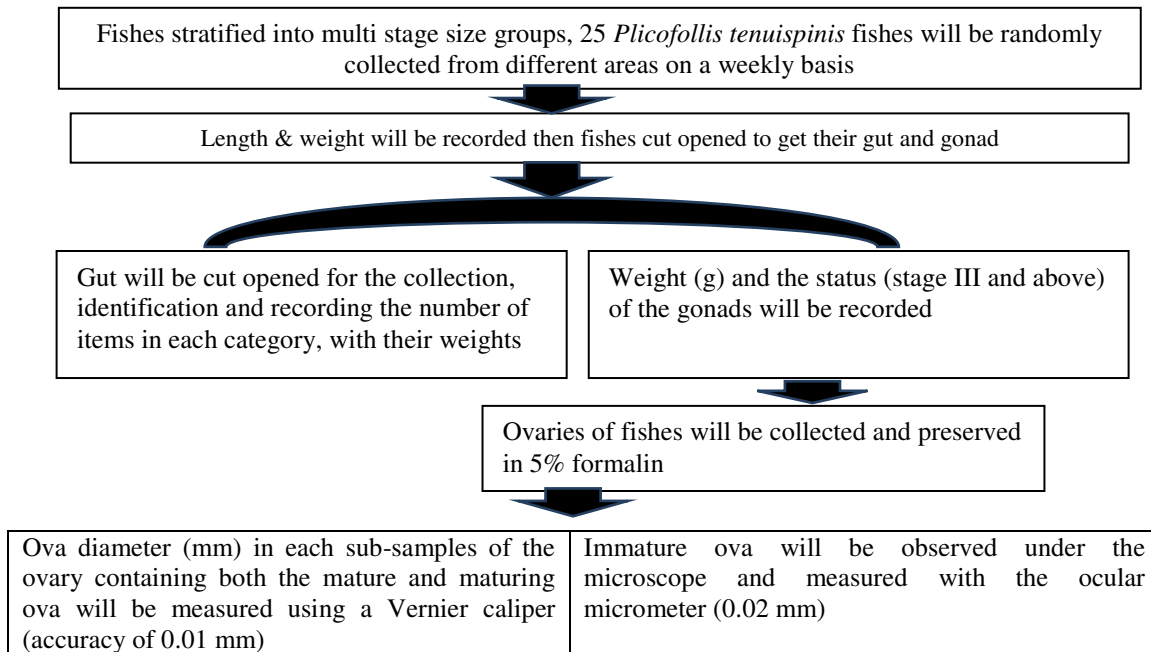

Fishes stratified into multi stage size groups, 25 *Plicofollis tenuispinis* fishes will be randomly collected from different areas on a weekly basis

Length & weight will be recorded then fishes cut opened to get their gut and gonad

Gut will be cut opened for the collection, identification and recording the number of items in each category, with their weights	Weight (g) and the status (stage III and above) of the gonads will be recorded

Ovaries of fishes will be collected and preserved in 5% formalin

Ova diameter (mm) in each sub-samples of the ovary containing both the mature and maturing ova will be measured using a Vernier caliper (accuracy of 0.01 mm)	Immature ova will be observed under the microscope and measured with the ocular micrometer (0.02 mm)

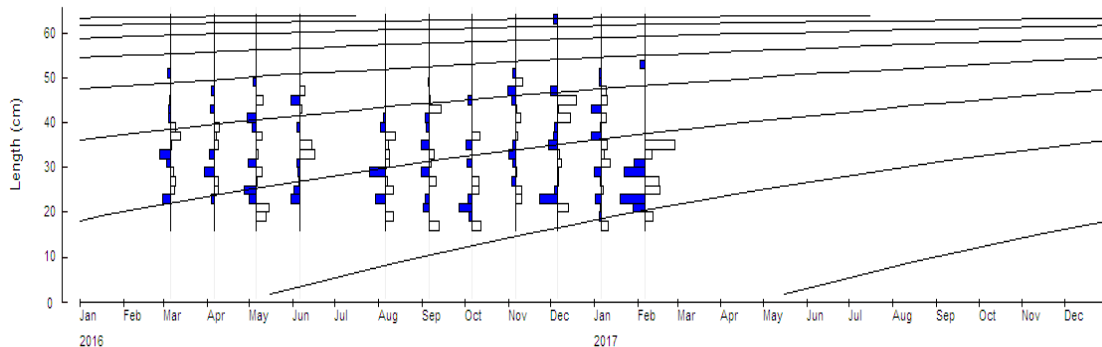**Figure-1** Flow chart of the study procedure followed for data collection of *P. tenuispinis.*

Figure-2: Results on Length Frequency analysis of *P. tenuispinis* (ELEFAN1).

Table-1: Length groups range of the *P. tenuispinis* landed by trawl net and gill net.

