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Nutritional profiling of some selected commercial important fishes of the Veraval coast

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Abstract
The present study was experimented with to analyze the proximate composition of some commercial species that landed on the Veraval coast. There were six species (Indian mackerel, Little tuna, Seer fish, Hilsa, Croaker, and Pomfret) collected from the Veraval harbor. Nutritional evaluation in which protein, fat, ash, and moisture were carried out by the Association of Official Analytical Chemists (AOAC, 2005) method. The moisture content was found in the range of 64.56±0.32 to 80.10±0.21. The highest protein content observed in *Euthynnus affinis* was 21.78±0.53. Among the selected species crude fat content was highest in *Tenualosa ilisha* (15.29%), the rest of the species have less than 6%. Seer fish (*Scomberomorus guttatus*) content hugely accumulation of ash and is lowest in little tuna. The present study showed that the commercial fish species have a good amount of nutrition that fulfills the human diet.

Keywords: Commercial fishes, Gujarat, proximate composition, human diet

1. Introduction
Gujarat state ranks first in fisheries because it is located on India's west coast and covers one-fifth of the country's coastline as well as an exclusive economic zone. It accounts for approximately 20% of total marine production. The state-wise fisheries production statistics show that Gujarat ranks third in fishery production, trailing only Andhra Pradesh (29.47%) and West Bengal (12.58%), with 8.59 lakh tonnes produced(Commissioner of Fisheries, 2020)[8].Gujarat marine products were exported to six major markets around the world. They were Japan, the United States, the European Union, China, South East Asia, and the Middle East, with exports to the remaining countries grouped under other countries. Fish and other aquatic species are high in protein and are widely consumed in many parts of the world. The world's demand for aquatic foods is increasing, not only due to its growing population but also due to a preference for healthier foods for humans (Aberoumand, 2012) [1].
Seafood is easily digestible due to its lack of connective tissue (Gladyshev et al. 2006) [10], As a result, fish and shrimp are often recommended in special diets. The chemical composition of any edible organism is critical because its nutritional value is reflected in its biochemical contents (Abimorad and Carneiro, 2007) [2]. The nutritional value of fish meat includes moisture, dry matter, protein, lipids, vitamins, and minerals, as well as the caloric value of the fish (Cooper, 2008) [9]. It is beneficial to human functioning and helps to prevent a variety of nutritional deficiencies (Ackman, 1989) [3]. Fish protein is considered slightly superior to any other land animal protein and is nutritionally equivalent to red meat (Agusa et al. 2008) [4]. Protein malnutrition is severe because the country's consumption of animal products is low (Herrador et al. 2015) [11]. Fish is high in protein, polyunsaturated fatty acids, especially omega-3 fatty acids, calcium, zinc, and iron (Alasalvar et al. 2002) [5]. In addition to other animal meat, fish is the only protein source that contains all of the essential amino acids in the proper proportions, a condition known as a complete protein. It is also the poor's only accessible and affordable source of animal protein (Thilsted et al. 2014) [17]. Fish in India and other developing nations provide essential nutrients to a large number of people and help to ensure nutrition security. Fish are high nutrient sources for humans, helping to lower blood cholesterol and reduce the risk of stroke and heart disease (Aberoumand, 2012) [1]. Some proximate profiles, such as protein, lipid, ash, and other nutrient contents, must frequently be determined to ensure that they are within the range of dietary requirements and commercial specifications.

2. Material and Methods

The proximate composition of fish was carried out by the Association of Official Analytical Chemists (AOAC, 2005) [7] method.

2.1 Collection of samples

The fish samples were collected from the Veraval harbor which is located in the western part of Gujarat, India. Those samples were stored at -18 ˚C until further use.

