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Research Article

Seasonal variation of proximate composition of *Istiophorus platypterus* from Visakhapatnam fishing harbor, East Coast of India.

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Abstract: Seasonal variation of proximate composition (moisture, protein, fat and ash) of *Istiophorus platypterus* was analysed for one year (January 2016 to December 2016) from Visakhapatnam fishing harbor, east coast of India. The results indicated that the proximate composition of the fish depends on season. The total mean values of moisture percentage was found more in monsoon (78.36±0.09) season, followed by pre-monsoon (77.90±0.12) and post-monsoon (77.81±0.17), whereas protein content was found more in pre-monsoon (18.38±0.09) season followed by monsoon (17.45±0.09) and post-monsoon (16.52±0.09) season, the fat percentage was accumulated more in the season of post-monsoon (2.15±0.07) followed by pre-monsoon (2.13±0.12) and monsoon (1.81±0.10), while ash content observed high in post-monsoon (3.15±0.16) followed by monsoon (1.97±0.08) and pre-monsoon (1.46±0.150 season respectively.

Keywords: East coast of India; Proximate composition; sail fish; seasonal variation; Visakhapatnam.

Introduction

Fishes are important resources of high grade protein and other organic products. They are more significant source of animal protein and have been widely accepted as a good source of protein and other elements for the maintenance of healthy body. (Andrew 2001). Fishes are the majority assorted group among all living vertebrates with more than 24,600 extant species currently known. They are identified by their morphological characters like appearance, shape, scales and fins *etc.* Protein, fat and moisture percentage of fish is imperative to consumers, scientists and manufacturers from many aspects including nutritional value, seasonal variant ions and considerations regarding processing (Murray and Burt, 2001).

The studies of biochemical analysis of fish muscle are of interest in terms of assessing fish quality, nutritional and edible value and to expand technology for processing fish, fish products and preservation (Mridha *et al.,* 2005). In addition, biochemical experts and people are interested in calorie content of the food they eat, necessitate information on biochemical composition. Worldwide fish are a main source of food for human nutrition, thus providing a considerable quantity of protein and lipid. (Vivekanandan and Jayasankar 2008). Fish constitutes a more chief component of the diet for several people and often gives the much-needed nutrient that is not afforded by the cereal-based diets (Clucas and Sutcliffe, 1981). Nutrition has been mentioned as one of the most important reasons why consumers are concerned to marine food (Gall *et al.*, 1983).

Seafood, particularly finfish endow with a major source of essential nutrients such as vitamins, proteins, fats and minerals which help in the maintenance of life to man (Rao *et al.,* 2016). Primary composition of fish is 16-21% protein, 0.2-25% fat, 1.2-1.5% mineral, 0-0.5% carbohydrate and 66-81% water (Love, 1970). In fish, fats are known to be an vital energy source for reproduction, since large amounts of lipids are required both for female (egg production) and for male (breeding activities, such as enhanced swimming activity, parental care courtship, competition, and nesting) (Goda *et al.*, 2007; Ebrahim nezhadarabi *et al.*, 2011).The objective of the present study was intended to examine monthly changes in proximate composition of *Istiophorus platypterus* in the Visakhapatnam fishing harbor, east coast of India..

Material and Methods

Istiophorus platypterus were collected in fresh condition biweekly from fishing boats operating from north-east coast of Visakhapatnam, Andhra Pradesh during the period January 2016 to December 2016. To prepare the sample for determination of proximate composition, approximately 100 – 200gms of edible muscle (free from scales and skin) was dissected from the dorsal region below the dorsal fin. Samples were washed with distilled water and the excess water was

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removed with blotting paper. The samples were sealed in polyethylene bags and kept frozen at -20 °C until further analyses.

