



Biochemical Composition and Nutrient contents of *Tilapia Zilli* from Barechi Lake, District Badin, Sindh, Pakistan

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Abstract: The present study on biochemical and nutrient contents of *Tilapia zilli* was enumerated from August 2015 to July 2016 from Barechi Lake, district Badin Sindh, Pakistan. A total of 30 fish samples ranged from 10.0- 15.0 cm in total length and 21.0- 67.5 grams in weight were taken into consideration. It was observed that the range of percentages of moisture, protein, fat and ash contents were 77.06-79.45%, 15.02-17.11%, 1.8-2.9% and 0.95-1.4% respectively. It was noticed that highest percentage of moisture was observed in the month of May (79.45%) and lowest in January (77.21%). In case of protein highest percentage was observed in the month of January (17.11%) and lowest in the month of February (15.02%). The percentage of fat was the high in the month of March (3.2%) and the low in the month of August (1.2%). In case of Ash content, it was the highest in the month of February (1.4%) and the lowest in the month of November (0.95%). Finally it was concluded that in the month of January *Tilapia zilli* found to be more rich in terms of nutrition.

Keywords: Bio-chemical composition, *Tilapia zilli*, Protein, Lipid, Moisture, Ash.

1.

INTRODUCTION

Fish group attributed as the third largest consumed product by people worldwide along with vegetables and rice (Hels *et al.*, 2003). Particularly the fish possesses the quality of being most important, fulfilling energy needs for humans because of having necessary nutritional components (Ojewola *et al.*, 2006 and Sutharshiny and sivashanthini 2011). Generally, the chemical makeup of the great number of the fish species for their moisture, protein and lipid contents includes about 70-80%, 20-30% and 2-12% respectively (Rose and Connolly 1993). Yet the chemical constituents and nutrients makeup of fish meat largely depends on the consumption of the food type and habit of feeding (Grant, 1997). Hence, the chemical makeup of fish flesh reveals the type of food available for fish consumption and it also indicates its feeding habits (Ahraf *et al.*, 2011). Fish has four major components such as water, protein and lipid along with ash in smaller quantities that comprise overall edible structure of fish body. The percentage of moisture, protein, fat and ash contents overall comprises of approximately 96-98% (Nowsad 2007). It is not only good for indication of nutritional value but it is also required for fish species quality of preservation and processing (Mridha *et al.*, 2005). Still, the fish species of different groups lack equal nutrient quality levels for their clients (Soriguer *et al.*, 1997 and Takama *et al.*, 1999) because chemical composition in fish body changes by changes in the environment which may be due to different water quality parameters, different feeding conditions, sex of the species, maturity

(Stage Brett *et al.*, 1969 and Javaid *et al.*, 1992) and capturing situations Oliveira *et al.*, (2003). Protein contents of fish provide rich source of some important amino acids as methionine, tryptophan, lysine, threonine and cysteine, FAD (2013). These vital amino acids ultimately provide health benefits for humans (Limin *et al.*, 2006). Most of the countries of tropical region are facing enormous nutritional deficiency problems due to low levels of proteins in their diet (Eyo 2001). The utilization of fish as part of diet has overall beneficial effects (Limin *et al.*, 2006) in major problems for diseases in heart (Mozaffarian and Rimm 2006), stroke, degeneration of muscle in elder people and ultimately the prevention of brain damage Peet and Stokes (2005). Lipids are molecules composed of fatty acid and glycerol that makes up the fats and oils. Water in the form of moisture, is necessary for all organisms to maintain homeostasis in the body. Fish meat is usually preferred in respect of other white and red meat as it has low levels of lipid and high levels of water when compared with chicken and beef (Nestle, 2000). Every time there appears inverse relationship between water and lipid contents while investigation fish muscle. If in case moisture levels are low in percentage, than fat and protein contents would be seen high in percentage with more energy stored in fat form in fish muscle (Dempson *et al.*, 2004). Ash contents in fish muscle are essential for proper physiological functioning of cells. The percentage of ash in fish muscle and any other food actually reveals the amount of the mineral contents in it (Omotosho *et al.*, 2011). In Asian region tilapias are

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predominantly cultured largely due to their fast growth rate and growing competency, better breeding capability in captivity and due to low trophic level feeding (El Sayed 2006) and Nguyen *et al.*, 2009). Pakistan is one of the Asian countries where most of the rural population consumes fish species with small size and weight for their protein needs due to their low income and inadequate resources. The species of tilapia are available in bulk with low price so that it would easily be afforded by rural population. Yet people prefer fish with taste and size in spite of their nutritional value. The benefits of fish consumption and risk of fish consumption are two important factors which make it necessary for us to judge the biochemical composition of fish. It will also make sure that fish is risk free from consumer's health point of view and contains all necessities of food requirements. Furthermore, the biochemical assessment will also unfold the commercial position and safety levels of fish in the region. *Tilapia zillii* is famous for being cheap and good source of essential protein amongst medium sized fish species for their biochemical composition in order to make it best choice for the people of locality.