2.2 Estimation of moisture

A 10-gm sample was taken and put in a petri dish that had already been weighed. The oven was set to 105 °C. The sample was left there for the whole night, with the weight being checked periodically until it stabilized. The percentage of moisture present in the sample was calculated from the difference between the beginning weight and final weight of the petri dish containing the sample.

$$\text{Moisture content (\%)} = \frac{M1 \times 100}{M2}$$

Where
M_1 = Loss in gm in the mass of the sample
M_2 = Mass in gm of the sample taken for the test

2.3 Crude protein

Crude protein in the sample fish fillets was quantified following the procedure of AOAC by Kjeldahl methods; 0.5 g of powdered fish fillet was weighed into a Kjeldahl digestion flask and heated at 370 °C for four hours in the presence of 6 ml sulfuric acid, 3.5 ml H_2O_2, 3 g of catalyst Copper Sulfate (CuSO4), and potassium sulfate to determine the amount of crude protein in the sample fish fillets (K_2SO_4). Following the completion of the digestion process, the clear solution that had been generated was chilled for 30 minutes, neutralized with 25 ml of NaOH (40%), and diluted with 25 ml of distilled water. A receiving flask with a 250 ml capacity that was linked to the distiller by a tube received 25 ml of distilled water, 25 ml of boric acid, and 3 drops of methyl blue. When the receiving flask's volume reached 200 to 250 ml, the distillation operation was stopped. Except for the sample, all reagents were put to the blank. By titrating the borate anion created with 0.1N HCl, the amount of nitrogen was calculated.

Total Protein = Nitrogen (N) × 6.25

2.4 Estimation of fat

The soxhlet extraction method was used to estimate the amount of fat. A dried sample weighing about 5gm was put within the apparatus' thimble, and petroleum ether, which has a boiling range of 60 to 80 °C, was put in a distillation flask before being placed on the heating mantel. The solvent was reflux-heated. Up a distillation arm, the solvent vapor rose and poured into the chamber holding the thimble. Any solvent vapor that has cooled will fall back into the chamber containing the solid substance because to the condenser. Warm solvent steadily filled the solid material-containing chamber. In the solvent that was sent back to the distillation flask, the fat present in the sample was dissolved. It was allowed for this cycle to continue for six hours. After the fat had been completely extracted, the solvent was added to a petri dish that had been weighed, and allowed to evaporate, and the final weight of the dish containing the fat was recorded. The amount of fat was determined from this.

$$\text{Fat content (\%)} = \frac{W2 - W1}{W} \times 100$$

Where,
W= Weight of sample in gm
W_1= Initial weight of beaker in gm
W_2= Final weight of beaker in gm

2.5 Estimation of ash:

Ash was analyzed using the weight difference method. A dried sample weighing around 5 g was placed in a crucible that had already been weighed, and it was heated to 600 °C in a muffle furnace for eight hours. After that, the weight was verified, and the crucible was once more heated for at least six hours. Once the weight stabilized, it was checked once more, and the process was repeated. The Ash content of the sample was calculated using the difference between the initial and end weights of the sample containing the crucible.

$$\text{Ash content (\%)} = \frac{W1 - W2}{W1 - W} \times 100$$

Where
W=Weight (gm) of empty crucible
W_1=Weight (gm) of crucible + dried sample
W_2=Lowest weight (gm) of the crucible with sample

Statistical analysis

Tables and graphs were prepared by Microsoft word, 2019. The mean and standard deviation of different proximate values were analyzed by Microsoft excel, 2019.

3. Result and Discussion

The information on the proximate composition of the six commercially important marine fishes is summarised in (Table 1). Proximate composition varied significantly between fish species. Protein content varies between species, ranging from 16.25% to 21.78%. Little tuna (*Euthynnus affinis*) had the highest protein content (21.78%), while pomfret (*Pampus argenteus*) had the lowest protein content (16.25%). This indicates that they were a good source of protein (Stancheva et al. 2013) [16]. High moisture levels make fish products susceptible to microbial spoilage and oxidative degradation of polyunsaturated fatty acids, lowering their quality and shelf life (Olagunju et al. 2012) [13]. Pomfret (*Pampus argenteus*) spoils quickly due to the high moisture content of its body flesh.

