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A Study on The Nutritional Value of Razor Clam *Solen Dactyls* (Mollusca: Bivalvia) in The Ghouban Tidal Channel (Persian Gulf) By Measuring of Their Total Lipids, Carbohydrate and Protein

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Abstract

This research took place to study to measure the total lipids and total protein content in a dominant razor clam of *Solen dactyls*. In the Gabon tidal channel situated in the north west of the Persian Gulf, 10 specimens of Jack knife clam *S. dactylus* were collected randomly in autumn 2016 and spring 2017 from 4 stations. The clam is one of the most important species of the solenoid that inhabit in high and mid intertidal sandy-muddy beach.
After sampling live specimens were transferred immediately to the laboratory and stored at -80°C until use. The total amount of protein with Kjeldahl method, carbohydrates with AOAC method*s* and total lipid by soxhlet methods respectively were measured three repeats. The results showed the amount of protein of *S. Dactyls* in autumn season was 17.93±1 and in spring 13.58±0.06 and results of fat in autumn season was 6.43±2.77 and in spring were 4.87±0.04 as well as in carbohydrates in autumn 3.12±0.01 that showed and in spring its 0.98±0.235. The values of protein, fat and carbohydrate levels showed that the value of fat and protein in autumn was slightly higher than spring. Due to the presence of gametes which are included fats. The result showed that *S. dactylus* is a generic clam and the gametogenic cycle began in the autumn season and spring season.

INTRODUCTION

Razor shells and jackknife clams from solenidae family. *Solen dactylus* (Von Cosel, 1989). The family solenidae is an edible bivalve that have high value economics and price in the market (Baron et al., 2004). Solen dactylus is one of the most important species of Solenidae, which like other species of Solenidae inhabits high and mid intertidal sandy– muddy beaches (Bruyne, 2003) along the Oman Sea and the Persian Gulf (Bosch, 1982). They inhabit soft bottoms in shallow water from the intertidal zone down to a depth of 110 m about 60-65 living species of Solenidae are presently known. They are predominantly tropical and subtropical with the distribution center in the Indo-West Pacific and only a few species in temperate zones. *S. dactylus* has an elongated and long shell with one small tooth in each valve (Baron et al., 2004). This bivalve also form an edible source for the shrimp and coastal population. For example, human populations in south of Iran coastal areas depend on certain molluscs (e.g. *S. dactylus*) as sources of food(Niamaimandi,2011).

Therefore, thus know about the biology of these species can be studied in the management of fish stocks and the reproduction, aquaculture of fishery, food management and treatment also important. Due to importance knowledages about this species and studiy about value for assessment resources and food management are important.

The aim of this study was to measure the amount of total lipid, carbohydrate and protein in the razor clam *S. dactyuls* in the Ghouban tidal channel in the north of the Persian Gulf. This region has very high salinity (56-58ppt) and very warm temperatures in summer. The Ghouban tidal is part of the international shadegan ponds that place in the south of the Persian Gulf. The people from this area there are called Malalis. The fishermen for taking them, put straight wire and collect the razor shell.

Materials and methods

Specimens of razor clams (*S. dactylus*) were collected seasonally from autumn (Desember 2016) to spring (May 2017) in the Ghouban estuary (fig1). Sampling of this shell was carried out at 4 stations in Ghouban Estuary. In this estuary, there is a lot of razor clam and available. 20 samples were captured by hand with excavation hole (fig2). All razor clam collected put on ice and immediately transfer to the lab and after measuring the length and width of jack knife and stored at (-80) Centigrade until use.

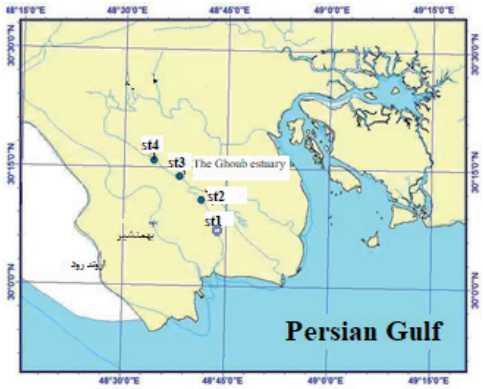

Figure 1: Map showing the locations of sampling stations.