The moisture content was determined using the oven drying method described in AOAC (AOAC, 2000), Kjeldahl method was used to determine the crude protein content of the samples (James, 1999). Acid hydrolysis method (AOAC, 2000) was used to determine the total fat content of the samples. The total ash content of each sample was measured using Pearson's method (Ronald *et al*., 1991). This method involves oxidation of all organic matter by incineration in a furnace at a specified temperature (550°C) for about 5hours. All of the chemicals used in this work were high purity GR grade. The data generated from the results of the present study were presented as mean ± standard error (SE) and statistically analyzed by one-way ANOVA using Origin Pro 8 to determine the variations among the mean concentrations of moisture, protein, fat and ash in *Istiophorus platypterus* during different seasons at 1% or 5% significance level.

Results

The mean values of proximate composition of *Istiophorus platypterus* were shown in table 1 and graph 1 respectively. The overall mean values of proximate composition had shown in figure 1. The moisture value forms the chief component of the biochemical composition. With an annual mean and standard error values of moisture content throughout the year from Visakhapatnam fishing harbour were recorded. Highest moisture (79.60±0.08) percentage in the month of August 2016, followed by 79.58±0.10 was observed in the month of October and 78.68±0.07 in the month of November respectively. In seasonal wise observation, more amount of moisture percentage was observed in monsoon (78.36±0.09) season followed by Pre-Monsoon (77.90±0.12) and post-monsoon season (77.81±0.17) respectively. The overall mean values of protein percentage throughout the year from Visakhapatnam fishing harbour were recorded highest protein (18.59±0.07) percentage in the month of July 2016, followed by 18.54±0.09 was observed in the month of June and 18.41±0.09 in the month of April respectively. In seasonal wise observation, more amount of protein content was observed in pre-monsoon (18.38±0.09) season followed by Monsoon (17.45±0.08) and post-monsoon season (16.53±0.09) respectively.

With an annual mean and standard error values of lipid content throughout the year from Visakhapatnam fishing harbour were observed as highest fat percentage (2.67±0.08) in the month of December followed by 2.64±0.10 and 2.45±0.09 in the month of January and May correspondingly. Seasonally, the total mean values of fat percentage (table 2) were represented as high in the post-monsoon (2.15±0.07) followed by pre-monsoon (2.13±0.12) and monsoon (1.81±0.10) respectively. Monthly variations of ash content shown that highest value was observed in the month of November (3.35±0.09) followed by January (3.28±0.10) and February (3.19±0.35) and lowest ash percentage was recorded in the month of April (1.34±0.09), whereas in seasonal wise observation, post-monsoon season had highest ash percentage (3.15±0.16) followed by monsoon (1.97±0.08) and pre-monsoon (1.46±0.15) respectively.

Table 1. Monthly wise proximate composition of *Istiophorus platypterus*

Season	Month & year	Moisture %	Protein %	Lipid %	Ash %
Pre-Monsoon	Mar-16	78.15±0.09	18.41±0.13	2.29±0.15	1.53±0.32
	Apr-16	78.33±0.12	18.41±0.09	1.47±0.15	1.34±0.09
	May-16	77.53±0.12	18.16±0.05	2.45±0.09	1.54±0.10
Monsoon	Jun-16	77.57±0.13	18.54±0.09	2.32±0.08	1.43±0.08
	Jul-16	76.61±0.10	18.59±0.07	2.43±0.08	1.55±0.08
	Aug-16	79.60±0.08	16.75±0.13	1.54±0.14	1.64±0.10
	Sep-16	77.64±0.07	17.70±0.09	1.70±0.08	2.58±0.07
Post-monsoon	Oct-16	79.58±0.10	16.76±0.08	1.57±0.11	2.12±0.05
	Nov-16	78.68±0.07	16.67±0.09	1.15±0.04	3.35±0.09
	Dec-16	77.80±0.18	16.37±0.02	2.67±0.08	2.79±0.11
	Jan-16	77.37±0.08	16.57±0.13	2.64±0.10	3.28±0.10
	Feb-16	77.38±0.34	16.49±0.11	2.15±0.06	3.19±0.35

