OCCUREENCE, FOOD NATURE, AGE AND GROWTH OF ORBICULATE BATFISH *Platax orbicularis* (EPHIPPIDAE) IN IRAQI TERRITORIAL MARINE WATERS

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ABSTRACT

A total of 313 Orbiculate batfishes *Platax orbicularis* were studied from the Iraqi marine waters at the shallow tip of the Arabian Gulf during the period from March to September 2015. This species is an omnivore (planktivorous) which migrate between surface and bottom for feeding activity. Length –Weight relationship and growth rate were calculated for the 222 specimens. The highest growth rate calculated was 5.16 which occurred at length group 23-27cm equivalent to age group I^+. The Iraqi marine waters were indicated as feeding ground but not spawning ground.

INTRODUCTION

Iraqi marine waters at the most north-western part of the Arabian Gulf are characterized by high fish diversity where 512 species belonging to 58 families were recorded as (1) demonstrated the presence of 16 cartilaginous species and 109 bony fishes species.

The family Ephippidae encompasses eight fish genera with sixteen species. Among this family, several types of protective mimicry are shared by some genera; *Platax orbicularis*, *P. teira* and *P. boersii* in the Indo-Pacific and *Chaetodipteru sfaber* in the Atlantic. The orbicular batfish *P. orbicularis* also has a broad distribution. It is found throughout the Indo-Pacific systems, from the Red Sea and East Africa, northwards to the Tuamoto Islands, southern Japan, and southwards to northern Australia and New Caledonia, and is also associated with coastal environments such as reefs and mangroves (2).

In the Arabian Gulf, two species i.e. *P. teira* and *P. orbicularis* have been recorded previously (3) with apparent juvenile cryptic mimesis, resembling and behaving like dry leaves near the water surface(4). Although some studies have analyzed the feeding and social ecology of these species, including aspects of mimetic behavior, there is no particular study focusing on their allometric growth patterns nor their biology in the Arabian Gulf area. It is important to consider allometric growth data as both species suffer changes in shape, behavior and habitat use at specific growth phases (2; 5; 4; 6; 7). *P. orbicularis* was explored to assess growth tendencies during the transition of the species between mimetic and non-mimetic life stages. The differences in morphology of juveniles and adult attracted scientists to further investigation the interested shift in body shape and diet from juveniles to adults. The juveniles occurred near the surface while the adults live in more deeper layers (5).

The Orbiculate batfish is a species which has only recently been grown in aquaculture. This species is reared in Taiwan and Polynesia and also produced on a small scale in Thailand for the ornamental market. More scientific literatures was traced concerning the food nature of juveniles of batfish (Barros *et al*., 2008), beside further concerned about the transition from pelagic to benthic while other researches dealt with dietary and shape changing from juveniles to adults (7).

MATERIALS AND METHODS

Fish samples were collected from the Iraqi marine waters at the north-west part of the Arabian Gulf (E 48˚. 45̀- 48˚.50̀) (N 29˚.48̀-29˚.45̀) (Fig. 1) during the period extended from March to September 2015 by using trawl nets. A total of 313 fish were collected and examined. Measurements of total length (TL) and total weight (W) were taken for all fishes. The digestive tracts of 180 fish were examined for food contents.