2. MATERIALS AND METHODS

Study area:

Samples of experimental fish *Tilapia zillii* were collected from Barechi Lake district Badin, Sindh Pakistan during August 2015 to July 2016, with the help of gillnets on monthly bases. In 30 samples, size ranged from 10.0-15.0 cm in total length and 21.0- 67.5 grams in weight. Obtained samples were kept in the ice box and then brought into the laboratory Institute of Biochemistry, University of Sindh, Jamshoro. These were weighted and dissected issues were taken a part for percentage analysis of protein, fat, moisture and ash contents.

Determination of protein contents

The determination of protein contents of the samples were made by total nitrogen estimated with standard method AOAC (1995). It involves the complete digestion of dried samples at first place. Then the liberated ammonia is distilled into 2% boric acid through distillation process by using bromocresol green methyl red as indicator. Thus the nitrogen amount obtained was changed to percent protein with multiplying total protein by factor 6.25 with following formula:

$$\text{Crude Protein (\%)} = \text{N\%} \times 6.25$$

Determination of fat contents

Fat contents of already homogenized samples were determined by using Soxhlet's method (Adewumi

et al., 2014) for almost 6 hours nearly at 65°C. The evaporation of the solvent contents was followed as fat contents were drawn out. Finally, the drawn out material was weighted and calculated. The percentages of fat were estimated with following formula. Contents of Fat (%) = (extract weight/sample weight) x 100

Determination of moisture contents

The estimation of moisture in muscle tissue samples were determined by applying the standard method AOAC (1995). Before analyzing, the samples were weighted in grams. After weighing the samples were put into an oven for drying at about 105°C for almost 10 hours. After being dry the samples were then immediately cooled with the help of desiccators, and weighted again. In the last moisture estimate was obtained by applying the following equation:

$$\text{Contents of moisture (\%)} = (\text{sample weight loss/sample original weight}) \times 100$$

Determination of ash contents

The determination of ash contents of sample was made possible by burning the sample in a hot furnace at about 600°C until the burning sample becomes white. After burning in furnace the samples were set on desiccators until properly cooled then weighted again. This procedure became possible when followed the standard method AOAC (1995). The percentage ash contents of samples were calculated with following equation:

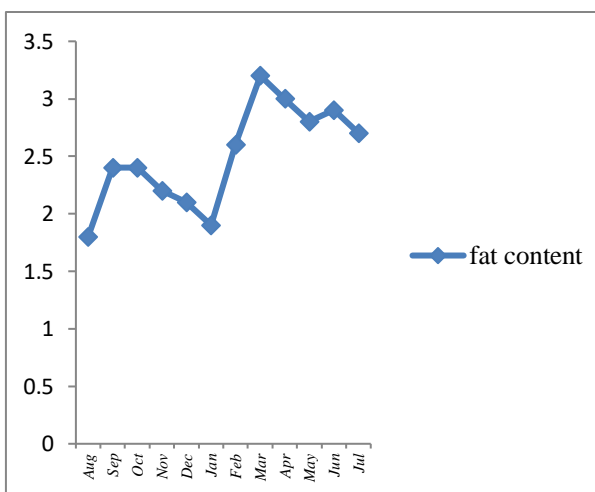
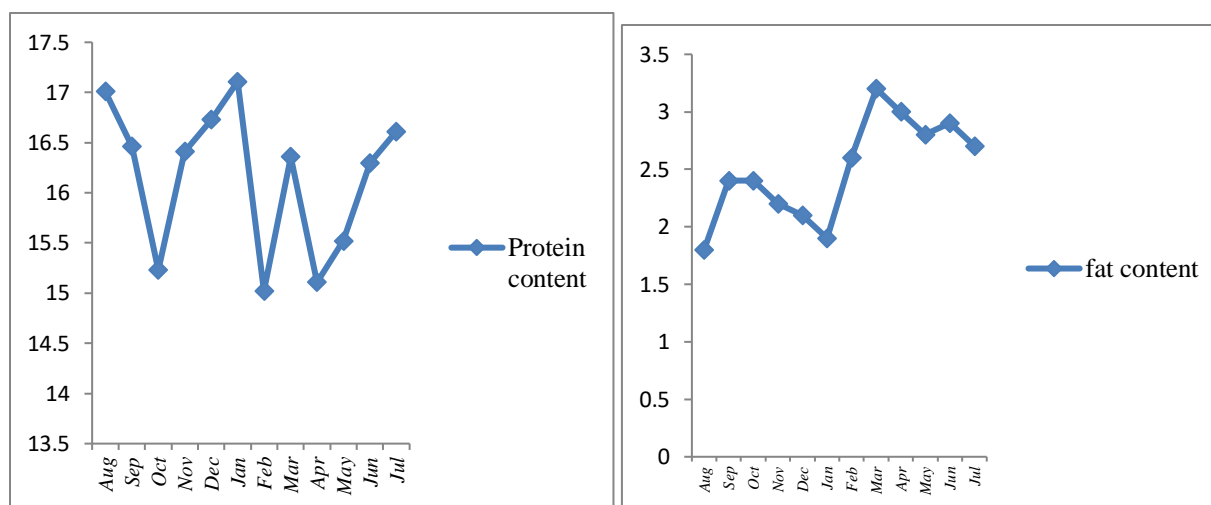
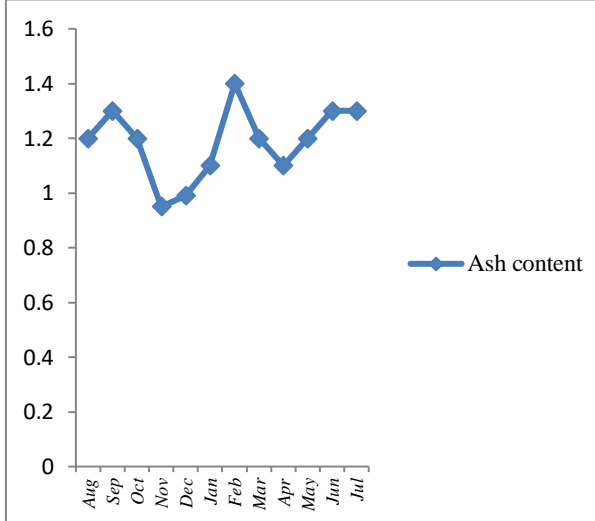
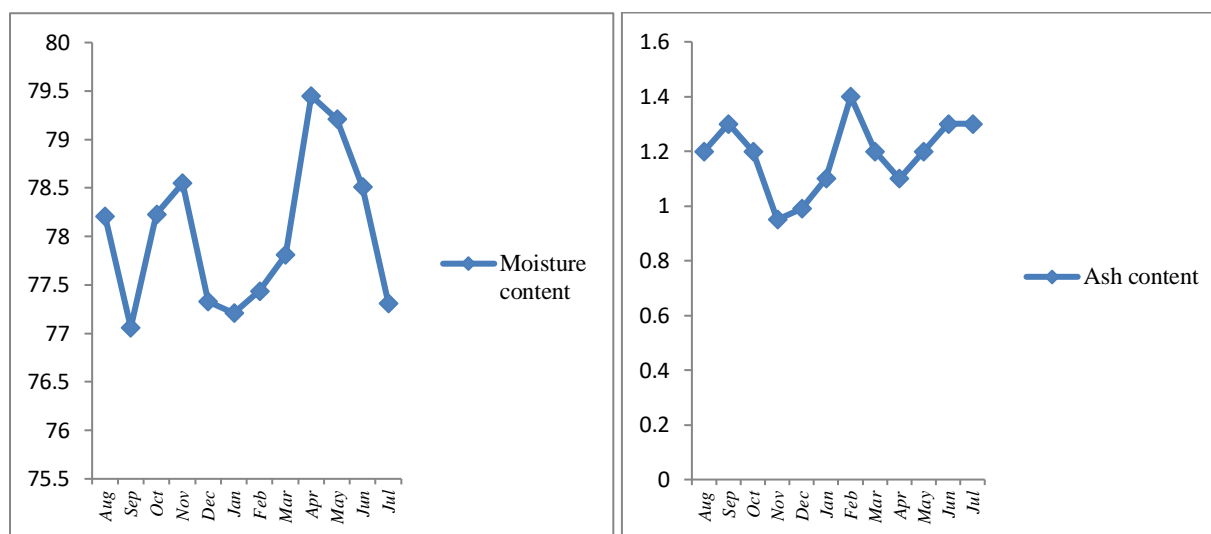
$$\text{Contents of ash (\%)} = (\text{ash weight/sample weight}) \times 100$$

