JKAU: Mar. Sci., **Vol. 24**, No. 1, pp: 17-26 (2013 A.D. / 1434 A.H.)
DOI : 10.4197/Mar. 24-1.2

Biometry of Stellate Puffer *Arothron stellatus* (Bloch & Schneider, 1801) from Shatt Al-Basrah Canal

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Abstract. One specimen of stellate puffer *Arothron stellatus* was caught by local fisherman from Shatt Al-Basrah canal during June 2011. Biometry was measured including morphometric and merestic characteristics. Total and standard length was 431.4 and 360.2 mm respectively. Ratio of different morphometric characteristics to total length were detected, the highest was 59% for Preanal fin length, while the lowest was 3.9% for eye diameter. There were 4 vertebrae in the dorsal fin base, 6 vertebrae in the post anal fin and the total vertebrae were 17, branchiostegal rays were six rays.

Introduction

Tetraodontidae is a family of primarily marine and estuarine fish of the Tetraodontiformes order. The family includes many familiar species which are variously called puffer fish, balloon fish, blowfish, bubble fish, globefish, swellfish, toadfish, toadies, honey toads, sugar toads, and sea squab (Froese and Pauly, 2011). The scientific name of this family refers to the four large teeth, fused into an upper and lower plate, which are used for crushing the shells of crustaceans and mollusks, their natural prey. There are 185 species of puffers in 28 genera, (Oliveira *et al*., 2006). They are most diverse in the tropics and relatively uncommon in

the temperate zone and completely absent from cold waters. They are typically small to medium in size (Keiichi & Tyler, 1998). Species of *Arothron* are widely distributed throughout the tropical region of the Indo-Western Pacific: Red Sea and East Africa, North to Southern Japan (Matsuura, 1994). Southeast Atlantic: South coast of South Africa (Su and Tyler, 1986; and Froese and Pauly, 2011).

The Puffer genus *Arothron* is characterized by having each nostril with two fleshy tentacles formed by bifurcation of a single base, and having a continuous lateral line without the supra-anal branch (Fraser-Brunner, 1943). The stellate puffer *Arothron stellatus* is considered as the giant among puffers reaching a total length well in excess of a meter (Froese and Pauly, 2011). Puffer fish are generally believed to be the second–most poisonous Vertebrae in the world, after the Golden Poison Frog, and most of the cases of poisoning have been reported to be caused by marine species of the family Tetradontidae (Noguchi and Ebesu, 2001). Several studies were done on the toxicity of these fishes (Berry and Hassan, 1973; Kan *et al.,* 1987; and Monaliza and Samsur, 2001).

Diversion canal (Shatt Al-Basrah) had been constructed due to several devastating floods and also to other purposes (Al-Ramadhan, 1988). Shatt Al-Basrah Canal was constructed to by-pass the excesses of water from Tigris and Euphrates to Arabian Gulf through Khor Al-Zubair. This canal is located between 47^{o} 45 - 47^{o} 49 longitude and $30^{o}18^{-}$ - $30^{o}39^{-}$ latitude.

In Iraqi marine water, there were several studies carried on fish species structure, Northwest Arabian Gulf (Hussain and Naama, 1989; Ali and Hussain, 1990 ; and Mohamed *et al*., 2005), Mohamed *et al.* (2001) listed *Lagocephalus lunaris* to be belonged to Tetraodontidae family. Limited studies were carried in Shatt Al-Basrah Canal concerning the species structure of fishes. Yousif (1986) showed the occurrence of some marine species and did not mention the occurrence of Tetraodontidae species. Jassim (2002) exhibit the availability of 22 species. Another study of Ali (1985) on fish assemblages in Khor Alzubair revealed 34 species belonged to 26 family, Younis (1990) record the existence of 41 species in Khor Abdullah, 35 species were Osteichthyes and six species were Chondrichthyes.

Materials and Methods

One specimen of stellate puffer *A.stellatus* was caught by local fisherman from Shatt Al-Basrah Canal during June 2011, using seine net. In the laboratory of Fisheries and Marine Resources, different characters of morphometric and meristic were measured, total and standard lengths of the fish were determined by scale measurement to the nearest 0.1mm, lengths of different parts were taken by using digital vernier, rays of the fins were counted using dissecting microscope. Numbers of vertebrae were calculated after removal of the skin and muscles. Count of vertebrae of the basal dorsal and anal fins, pre and post dorsal, pelvic and anal fins and abdominal vertebrae were executed. Then the sample was boiled to remove the skin and muscles to calculate the total of vertebrae.

Results

Table 1 shows different biometry measurements of the stellate puffer *A.stellatus*, in comparison of the measurements of Kuthalingam *et al*. (1973). Twenty seven morphometric characteristics and five merestic measurements were detected, total and standard lengths were 431.4 and 360.2 mm respectively. Ratio of different morphometric measurements characteristics to total length were detected, the highest was 59% for preanal fin length and the lowest was 3.9% for eye diameter. Dorsal, pectoral and anal fins had 11, 18, 11 rays respectively, Caudal fin had two unbranched rays and nine branched rays.

Table 1. Morphometric and merestic of *A.stellatus* in Shatt Al-Basrah canal compared with one specimen from the literature. (TL, total length; HL, head length; DFL, dorsal fin length; AFL, anal fin length; PFL, pectoral fin length; NA, not available).