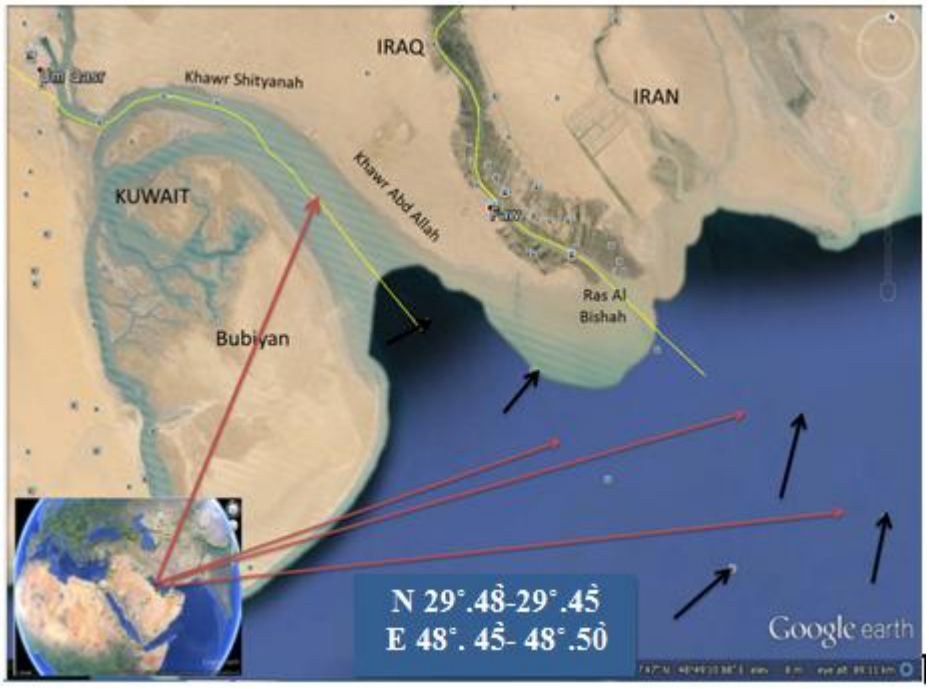

Fig. (1): Map of sampling orbicular batfish *P. orbicularis* collected from the Iraqi marine waters.

The relationship between the total length and weight was calculated according to the following equation W= a L^b where X axis represented the total length , Y axis represented the other parameter, a and b are constants calculated from the data set. The equation of (8) was used to establish the relationship between increasing length with unit of time [(L2- L1)/ (t2-t1)] and with average length [(L1+ L2)/2] to give a straight line as follow:

K = - b *Loo=a/-b*

The values of K and L_∞ are measured by using the draft of (9) while the value of t_o was measured by the following equation that derived from the above equation: $t_0 = \{ \ln (L_\infty - L_t) + K_t - \ln L_\infty \} / K$

For feeding study, digestive tracts were removed and gave a degree of fullness (between 0 and 20) then opened in a Petri dish to count different food items. Frequency of occurrence and point methods were used to analyze food items (10). Index of relative important (IRI) was calculated according to the following formula of (11):

IRI = Pw× F

Where Pw is weight percentage of food item and F is its frequency of occurrence.

RESULTS

The distribution of total length frequency for all 313 fishes was shown in figure (2). It illustrated the existence of 19 length groups with dominant group of 32 cm (15.3% of total fish), followed by group 34 cm (11.5% of total fish). Total lengths of fishes were ranged from 20 to 56 cm and weight from 623 to 5442 gm.

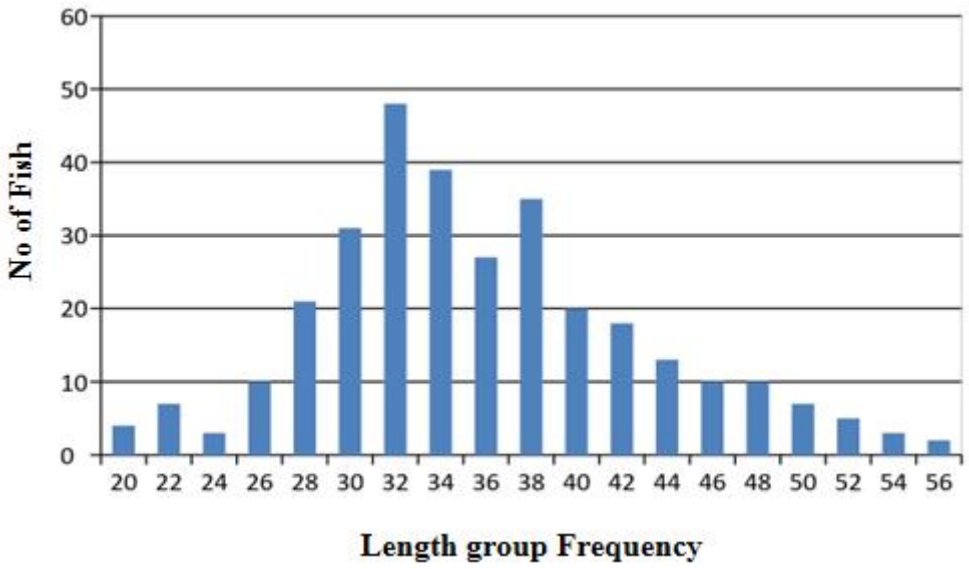

Fig. (2): Length group frequency of orbicular batfish *P. orbicularis* from Iraqi marine waters.