Figure 2: Images of different parts of *S. dactylus*

Sample preparation and biochemical analysis

For biochemical analysis, shell of the *S. dactylus* was removed and flesh was dried with filter paper to avoid the outer water content.

Total lipid was determined according to (AOAC,1990) assy by using petroleum ether extraction from small samples. Sample (5gr) was refluxed in soxhlet system with 200 ml petroleum ether for 6 hour. The over plus solvent was removed by evaporation under vacuum and dried in a to a constant weight in a air oven. lipid content was expressed as a percentage of dry sample weight (AOAC,1990).

The Kjeldahl method or in analytical chemistry is a method for the uantitative determination of nitrogen contained in organic substances plus the nitrogen contained in the inorganic compounds ammonia and ammonium (NH_3/ NH_4^+) (Kjeldahl, 1883).The Kjeldahl method was performed according to the method of the AOAC International. About 1 g of sample was hydrolyzed with 15 mL concentrated sulfuric acid (H2SO4) containing two copper catalyst tablets in a heat block at 420 Centigrade for 2 hours. Then cooling, after neutralization and titration, H2O was added to the hydrolysates. The amount of total nitrogen in the samples were multiplied with both the standard1factor of 6.25 and species conversion factors in order to determine total protein content.

Sulphuric acid method proposed by Kemp and Van Kitz (1954) was used to estimate carbohydrate; Determination of glycogen plus glucose. Muscle (25-75 mg.) are ground with 5 ml of the deproteinizing solution in a centrifuge tube; a stainless-steel pestle with longitudinal grooves which fits closely into a cylindrical centrifuge tube has proved useful for this purpose. One ml. of the clear supernatant fluid is added to 3 ml. of H2S04 in a wide test tube and mixed by vigorous shaking. The mixture is heated in a boiling-water bath for exactly6-5 min. and subsequently cooled in running tap water. The intensity of the pink colour produced is measured spectrophotometrically at 520 nm and the glycogen concentration read from a standard curve in terms of glucose equivalents. SPSS version 17 and Excel 2007 software were used for statistical analysis and plotting all graphs.

RESULTS AND DISCUSSION

Average of 10 species *S. dactylus* were calculated the length (cm) , wide (cm) and the length to width ratio (Table 10).

The average protein in the autumn season was 17.93 ± 1 and in the spring season 13.85 ± 0.066 percentage by

weight. Thus the highest average protein was recorded in the autumn with an average of 17.93%(fig3). Thus the results show that there are a significant difference between the two seasons ($p \leq 0.05$).

Table 1. Average of Length (cm) , Width (cm) and length-to-width ratio of *S. dactylus*

Length to width ratio	Width (cm)	Length (cm)	o.
5.23	1.7	8.9	1
5.8	1.8	10.6	2
6.06	1.5	9.1	3
5.64	1.7	9.6	4
5.9	1.5	8.9	5
5.18	1.6	8.3	6
6	1/1	6.6	7
5.6	1.6	9.0	8
6.125	1.6	9.8	9
6.18	1.6	9.9	10
5.77	1.57	9.7	mean

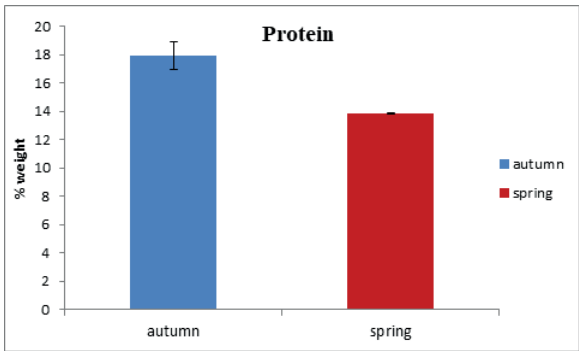

Figure 3. The average protein of *S. dactylus*

The mean of total lipids in the autumn season was 6.43 ± 2.77 and in the spring was 4.87 ± 0.04(fig4).