Morphometric Characters (mm) and Ratios	Present Specimen	Kuthalingam *et al.* (1973) Specimen
Total length (TL)	431.4	380
Standard length (SL)	360.2	294
% TL	83.5	77.4
Head Length	119.8	115.9
%TL	27.79	30.5
Eye diameter	16.83	16
% TL	3.9	4.2
Head depth	121.21	NA

Morphometric Characters (mm) and Ratios	Present Specimen	Kuthalingam *et al.* (1973) Specimen
% TL	28.1	
Head width	86.77	NA
% TL	20.11	
Maximum mouth width	44.97	NA
% TL	10.42	
Interorbital distance	64.04	66
% TL	14.85	17.4
Preorbital distance	60.6	59
% TL	14.05	15.5
Postorbital distance	42.44	NA
% TL	9.84	
Body depth	134.34	130
% TL	31.14	34.2
Body width	92.56	NA
% TL	21.46	
Predorsal fin length	234.61	230
% TL	54.38	60.5
Prepectoral fin length	132.39	NA
% TL	30.68	
Preanal fin length	257.3	185
% TL	59.64	48.7
Preanus length	243.22	NA
% TL	56.38	
Postdorsal fin length	75.45	NA
% TL	17.49	
Posanal fin length	60.49	NA
% TL	14.02	
Caudal peduncle length	74.7	62
% TL	17.32	16.3
Caudal peduncle depth	61.41	50.2
% TL	14.24	13.2
Dorsal fin height	62.28	67.3
% TL	14.44	17.7

Morphometric Characters (mm) and Ratios	Present Specimen	Kuthalingam *et al.* (1973) Specimen
Anal fin height	56.44	65
% TL	13.08	17.1
Pectoral fin length	50.12	50.9
% TL	11.62	13.4
Dorsal fin base length	30.62	NA
% DFL	49.17	
Anal fin base length	27.03	NA
% AFL	47.89	
Pectoral fin base length	33.22	NA
% PFL	66.28	
Caudal fin length	71.2	85.9
% TL	16.5	22.6
Merestic Characters		
Number of dorsal fin rays	11	11
Number of pectoral fin rays	18	18
Number of anal fin rays	11	11
Number of caudal fin rays		
Unbranched	2	NA
Branched	9	9
Number of branchiostegal rays	6	NA

Table 2 illustrates number of the vertebrae of various regions of this species. There were four vertebrae in dorsal fin base, six vertebrae in the post anal fin and the total vertebrae were 17.

Table 2. Numbers of vertebrae of different regions of *A.stellatus.*

The parts	Number of vertebrae
Vertebrae of the basal dorsal fin	4
Vertebrae of the basal anal fin	2
Vertebrae of the pre dorsal fin	6
Vertebrae of the post dorsal fin	7
Vertebrae of the pre anal fin	9
Vertebrae of the post anal fin	6
Abdominal vertebrae	9
Caudal vertebrae	8
Total vertebrae	17

Figure 1 indicates internal skeleton and total number of vertebrae of this species. The number of vertebrae were nine abdominal and eight caudal. Figure 2 displayed the four large teeth, fused into an upper and lower plate, The branchiostegal rays were six rays (Fig. 3). Caudal fin had two unbranched rays and nine branched rays (Fig. 4).

Fig. 1. Internal skeleton shows total number of vertebrae of *A.stellatus* collected from Shatt Al-Basrah Canal.

Fig. 2. Mouth of *A.stellatus.*

Fig. 3. Branchiostegal rays of *A.stellatus.*

Fig. 4. Caudal fin of *A.stellatus.*

Discussion

The external morphology of specimen agrees with the description of Kuthalingam *et al.* (1973). Many studies had been done on the poisons of Puffer fishes. Iin early 1970^{s}, three species of puffer were collected from Malaysian water, one of them was *A.stellatus*, which was found to be toxic and caused mouse lethality (Berry and Hassan, 1973). Al-Daham (1984) explained that this species was widely distributed throughout the Indian Ocean and the Red Sea but occurred in a little number in the Arabian Gulf. The dorsal fin and anal fin of this species had 10-11 rays, while in our study and Kuthalingam *et al.* (1973) study, they had 11 rays.

As far as the present authors are aware, only one study has given morphometric and meristic characteristic of the stellate puffer collected from Vizhinjam (Kuthalingam *et al.*, 1973), other studies have given the total and standard lengths or number of fin rays (Carpenter *et al.*, 1997; Kulbicki *et al*., 2005; Survey report, 2009; and Froese and Pauly, 2011). In the comparison with the other studies, the maximum size reached by this species 600, 900, 750, 535, 1200 mm as mentioned by Matsuura (1994); Carpenter *et al.*(1997); Kulbicki *et al.*(2005); Survey report (2009); Froese and Pauly (2011) respectively, while the size of the present specimen was 431.4mm. From the previous studies in Iraqi water none of them mentioned to the occurrence of the stellate puffer *A.stellatus* in Shatt Al-Basrah Canal, therefore our work on meristic and morphometric characteristics of this species is the first study to record this species in Shatt Al-Basrah Canal.

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الصفات المظهرية والعددية لسمكة العنيز النجمي *Arothron stellatus* (Bloch & Schneider, 1801) في قناة شط البصرة

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المستخلص. اصطيد نموذج واحد من سمكة العنيز النجمي *Arothron stellatus* من قناة شط البصرة خلال شهر حزيران ٢٠١١م من قبل صياد سمك. سجلت الصفات العددية والمظهرية، كان الطول الكلي والقياسي ٤٣١,٤ و ٣٦٠,٢ ملم على التوالي. أخذت نسبة الصفات المظهرية المختلفة إلى الطول الكلي، كانت أعلى النسب ٥٩٪ للمسافة قبل الزعنفة الشرجية، بينما أقلها ٣,٩٪ لقطر العين. توجد أربعة فقرات لقاعدة الزعنفة الظهرية، وست فقرات بعد قاعدة الزعنفة الشرجية وكان العدد الكلي للفقرات هو ١٧ فقرة، عدد الأشعة الخيشومية العظمية ستة أشعة.