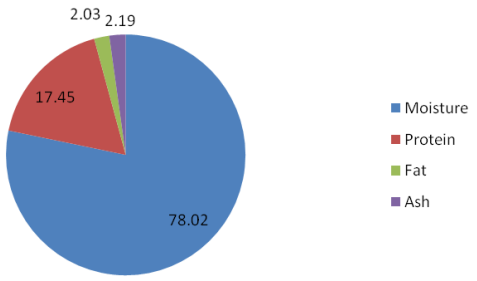
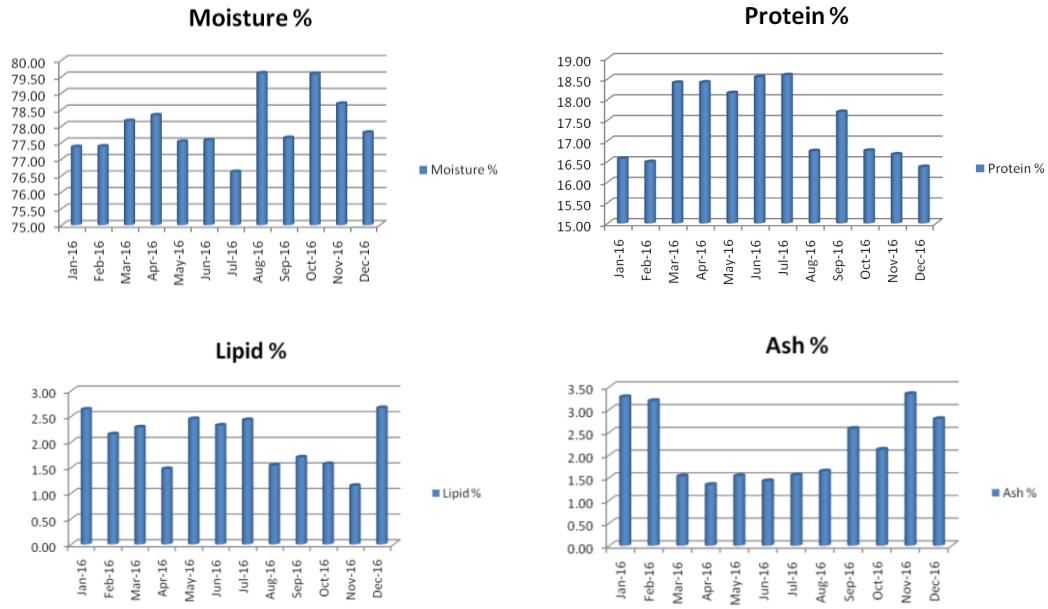


Figure 1. Overallmean values of proximate composition of *Istiophorus platypterus*

Graph 1. Monthly wise proximate composition of *Istiophorus platypterus*



Discussion

Seafood are noteworthy division of a healthy diet where they have high quality protein and other indispensable nutrients and are squat in saturated fatty acids and may have omega-3 fatty acids (Geetha *et al*., 2016). Proximal chemical composition in seafood edible part were presided by numerous factors, including species, feed and season, growth stage (Yanar *et al* 2004; Rao *et al*., 2016). According to FAO (1999) water and fat percentages in edible part of seafood are inversely related and their amount is approximately 80% with other components accounting for the remaining 20%. This inverse relationship has also been statement in marine fishes such as, *P. seudosciaena aeneas* and *Johnius carutta* (Rao and Rao, 2002), *Mullus barbatus* (Lloret *et al*., 2007).