Table 1: Proximate composition of commercial important fish

Species	Moisture (%)	Protein (%)	Fat (%)	Ash (%)
Indian mackerel (*Rastrelliger kanagurta*)	73.98±0.65	19. 74±0.06	5.02±0.13	0.98±0.25
Little tuna (*Euthynnus affinis*)	74.38±0.76	21.78±0.53	1.01±0.69	0.90±0.21
Seer fish (*Scomberomorus guttatus*)	75.01±0.51	19.23±0.09	2.97±0.18	1.45±0.32
Hilsa (*Tenualosa ilisha*)	64.56±0.32	17.39±0.17	15.29±0.77	0.74±0.08
Croaker (*Otolithusruber*)	76.53±0.43	16.93±0.63	2.50±0.09	1.21±0. 35
Pomfret (*Pampus argenteus*)	80.10±0.21	16.25±0.48	1.56±0.23	1.05±0.87

Moisture content and fat content are inversely related, showing that fatty fish have lower moisture content. Fish are classified into four groups based on their fat level, according to Ackman (1989) [3]: lean (2%), low fat (2 to 4%), medium fat (4 to 8%), and high fat (> 8%). Hilsa was classified as a highly fatty fish as a result of this. Fish fats are the principal energy storage material. In some species, lipid content is a decent predictor of future survival and a strong predictor of reproductive capacity in particular fish stocks.Since of the presence of marine omega-3 fatty acids, the increased fat content in some fish species has nutritional significance because it provides a preventive impact against coronary heart disease (Alonso et al. 2013) [6].

