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Estimation of Moisture and Total Lipid Content of Some Small Indigenous Fishes of Manipur

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Abstract: ***The present paper reveals the proximate composition of fish which is the most important aspect in fish nutrition. Small indigenous fishes (SIF) are very tasty and costly as compared to other small fishes. It may be due to its highly nutritive value. In this present study, an attempt has been made to estimate the moisture and lipid content of some selected small indigenous fishes of Manipur namely Channa striatus (Bloch) locally called as Porom, Trichogaster fasciatus (Schneider) locally called as Ngapemma and Puntius sophore (Hamilton-Buchanan) locally called as Phabounga. Channa striata , Trichogaster fasciatus and Puntius sophore contain 80.11%, 78.05% and 78.95% moisture respectively. Lipid content was found to be 1.66%, 5.93% and 2.34% respectively. Trichogaster fasciatus contains highest lipid value. These values are useful references for consumers in order to choose fish based on their nutritional contents.***

Keywords: Proximate composition, Channa striatus, Trichogaster fasciatus , Puntius sophore

1. Introduction

Fish is one of the cheapest source of animal protein that is accessible to the poor and it is aptly called the 'rich food of the poor'. India, one of the 17 global mega biodiversity hot spot, is native to many freshwater fish species. About 450 species, out of the 765 freshwater species reported are categorized as small indigenous fishes(SIF).The freshwater species which grow to a size of about 25-30cm in matured or adult stage are categorized as small indigenous fishes (BP Mohanty., *et al.* 2010). The chief components of fish tissue include water, protein and lipid. The amount or percentage of each within a fish's body is termed as proximate composition. Proximate composition is often determined in studies of fish physiology, growth and nutrition (Timoty Copeland., *et al.* 1999). Consumption of fish has been linked to health benefits as the long chain PUFA has gained attention because of the prevention of human coronary artery disease (Ward OP., *et al*.2005), improvement of retina and brain development (Crawford MA., 1993), decrease incidence of breast Cancer, Rheumatoid Arthritis, Multiple Sclerosis, Asthma, Psoriasis, inflammatory bowel disease (Simopoulos, A.P., 2002 and JHCI, U.K., 2004) and regulation of prostaglandin synthesis (Gibson, R.A. 1983). Researchers have found that fresh water fishes contain lower proportion of ɷ-3 PUFA than marine fish (Rahman, S.A., *et al.*1995). Therefore the ratio of total ɷ-3 to ɷ-6 fatty acids is much higher in the marine fish. The lipid content of fish differed due to variation of species, diet, geographical origin, age and season (Rasoarahona, J.R.E., *et al.*2005). According to Ozogul and Ozogul, fatty fish usually contain a minimum of 5-8% fat in edible tissue (Ozagul, Y., and Ozogul, F. 2007). Low fat fish have higher water content as a result; their flesh is white in colour (Focley, R.M., Criner., *et al.*, 1972). Fatty fish store the fat in muscle tissue and so their flesh colour is yellow, grey and pink (Gurr, M.I. 1992). Extensive work was done to evaluate the proximate composition of freshwater fishes with the assistant of government in various areas. There is always variation in their nutritive value. Therefore the main objective of this research work is to estimate the moisture and total lipid content in muscle of these three small indigenous fishes namely *Channa striata, Trichogaster fasciatus and Puntius sophore* were collected from fish market, Nambol, Bishnupur Manipur thereby exploiting nutritive value. Nambol is a city and a municipal council in Bishnupur district in the Indian state of Manipur. Nambol is one of the educational hubs of Bishnupur district as well as of Manipur. Its market, known as Nambol Bazaar is the second busiest market, after Khwairamband Bazaar (also known as 'IMA market') in Manipur. Nambol is located at 24.71°N 93.84°E. (Figure: 1). Figure 2, 3 and 4 shows specimen which are studied.