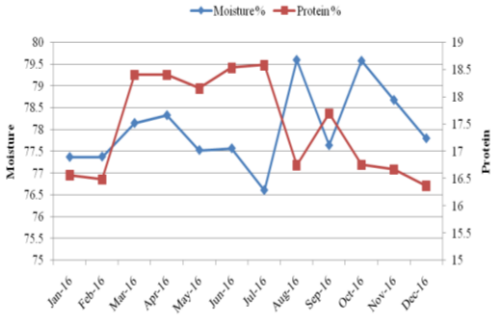
The proximate composition of fish varies greatly from one species or one individual to another based on the starvation and intensive food intake periods (Huss, 1995) and external factors such as salinity and temperature (Zlatanos and Laskaridis, 2007). Changes in moisture and lipid signify that while there was a decline in moisture content, lipid content obviously augmented due to heavy feeding during this period, which is in good agreement with previously reported results by Huss (1995). Moisture has slight role in nutrition whereas it is imperative from technological point of view (Rao *et al*., 2016). The moisture was inversely related to lipid content in the present study. The protein digested and incorporate is mostly integrated in the edible part of the fish (Dabhade *et al*., 2009). Fat content in the fishes increases due to the utilization of plankton rich food (Venkataraman and Chari, 1951). Several authors have reported inverse relationship between the moisture and protein. Decreases in the protein content lead to augment the water content (Love, 1970).

In the present study, the protein content in *Istiophorus platypterus* of monsoon season is comparable with works of Nurjanah *et al* (2015). The protein levels of *Istiophorus platypterus* was comparable with the protein values reported by Ali (2012) whereas increase was noted from March reaching peak levels in September where maximum numbers of mature fishes were found. Decline in protein content was noticed from October (spawning period) to February, coinciding with post-spawning period. Such depletion in muscle-protein during spawning period has been reported in many fishes (Love, 1970). Lipids are the prime energy storage substance in fish (Love, 1970; Adams, 1999; Tocher, 2003). Fat content is a good index of prospect survival in some species (Simpkins *et al*., 2003) and a strong indicator of reproductive prospective in some fish stocks (Marshall *et al*., 1999).

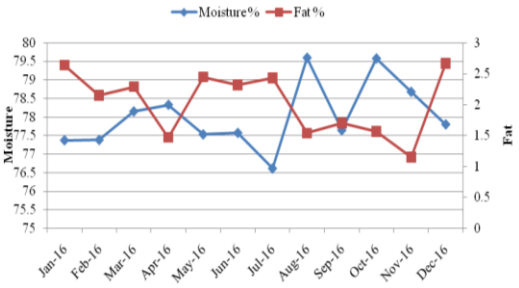
Lipids play a momentous role in membrane biochemistry and membrane mediated processes such as osmo-regulation, assimilation of nutrients and transport in fishes but the nature and magnitude of lipids in fish diverge within species and habitat (Kumaran, 2013). Ash is a measure of the mineral content of some food including fish (Omotosho *et al*., 2011). The concentration of minerals and trace elements that contribute for the total ash contents are known to differ in fish depending on their increasing weight, feeding behavior or length of fish (Hassan, 1996) season, ecosystem, environment and migration even within the same area (Abdallah, 2007). The content of ash varies with the time of storage due to absorbance

of moisture and loss of protein (Hassan *et al.*, 2013). In the present study, inverse relationship found in moisture and protein; moisture and fat in the month of August and protein and fat inverse relationship was found in the month of April, which was comparable to previous studies (Gokoglu *et al.*, 1999; Love, 1997; Nurnadia *et al.*, 2011) and graphically represented (Graph 2, 3, 4).

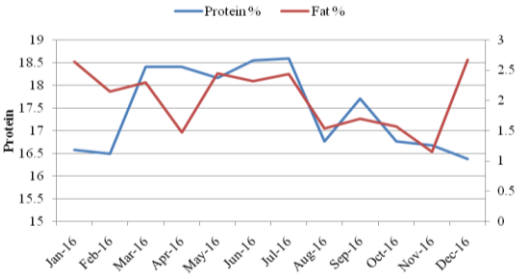
Graph 2. Inverse relationship between moisture and protein



Graph 3. Inverse relationship between moisture and fat



Graph 4. Inverse relationship between Protein and fat



Conclusion

The present study provides information on seasonal variation of proximate composition of *Istiophorus platypterus*. The results indicated that the fish resources analyzed contain high protein content, and hence can be exploited commercially for meeting protein requirements.

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