Month	Length group (cm) range	Sample size (Numbers)
March 2016	22-52	125
April	24-48	102
May	20-50	102
June	24-48	100
August	20-42	106
September	18-50	100
October	18-46	100
November	24-52	100
December	22-64	102
January 2017	18-52	100
February	20-54	100
Total (year)		1137

Length weight relationship: Males and Females individual length and weight were used for estimation of length-weight relationship separately and pooled length-weight relationship. Using formula calculated as

$W = aL^b$

Males; $W = 0.012*TL^{2.9498}$ (Regression $r^2 = 0.926181$; Table-2)

Females; $W = 0.0125*TL^{2.9575}$ (Regression $r^2 = 0.9402$; Table-2)

Since there was no significant difference was found between the slopes of males and females at 5% level of significance, a pooled length weight relationship was obtained.

Pooled; $W = 0.012*TL^{2.958}$ (Regression $r^2 = 0.93412$; Table-2)

The current study establishes the slopes of regression equation for *P. tenuispinis* was significantly difference at 5% from the Isometric value b=3, results showing present study that the allometric growth for the *P. tenuispinis*.

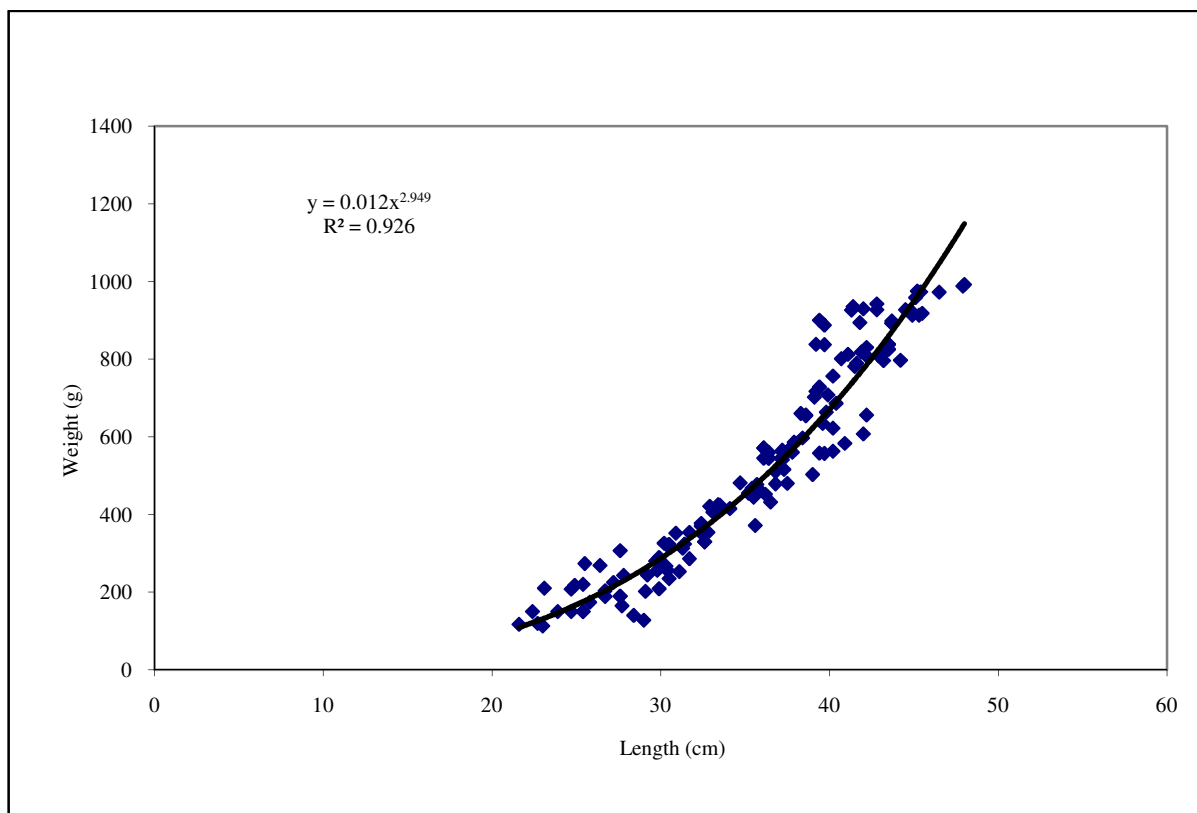Results of length-weight relationship were males and females shown in Figure-3 and Figure-4.