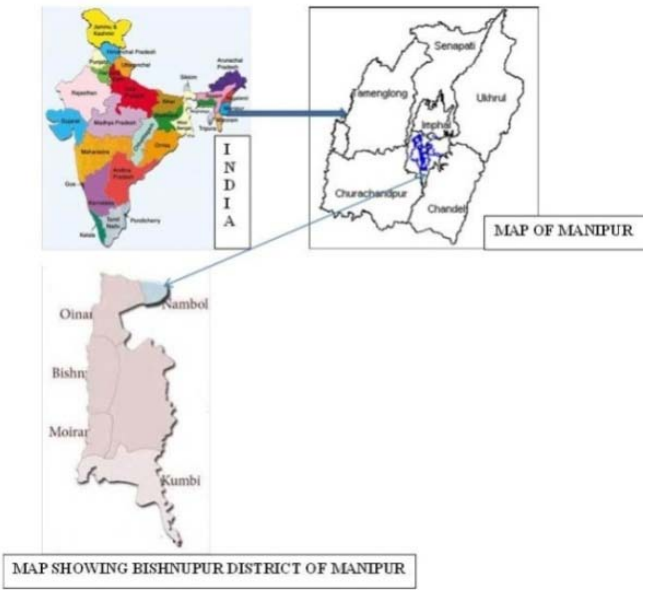


Figure 1: Map Showing the Nambol, Bishnupur, Manipur

Figure 2: *Puntius sophore*

Figure 3: *Trichogaster fasciata*

Figure 4: *Channa striata*

2. Materials and Methods

Three small indigenous fishes namely *Channa striata* , *Trichogaster fasciatus and Puntius sophore* were collected from fish market, Nambol, Bishnupur and brought to the Fish Disease and Biotechnology research Laboratory, Department of Zoology, Thambal Marik college ,Oinam, Manipur.

2.1 Sample Preparation:

The fish were washed with running tap water and blotted with blotting paper. The length and weight was measured and recorded .The fish was de scaled with sharp blade. The dorso-lateral portion muscle was collected and bones were removed from fish muscle. Then the muscle was dried in an oven and ground into fine powder.

2.2 Moisture

The moisture content in the fish tissue was estimated by drying 2g of fish tissue in a hot air oven at 105±5^{o}C for 16 hours. The difference in weight before and after drying is the amount of moisture content and the result was represented in percentage of wet weight of the muscle.

2.3 Total lipids

Total lipid content was estimated by using Folch method (Folch, J., M. Loes and G.H.S, Stanley, 1956). 500±0.1 mg of powdered oven dried tissue was mixed with 5ml of chloroform: methanol (2:1) mixture tightly covered with aluminum foil and kept at room temperature for 24 hours. It was then filtered by using whatman no.1 filter paper and filtered extract was taken in a pre-weighed petridish and oven dried. Petridish was weighed with lipids and the difference in weight was taken as total lipid content and percentage was calculated.

3. Result and Discussion

Table no.1 shows the length, weight, moisture and total lipid content of *C. striata*, *T. fasciatus* and *P. sophore* with standard deviation. Among these three species *C. striata* contains highest moisture content (80.11%) and lowest total lipid content (1.66%). *T. fasciatus* contains highest lipid content (5.93%). All the moisture value was in the range of 70-80% given by (Kalay *et al.*, 1999) except in the case of *C. striata* (Shamin Ahmed, A.F.M., *et al.*, 2012). Higher the moisture value, the lower is the lipid content. The lipid value (1.66%) and moisture (80.11%) of *C. striata* was found to be near to 1.47% lipid and 82.66% moisture given by (Shamin Ahmed *et al.* 2012). *P. sophore* contains 2.34% of total lipid content which is higher than 2.28% lipid content given by Shamin Ahmed *et al.* (2012). *T. fasciatus* contains 5.93% lipid content which is much higher than 2.58% lipid content. But *T. fasciatus* of Manipur has got much lower moisture than Bangladesh fish. Thus there is co-relation between moisture and other nutrient value. If lower the percentage of water, greater the lipids, protein contents and higher the energy density of the fish (Dempson, J.B., *et al.*, 2004). High moisture content increases the fish susceptibility to microbial spoilage, oxidative degradation of polyunsaturated fatty acids and consequently decreases in the quality of the fishes for longer preservation time (Omolara, O.O., *et al.*, 2008).