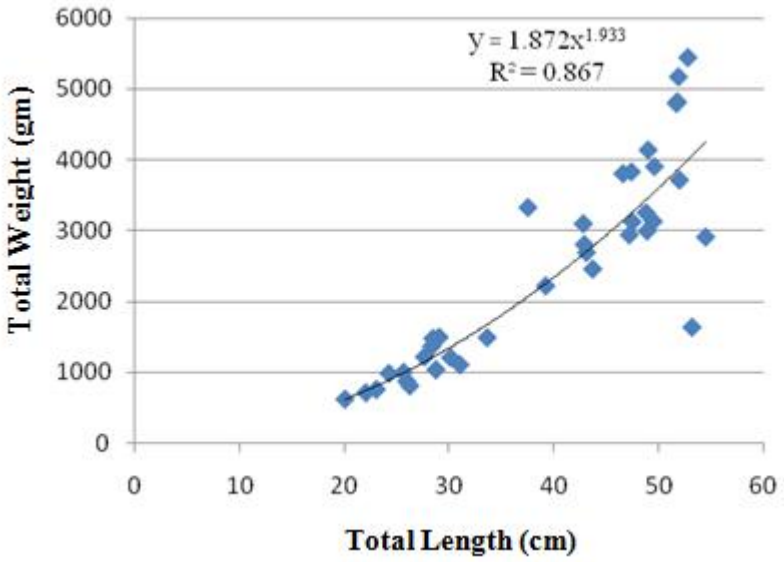

Fig. (3): The relationship between total length and weight of orbicular batfish (slope value 1.933).

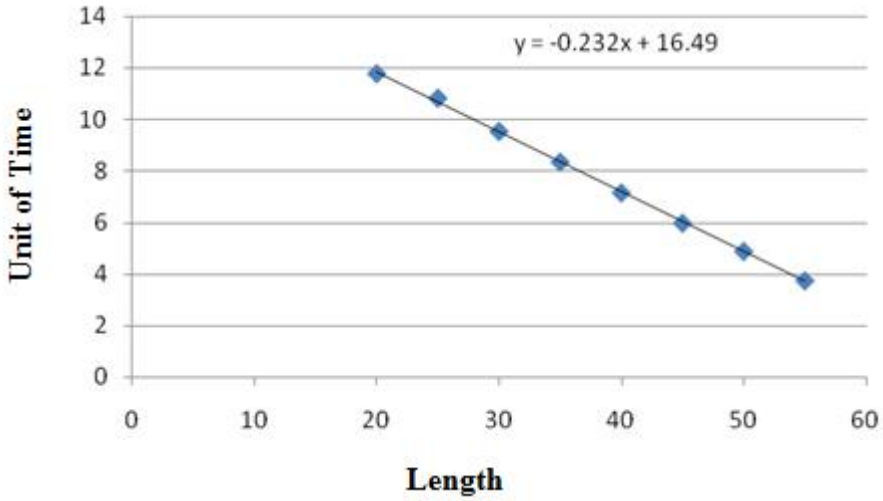

Fig. (4): The relationship between increase length and unit of time (*K* = 0.23 and L∞=70.9) for orbicular batfish.

The exhibited length groups and numbers of *P. orbiculaisr* were exploited to apply cohort analysis technique. Six age groups were showed containing a minimum age of I+ at lengths of 18-23 cm. The oldest age group VI^{+} encompassed fishes of 53-57 cm lengths (table 1).

Food analysis was demonstrated according to the values of the index relative importance (IRI). Algae scored the highest percentage (58%). Food composition dominance of batfish is followed by zooplankton (21.6%) , benthic invertebrates (13.2 %) coming in third rank and finally digested matter which represented only (5.7 %) of the diet composition as depicted in figure (5).

Table (1): Analysis the length of generation for orbicular batfish *P. orbicularis*.

L. Group	Mean T.L	No. of fish	t_1	t_2	tΔ	$\bar{T}$	Ln (N/ Δt)
18-22	20	45	1.26	1.60	0.34	1.43	**4.88**
27-23	25	65	1.69	2.06	0.37	1.87	**5.16**
32-28	30	62	2.16	2.58	0.42	2.37	**4.99**
37-33	35	19	2.69	3.17	0.48	2.93	**3.811**
42-38	40	15	3.30	3.86	0.56	3.58	**3.28**
47-43	45	8	4.0	4.67	0.67	4.33	**2.48**
52-48	50	5	4.85	5.67	0.82	5.26	**1.80**
57-53	55	3	5.89	6.96	1.07	6.42	**1.030**