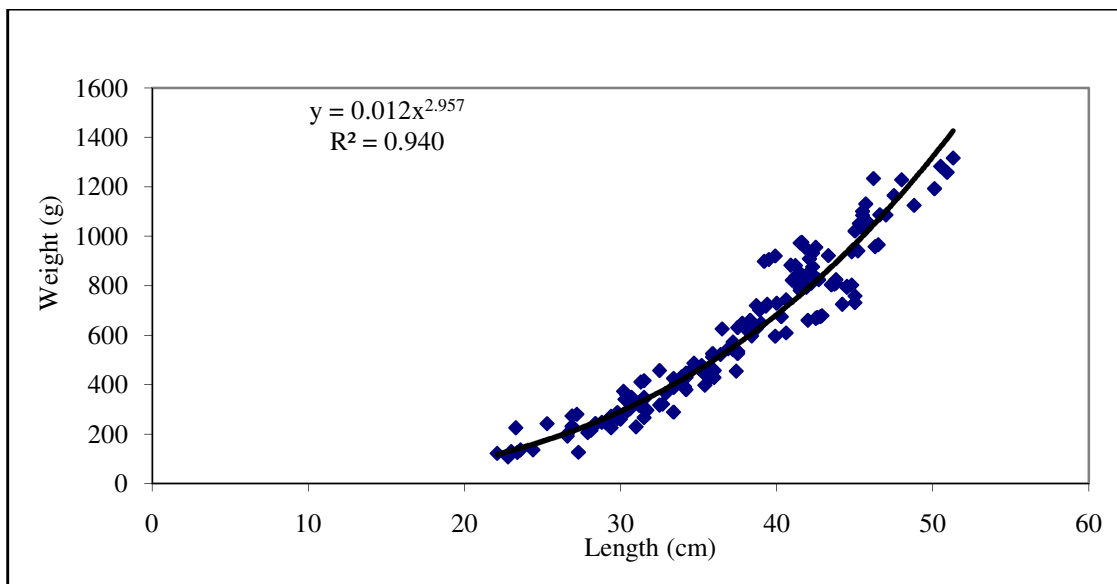**Figure-3:** Length weight relationship of Males.

Figure-4: Length weight relationship of Females.

Figure-5: View of Veraval Fishing Harbour during Fishing ban Season.

Figure-6: Measuring of length and Recording of weight.

Figure-7: Glass bottles with 4% formalin used for preservation of samples.

Table-2: Comparison of Regression lines of male and Female *P. tenuispinis* using ENCOVA.

Source	d.f.	ssx	ssy	spxy	Reg. coef	Deviations from regression				
						d.f.	S.S.	M.S	F	Prob
Within										
Males	143	5.18	48.678	15.284	2.950	141	3.593	0.025		
Females	167	5.97	55.543	17.657	2.957	165	3.323	0.020		
						306	6.916	0.023		
Pooled W	310	11.15	104.222	32.941	2.954	307	6.917	0.022		
		Difference between slopes				1	0.00016	0.00016	0.0072	0.932
Between B										
W+B	309	11.25	105.348	33.267		308	6.940			
		Between adjusted means				1	0.023	0.024	1.053	0.306

Note: if probability <0.05 then significant at 5% level, if probability <0.01 then significant at 1% level. d.f= degrees of freedom; ssx= sum of square of the x; ssy = sum of square of the y; sum of square of the xy; Reg. coef= regression coefficient; S.S. = sum of square; M.S= mean of sum of square; F = F test table value; Prob= probability;

Table-3:

Length weight (L-W) relationship	a	b	regression square (r^2)
Males	1.42E^{-05}	2.949814	0.926181
Females	1.38E^{-05}	2.957495	0.940171
Pooled	1.36E^{-05}	2.958149	0.93412

The studies along the Mumbai waters on *P. tenuispinis* and *Arius caelatus* reported that isometric growth rate for both *A. caelatus* and *P. tenuispinis* were found from the Length-weight relationship W = 0.00419 TL $^{3.263}$ (R^2 = 0.899) and W = 0.0306 TL $^{2.720}$ (R^2 = 0.953) as given by Sawant *et al*[9]. *P. tenuispinis* at Bay of Bengal in Bangladesh coastal waters worked out by Das *et al*[10]. They has noticed that a Length weight relation were Log W = -0.8772 + 2.2562 Log TL which indicated the species showing the allometric growth pattern. The current study on *P. tenuispinis* at Veraval found slightly allometric growth pattern in both sexes, which was nearly similar to that Das *et al*[10]. The length-weight relationship of eleven species of marine catfishes from the northern Arabian Sea coast of Pakistan carried out by Farooq *et al*[11].

First report on occurrence of marine external parasites during the spawning season of the *P. tenuispinis* at Veraval: First time occurrence of large external parasites were found during the month of March to May in 2016 which is the spawning season of the *P. tenuispinis* at Veraval noticed during the present study.

It is well known that less harmful parasites can be utilized as biological tags, indicators for the host fish stock identification, life stage, sex, spawning area, locating, and occurrence of habitat. Present study observed that these parasites were very commonly occurring on the matured induvial of the *P. tenuispinis* specifically on the caudal peduncle region. Symptoms observed on host *P. tenuispinis* were as these parasites are causing reddish swelling on the attached region on the host.

As were observed specimens photos are given on Figure-8 and 9.

Conclusion

Present study will rivaling that reporting the occurrence of the marine Isopodan parasites on the caudal peduncle region of thin spine sea catfish stock landed at Veraval coast during the its spawning season from March to May. Results of the Length-weight relationship pointing towards the allometric growth pattern in *P. tenuispinis.* Study were revaling that current study finding we can be applicable in fish stock identification using cheap biological parasitic tags for the fisheries management supporting studies which provide adequate information for the managers by indicating the thinspine sea catfish stock.

Acknowledgement

Figure-8: Isopodan parasites on caudal peduncle region of *P. tenuispinis.*

First noticed by Bhukya Bhaskar at Veraval coast on 25th March 2016, India.
Figure-9: Ventral view of ventral side of Isopod parasite recently caught *P. tenuispinis.*

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