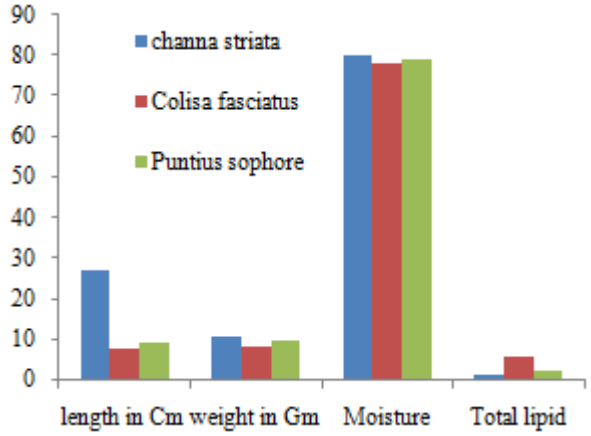
Due to low cholesterol content in fish when compared with other meat fish is often recommended for consumption especially among adult population. Small indigenous fishes have high content of vitamin A(2680 retinol equivalent(RE)/1000g raw edible parts commonly cultured carp species have low content <100µgRE/100g raw edible parts (Roos, N., *et al.*,2002). The low concentration of lipid in the muscles of the fresh water species could be due to poor storage mechanism and the use of fat reserves during spawning activities (Osibona, A.O., *et al.*, 2009). According to Stanby (1954), Salam (1995) and Jacquot (1961), variation in proximate composition of the fish flesh may vary with species variation, season, age and the feeding habit of fish. According to Ackman1989, fish can be grouped into four categories according to their fat content, lean fish<2%, low fat (2-4%), medium fat (4-8%) and high fat (6-8%) (Ackman, R.G., 1989). *C. striata*, *T. fasciatus* and *P. sophore* belong to lean fish, medium and low fat fish respectively. The fat content of the fishes varies with species, age, size and season. Even the same contained different value due to variation in feeding habit, quality of the water, state of the maturity and sex. Lipids are considered to be the most important constituent of fish egg as a reserve energy source

(Pal *et al*., 2011).According to M. A. Hossain et al.,2014 hilsa muscle and egg represent a very good source of n-3 PUFA for human diet. Protein and lipid values of the endemic fishes of Manipur were found to be higher than that of the fresh water fishes of India (Vishwanath, W. and Ch. Sarojnalini 1998). Lipid content of fresh water fishes was found to be higher in November and December (Jafri, A.K. 1968). In this study also, the total lipid content was higher than other fishes of Bangladesh. Bijayalakshmi *et al*., (2014) also found that the nutritional value of *Amblypharyngodon mola* of Manipur was higher than other states of India. In Manipur various small indigenous fishes are found but their nutritive value was not properly understood. If the nutrient compositions of these small indigenous fishes are estimated then it would be easy for the dietician to formulate the requirement value of the fishes.

Table 1: Showing the length, weight, moisture and total lipid content (mean±std.dev)

SL N.	*Name of the fish*	*Length (cm)*	*Weight (gm)*	*moisture*	*Total lipids*
1.	*C.striata*	27.18±11.02	11±4.92	80.11±0.125	1.66±0.416
2.	*T. fasciatus*	7.73±0.71	8.30±1.88	78.05±0.141	5.93±0.461
3.	*P. sophore*	9.45±0.87	9.88±3.145	78.95±0.257	2.34±0.416

Graph Showing Length, Weight, Moisture and Total lipid content



4. Conclusion

This research work indicates that the proximate composition of small indigenous fishes of Manipur is high as compared to that of other states. These values would be useful the consumers in selecting the fish based on their nutritional values.

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