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Proximate composition of three species of fishes of family Channidae from Loktak Lake, Manipur

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Abstract- The proximate composition of three fishes belonging to the Channidae family viz., *Channa punctata* (Spotted snakehead), *Channa striata* (Stripped snakehead) and *Channa orientalis* (Ceylon snakehead) were analysed to evaluate their nutritive value. These fishes were collected from Loktak Lake, Manipur to measure the diversity of their nutrients as compared to the other Channidae species available at different areas. Moisture content, average body weight with respect to their length, total ash and crude fat were measured, showing the highest moisture content of 83.68% on *Channa orientalis,* highest total ash of 7% shows with *Channa striata* and the highest crude fat value of 5.4 was found at *Channa punctata* respectively.

Key words: Proximate composition, fishes, channidae, nutrients, Loktak lake, Manipur

INTRODUCTION

Fish are the primary and best dietary source of animal protein which is one of the major components of nutrition. It is consumed by a large percentage of population in the world due to its high quality and cheapest source of protein. The nutritional characteristics of fish and fishery products are an excellent means of obtaining dietary essentials like protein, minerals and vitamins.[1] Consumption of regular fish can reduce the risk of cancer, lower the risk of Dementia and Alzheimer's disease,[2] and also prevents cardiovascular diseases.[3] Proximate studies of fish is essential to estimate their nutritional value and also to plan the most appropriate industrial and commercial processing.[4] Fish fat contains a high proportion of poly unsaturated fatty acids, which may help to decrease the incidence atherosclerosis. The flesh of fish is made up of five main biochemical components such as proteins, lipids, water, minerals and vitamins.[5] Besides fish meat is also a rich source of minerals and most abundant micro-elements like zinc, iron and copper.[6] The human body usually contains a small number of minerals and deficiency of these principal nutritional elements indicates a lot of malfunction and causes various diseases such as the inability of the blood clot, osteoporosis, anaemia etc.[7] Fish can be considered "the poor man's food"[8] and also an irreplaceable animal food sources for large number of population.[9] Channidae species are considered as indigenous fishes and are more accessible to poor.[10] Indigenous fishes are important source of micronutrients which plays a vital role in life and economy of the

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fisherman and poor rural people. There are some studies reporting biochemical composition and nutritional value of indigenous fishes.[9,11-12] This paper is focused on analysing proximate composition of three channidae species. This information might be useful to the dieticians and nutrient biochemist to fill the records of nutritional qualities of such kind of fish varieties.

MATERIALS & METHODS

Three species of Channidae family viz., Spotted snakehead locally known as Ngamu bogra (*Channa punctata*), Stripped snakehead which are locally known as Porom (*Channa striata*) and Ceylon snakehead locally called as Meitei ngamu (*Channa orientalis*) were collected from Loktak Lake. Their length and weight were recorded before sampling and then prepared for the estimation of moisture content, ash and fat content respectively.

1. Moisture:

Pooled minced fish meat was taken in a clean dry petridish, kept in an oven maintaining temperature of 105°C for about 2 hours. It was then cooled in a desiccator and weighed (W_1). From W_1 about 2 gram portion of fish (W_2) was taken in a pre-weighed petridish and kept in an oven again at the same temperature over night. Then the petridish was cooled in a desiccator and weighed again (W_3). Therefore the moisture content was measured as follows.

$$\text{Moisture content (\%)} = \frac{W_2 - W_3}{W_2 - W_1} x\ 100$$

$$\text{Moisture content (\%)} = \frac{\text{Weight of moisture in the sample}}{\text{Weight of the wet sample}} x\ 100$$

2. Ash:

Silica crucible or platinum was heated to 600°C in a muffle furnace for 1 hour, cooled in a desiccator and weighed (W_1). 2 gram of dried sample was weighed accurately into a pre weighed crucible and heated at low flame by keeping on a flat triangle to chat the organic matter (W_2). The charred material was then placed inside the previously set 600°C muffled furnace and heated for about 6 to 7 hours to obtain a greyish white ash. The crucible was cooled in a desiccator and weighed (W_3).