The results show that there are no significant difference between the autumn and spring seasons.

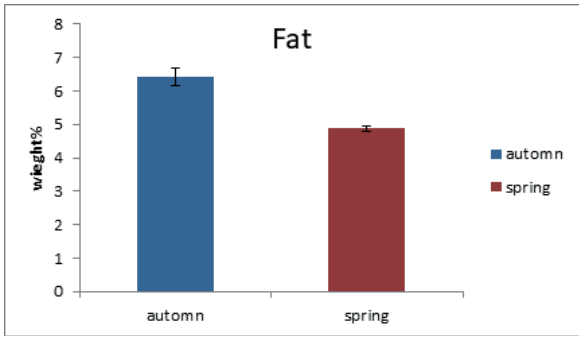

Figure 4. The average total lipids of *S. dactylus*

Average carbohydrates in autumn 3.12 ± 0.01 and in spring was 0.98±0.235 weight percentage(fig 5).Thus the results show that there are a significant difference between the two seasons ($p \leq 0.05$).

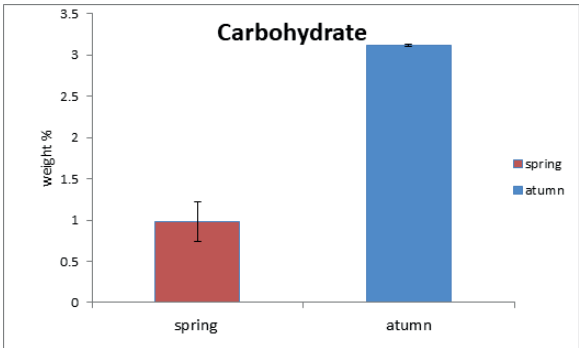

Figure 5. The average carbohydrates of *S. dactylus*

S. dactylus is not able to close its shell completely; therefore, the posterior and anterior of the shell always remain open. Due to lipid, protein and carbohydrates have increased in the autumn compared to the spring season that it can be related to the sexual gonads in this, gonads contain sexuall cells and have oocytes and fat and have organic substance. In spring that cells, reducing fat and proteins.

In general, the amount of fat, protein, carbohydrate in the muscle of the fish varies in different species. This quantity depends on the type of nutrition, living environment, age, sex of the animal. The gametogenesis cycle begins in September and ends in the May. *S. dactylus* spawned from January to March and after from march to end of February to enter a sexual rest (Saeedi et al., 2013). Saeedi study on razor clam in 2 season in Bandar abbas the result showed that the amount of protein in autumn season was 11.30 % and in the spring was 11.79 %. The amount of fat showed in the autumn was 0.86 % and in the spring was 0.55% thus result shows the amount fat and protein have increased in autumn season that exactly similar to this study (Saeedi et al., 2009).

Another study on *Anodonta cygnea* in the Anzali lagoon that result showed the amount of protein in the autumn season, 12% and in the spring was 10% as well as the amount of fat in autumn 4% and in the spring was 3% (Saeedi & Ashja Ardalan, 2010). The result of reproductive biology of *Solen reseomaculatus* that's showed the spawning time start in spring to the end of summer (Hosseinzadeh, 2004). The result showed that the amount of total protein was 16.09 % and total fat was 1.19% record . That result was near to this study, therefore the amount of total lipid in S. *dactylus* were more than *Mytella sp.* And the amount of protein in tow shells is the same (Craralho et al., 2007). Measurement of protein, fat, and carbohydrate levels showed that fat and protein and carbohydrate levels are higher in the autumn than spring, due to the presence of sexuall cells which are included fats.

However, the values of total lipid of *S. dactylus* was higher in the autum(ripeness) compared to spring. The spring, most of the razor clams are in their sexual rest stage. *S. dactylus* is a gonochoric razor clam like *S. marginatus*.

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