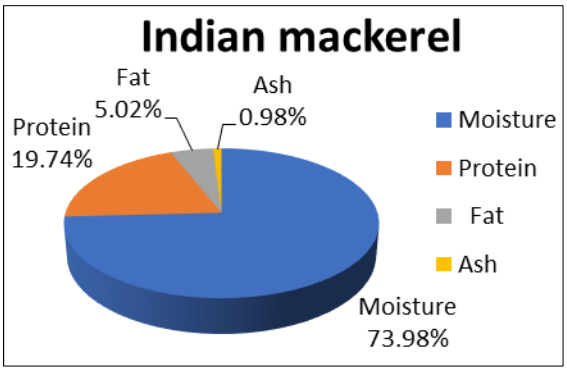

Fig 1: Proximate composition of Indian mackerel

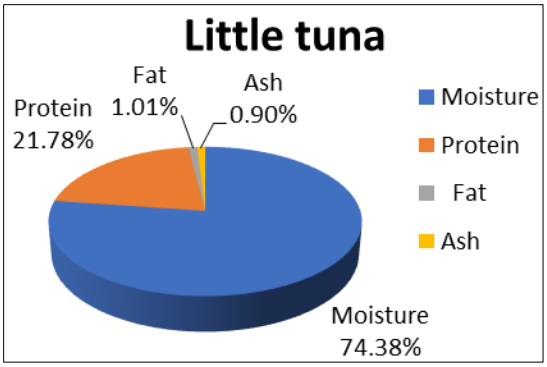

Fig 2: Proximate composition of little tuna

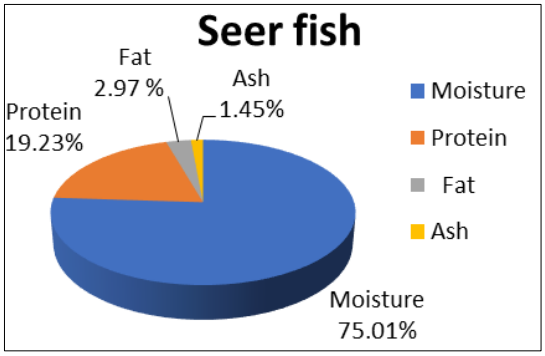

Fig 3: Proximate composition of seer fish

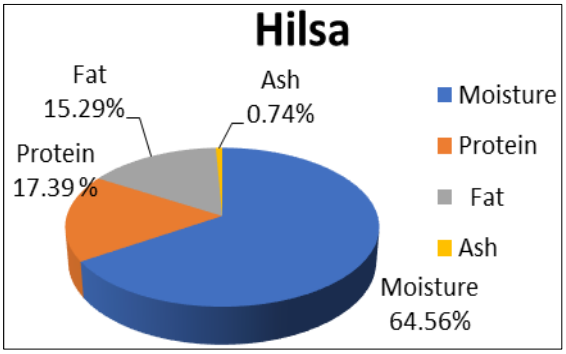

Fig 4: Proximate composition of hilsa

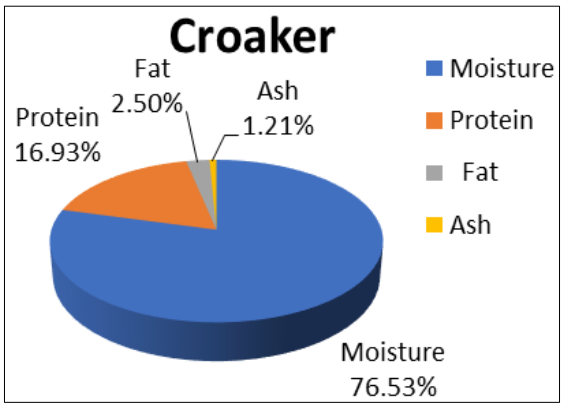

Fig 5: Proximate composition of croaker

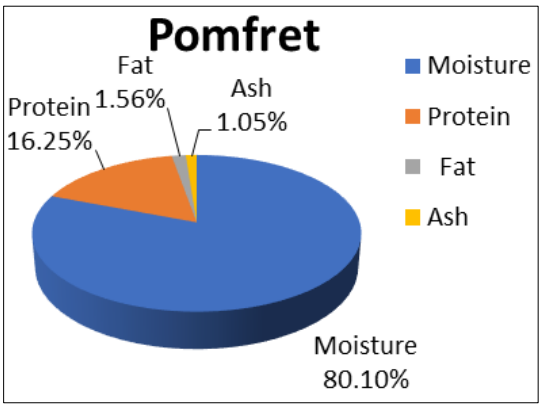

Fig 6: Proximate composition of pomfret

The calculated protein value was 19.74%, indicating that Mackerel is an inexpensive source of protein. The ash content was 0.98%, which is normal. The moisture content in the current study on the same species is nearly identical to previous findings (Sumi et al. 2016) [15]. *E. affinis* has high protein content. Tuna has high protein content and is high in critical amino acids. Fresh seer fish (*S. guttatus*) had moisture, crude protein, crude fat, and ash levels of 75.01, 19.23, 2.97, and 1.45%, respectively. With a few exceptions, the results for the proximate composition of seer fish were identical to those published by (Hiremath and Sen, 1988) [12]. Fresh muscle from croaker fish (*Otolithusruber*) has the following composition: 76.53% moisture, 16.93% crude protein, 2.50% crude fat, and 1.21% ash. Many authors, including (Hiremath and Sen, 1988) [12] and (Shamasunder et al. 1988) [14]. reported similar findings.

4. Conclusion

The current study indicated that there was a significant variance in proximate composition among fish species. Little tuna contained much more protein than other fish species, while hilsa content included the crudest fat. Based on the ash content, the results revealed that marine fish are good suppliers of proteins, and energy, and have an average

mineral supply. High-quality protein for human consumption and animal feed formulation, shrimp feed, shrimp business, nutritionists, pharmaceuticals, chemists, and so on. The fishing sector in Gujarat played a significant part in addressing India's food security challenges by changing consumer dietary preferences toward nutritious and healthy meals. Gujarat was the nation's biggest producer of marine fish. In general, further research is needed to investigate the amino acid and fatty acid makeup of these fishes.

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