Calculation

$$\text{Ash content (g/100g)} = \frac{W_3 - W_1}{W_2 - W_1} x\ 100$$

Where,

W_1- Weight of the crucible

W_2 – Weight of dry sample and crucible

W_3 – Weight of crucible after ashing

$$\text{Ash content (g/100g)} = \frac{\text{Weight of the ash}}{\text{Weight of the sample}} x\ 100$$

3. Crude Fat

Crude fat was determined by Soxhlet method from moisture free sample by using ethyl ether as solvent. 5g (W_1) of sample was weighed into a thimble and cotton plugged. It was then placed in a Soxhlet apparatus and about 200 ml of ethyl ether was added and distilled for 16 hours. The apparatus was then cooled and the solvent was filtered into a pre weighed conical flask (W_2). The flask of the apparatus was rinsed with a little quantity of ether to make sure the whole distilled solvent is collected. The ether was removed by evaporation and the flask containing fat was dried at 80-100°C, cooled in a desiccator and weighed (W_3).

Calculation

$$\text{Fat content (g/100g)} \frac{W_3 - W_2}{W_1} x\ 100$$

Where,

W_1= Weight of dry matter taken for extraction

W_2 = Weight of conical flask and

W_3 = Weight of flask with fat.

RESULT

Proximate composition of three species of fishes belonging to family channidae of Loktak Lake, Manipur were determined and the correlation between their moisture, mineral and lipid contents were represented in table 1. Major essential biomolecules present in the edible portion of fish are water, protein, lipid (fat and oil) and ash (minerals). Therefore physical and chemical analysis of these basic constituents are often referred to as proximate analysis. The live weight of majority of fishes usually consists roughly of water, 70-80% and lipid 12%.[13] Moisture content ranged from 81.04% in *C. punctata* to 83.68% in *C. orientalis* which is the highest.

Table 1- Details of length, weight, moisture, ash and fat content of the three species of Channidae family of Loktak Lake, Manipur

Species	Length (cm)	Weight (g)	Moisture (%)	Ash (%)	Fat (%)
Channa punctata	16.7	47.3	81.04	5.5	5.4
Channa striata	23	99.5	76.7	7	2.6
Channa orientalis	15	32	83.68	5.2	1.6

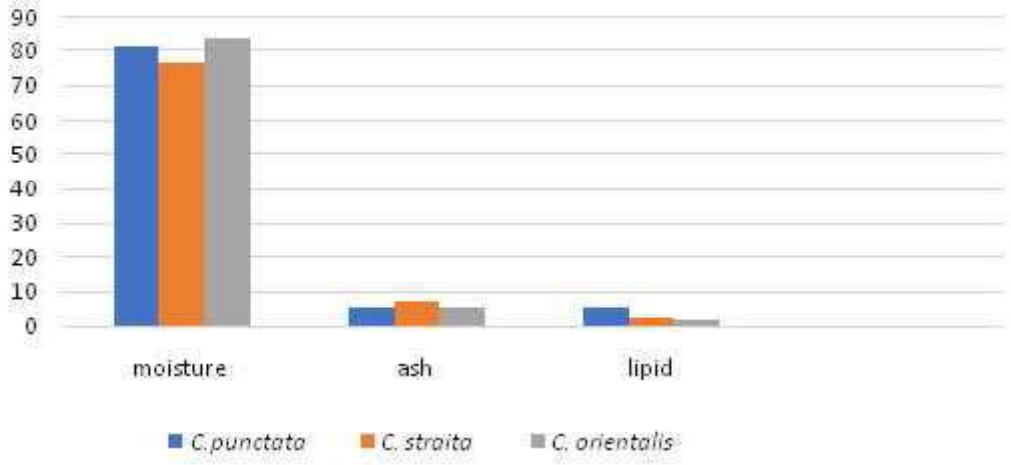

Fig. 1- Graph showing proximate values of three Channidae species of Loktak Lake, Manipur.

The total lipid content were highly variable since the biochemical composition of fish is influenced by a number of factors such as biological variations, environmental conditions and seasonal changes. Fish lipid contains poly-unsaturated fatty acids which transports the cholesterol from the blood maintaining the cardiovascular system.[14] Their values may vary considerably within and between species, and also with size, sexual condition, feeding, time of the year and activity.[15] Total lipid content of 5.4% was found in *C. punctata* which was the highest among three. *C. orientalis* gives the least lipid content of 1.6%. Minerals play an important role in human nutrition as iron which is an essential element. Minerals take continuous complex processes on molecular level, e.g., the transportation of oxygen around the human body. Minerals required in the human body includes Ca, K, Na, Fe and Mg. Ca is a mineral that is constantly needed by the bones. The total ash analysis measures the value of mineral content in the fish. *C. striata* measures the highest ash level by 7% among the three species.

CONCLUSION

The resulting data from the above analysis would be useful in adding knowledge of proximate composition of indigenous fishes to the researchers and dieticians. It would also be a good preference for the fisherman and consumers to select which varieties of fish should be farming or consuming.

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