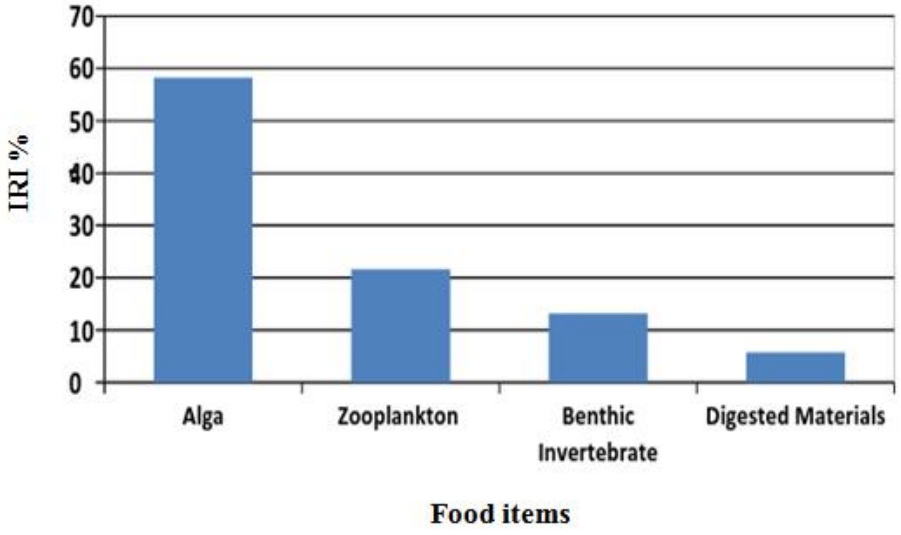

Fig. (5): Diet composition of orbicular batfish (index relative importance (IRI) from Iraqi marine waters.

DISCUSSION.

Occurrence of batfish in Iraqi marine waters seem to be odd, since these waters represent the estuarine part of the Arabian Gulf beside the area characterized by muddy substratum and virtually no coral reef exists.

(12) miss recording batfish from the Arabian Gulf because most of their fish samples were collected from deeper waters. Again, (13) failed to record batfish from Kuwaiti waters. On contrary, (14) and (15) recorded batfish from the waters of Qatar and Bahrain. (16) mention that

this species occurred at eastern coast of Saudi Arabia and United Arab Emirates. It seems that batfish occurs on the shallow side of the Arabian Gulf, associated with existence of coral reefs.

The existence of medium and large sizes (20 -56 cm) indicated that the Iraqi marine waters representing a feeding ground and not spawning ground due to the disappearance of juveniles and small size specimens as younger fish stay at the coral reef and the spawning grounds (2).

The deviation of batfish length-weigh correlation from the generalized formula for other fishes is due to the body shape which compressed laterally and not the normal fusiform correlation between the total length and weight (17). Current results which calculated from the relationship of the total length of the four types of weight values b at this study did not deviate significantly from the value 3, coincided with values of b. The relationship of length weight may vary not only between species and even between individuals within the same sex and this is due mainly to seasonal variations in the growth, development of the gonads, the level of nutrition and the rate of deposition of fat in the body (18; 19). Younger ages of batfish of age II^{+} scored the fastest and higher length increment (5.66) occurred at length group of 23-27 cm followed by the next length group (28-32) with increment of (4.99). As its well known in fish biology, most higher and fast increment in length occur at younger age stages (20).

One of the explanations for the occurrence of batfish in Iraqi marine waters could be due to availability of important plankton food resources as phyto- and zooplankton since the Iraqi marine waters is characterized by high primary productivity coincides with winter and spring blooms followed by zooplankton flourishing as suggested previously (21). It seems that batfish feed near the surface mostly on phytoplankton and to lesser extent on zooplankton and migrate toward the bottom to supplement their diet with existed invertebrates, since the tip of Gulf is considered as a very shallow area. Consequently, the batfish could be considered as an omnivorous fish with a tendency to be planktivorous; a conclusion which also confirmed by (5).

تواجد وطبيعة تغذية وعمر ونمو اسماك الوطواط ORBICULATE BATFISH *Platax orbicularis* (EPHIPPIDAE) في المياه الاقليمية البحرية العراقية

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الخلاصه

جمعت 313 سمكة *Platax orbicularis* Orbiculate batfish في هذة الدراسة من المياه البحرية الضحلة في الخليج العربي للفترة من اضهر الى ايلول 2015. ان هذا النوع مختلط التغذية والتي تنشط تغذيتها من خلال هجرتها بين السطح والقاع. علاقة الطول بالوزن والنمو حسبت ل 222 عينة. كانت الزيادة في النمو 5.16 التي ضهرت في مجموعة الطول 23-27 سم في العمر النسبي الاول. اتضح ان المياه البحرية العراقية منطقة تغذية وليس تكاثر لهذة الاسماك.

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