3. RESULTS

The biochemical composition of *Tilapia zillii* from the Barechi Lake, district Badin Sindh, Pakistan was carried out to ascertain nutritional value given in (Table.1). Protein content was ranged from 15.02-17.11%. The fat was 1.8-2.9%. Moisture was 77.06-79.45% and Ash was recorded from 0.95-1.4%. Ash is the inorganic remains which are obtained when all the organic matter is burned off. It is always found in small quantities. It was noticed that highest percentage of moisture was observed in the month of May (79.45%) and lowest in January (77.21%). In case of protein highest percentage was observed in the month of January (17.11) and lowest in the month of February (15.02%). The percentage of fat was high in the month of March (3.2%) and low in the month of August (1.2%) in case of Ash content it was high in the month of February (1.4% and low in the month of (0.95%). It was observed that in the month of January *Tilapia zillii* found to be more rich in terms of nutrition (Table 1 Fig. 1-4).

Table.1; Average biochemical values of *Tilapia zilli* from Barechi Lake in the year 2015-2016.

Months	Protein	Fats	Moisture	Ash
Aug, 2015	17.01	1.8	78.21	1.2
Sep, 2015	16.46	2.4	77.06	1.3
Oct, 2015	15.23	2.4	78.23	1.2
Nov, 2015	16.41	2.2	78.55	0.95
Dec, 2015	16.73	2.1	77.33	0.99
Jan, 2016	17.11	1.9	77.21	1.1
Feb, 2016	15.02	2.6	77.44	1.4
Mar, 2016	16.36	3.2	77.81	1.2
Apr, 2016	15.11	3	79.45	1.1
May, 2016	15.52	2.8	79.21	1.2
Jun, 2016	16.30	2.9	78.51	1.3
Jul, 2016	16.61	2.7	77.31	1.3


Fig.1. Showing average protein content for different months Fig.2. Showing average fat content for different months

Fig. 3. Showing average moisture content for different months. Fig.4. Showing average ash content for different months.

4. DISCUSSION

The moisture was the main constituent of fish flesh and was found high during summer months and lower in winter months. Moisture increase might be due to breeding season and availability of more water and more activeness and vigor of fish. Similarly, protein contents were the second highest contents in fish flesh. Average protein ranged varies during winter and summer, in the present study. Increase of protein content during summer month was also due to the spawning of fish during breeding season.

Present research was design to elucidate the biochemical composition of *Tilapia zilli* from Barachi Lake, district Badin, Sindh, Pakistan. The moisture value in present experiment were ranged between 77.06-79.45% which are overall satisfactory and fall within acceptable levels of (60%-80%) and range of present finding supports the stability of the environmental conditions of the area (Tsegay *et al.*, 2016). Further these obtained results very similar to the results obtained by other researchers such as (Job *et al* 2015) determined moisture ranges from 77.69 to 79.11% by. Khan *et al.*, (2017) elaborated moisture levels in *Tilapia nilotica* which were 80.90% and these values are again very near to the levels obtained in present finding. The protein content for *Tilapia zilli* has been observed within range from 15.02-17.11%. Similar was observed by other researchers like (Job *et al* 2015) reported the variations 15.31-16.32%. The value of fat content was ranged from 1.8-2.9% for biochemical composition of tilapia fish from Barechi Lake. Alike results were also obtained by numerous researchers like (Mehboob *et al.*, 2003 and Job *et al.*, 2015) obtained values of similar range for fat content between 1.20-2.45% displayed nearby values for fat contents ranging from 1.30-2.94% which supports present findings. The levels of ash were within the range of 0.95-1.4%. Alike results were observed by Tsegay *et al* (2016), elaborated estimations during research investigation ranging from 0.81-1.16% which are in agreement with present finding. (Naeem *et al* 2011) have also reported 74.52%, 17.61%, 2.73%, and 5.13% water, Protein, ash and fat contents, respectively, in female population of female *Oreochromis mossambicus*. However, present study on *T. zilli* reports fat contents range 1.8-3.2%. Variation in fat contents might be species specific or due the sex, fish size and season which fish captured.

5. CONCLUSION

It was noticed that highest percentage of moisture was observed in the month of May (79.45%) and lowest in January (77.21%). In case of protein highest percentage was observed in the month of January (17.11) and lowest in the month of February (15.02). Fat percentage was observed high in the month of

March (3.2) and low in the month of August (1.2) in case of Ash content it was observed high in the month of February (1.4 and low in the month of (0.95). Finally decided that in the month of January *Tilapia zilli* found rich in nutrient value, having highest percentage of protein.

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