Study on proximate composition of some fishes species of Kali Bein – A Tributary of the River Beas in Punjab, India

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Abstract:

The proximate composition of five species of fishes Viz. *Chanda nama, Osteobrama cotio, Mystus cavious, Channa marulius and Channa punctatus* were analyzed to study their nutritive value. Main nutrient composition of fish species like moisture, protein, fat, carbohydrates and ash were estimated. The moisture contents ranged between 72.06± 1.32 % and 75.24±0.21% with lowest in *C. marulius* and highest in *C. nama.* Similarly protein contents varied from 13.02±0.19% to 16.76±0.34 with minimum in *C. nama* and highest in *C. marulius.* Likewise fat contents ranged between 2.04±0.09 % (*O. cotio*) and 3.81±0.11 (*M. cavious*), ash contents 2.51±0.13 (*O. cotio*) and 4.27±0.12 (*M. cavious*) and carbohydrates 5.12±0.31% (*C. punctatus*) and 6.22±0.12% (*O. cotio*). The energy contents (KJg⁻¹) varied between 5.19±0.18- 5.81±0.21 among different species of fish samples. From the present analysis, it could be concluded that these small size fishes species of Kali Bein are good source of protein.

Introduction:

Fishes are one of the cheapest sources of protein, essential fatty acids and other essential nutrients. Fish contributes approximately 17 % of the supply of animal protein (Kulachi *et al*., 2014) and Asia contributes 80 % of the total fish production. Fish protein is very rich in methionine, lysine amino acid and low in tryptophan compared to mammalian protein (Nowsad, 2007). Fish have high source of essential nutrients required for growth of infant and adult (Abdullahi *et al*., 2001). The study of proximate composition assists in determining the nutritional status of fish (Dempson *et al*., 2004). Body composition of fish depends upon the fish species, feeding rate, time of year, body size and sexual stage (Ali *et al.,* 2001). The composition of fish affects various details of fish biology and ecology (Breck, 2014) and various stress conditions affects the composition of fish. The proximate composition of any fish is good indicator of quality of fish (Sonavane *et al.,* 2017). The increase in ash contents where as fat contents decrease significantly and protein contents remain the same in starvation and stress conditions (Shah *et al*., 2017).The mature fishes shows relatively more in term of proximate components than immature fishes; due to fundamentally nitrogen requirement for maturation and high lipid and protein for liver (Kumar and Padmavati, 2017). The body compositions of these fishes were carried out because of their abundance in the rivulet and low cost, high protein contents food material to weaker section of society.

Materials and methods:

Fish samples of five species viz. *C. nama, O. cotio, M. cavious, C. marulius and C. punctatus* were collected from Kali Bein- A Tributary of the River Beas in Punjab and brought to laboratory. The Kali Bein rises from a spring in the Dhanoa village of tehsil Dasuya, district Hoshiarpur. Mukerian hydel canal are the main source of water for Kali Bein. Beins are a feature of the plains and are marked by their zigzagging course. The Kali Bein flows through the districts of Hoshiarpur and Kapurthala and there are several towns on its banks. It plays a key role in recharging the water table and in flood management in its watershed. A Ramser site, The Kanjli wetland, is supported by the Kali Bein. After evisceration the fishes were cut into small pieces. These pieces were then weighed and put in hot air oven (60°C for 12 h) for drying to determine the moisture content. The dried sample in aluminium foil was stored in desiccators for proximate analysis following the standard procedures (AOAC, 1995).

The proximate compositions of each species were analyzed by using the standard methods-

Per cent moisture: To determine the moisture content, weighed amount of fish sample was dried at 100±5°C initially for 30 minutes and thereafter at 60°C until a constant weight is obtained

$$\text{Moisture content (\%)} = \frac{\text{Weight of fresh sample-weight of dry sample}}{\text{Weight of fresh sample}} \times 100$$

Crude protein: The determination of crude protein was done by standard Lowry method.

Crude lipid: Crude lipid content was determined using 3.0 g of dried sample in Soxhlet's apparatus.

Ash: The ash content was determined by igniting the weighted amount of the fat free sample in a Muffle furnace at $550 \pm 50°C$ for 6 hours.

$$\text{Per cent (\%) ash content} = \frac{\text{Weight of ash} \times 100}{\text{Weight of sample}}$$

Nitrogen- free extracts (NFE): NFE/ Carbohydrates were calculated according to following formulae.

NFE = 100- (% of crude protein + % crude lipid + % moisture + %

Caloric value: The energy (E) contents of fish was calculated using the average caloric conversion factor of 0.3954, 0.1715 and 0.2364 KJg^{-1} for lipids, carbohydrates and proteins respectively, according to Henken *et al.* (1986) as follows:

$$E\ (kJ\ g^{-1}) = 0.2364 \times \text{protein (\%)} + 0.3954 \times \text{fat (\%)} + 0.1715 \times \text{carbohydrate (\%)}.$$

Results: The result from the present study reveals that contents of moisture, protein, lipid, carbohydrates, ash and energy showed variation among the studied fish species. The moisture contents varied from 72.06±1.32 to 75.24±0.21. The lowest moisture content was reported in *C. marulius* while highest in *C. nama.* The protein contents ranged between13.02±0.19 and 16.76±0.34. The lowest protein content was reported in *C. nama* and highest in *C. marulius.* The quantity of protein normally remains higher than all other nutrient composition

in fish (Debnath et al., 2014, Hossian *et al.,* 2015, Mazumdar *et al.,* 2018). The fat contents varied from 2.12±0.09 to 3.81±0.11. The lowest fat content was reported in *O. cotio* (2.12±0.09) and highest in *M. cavious* (3.81±0.11).

Fish species	Moisture	Protein	Fat	Ash	Carbohydrates	Energy(KJg^{-1})
Chanda nama	75.24±0.21	13.02±0.19	2.91±0.11	2.51±0.13	6.22±0.12	5.29±0.16
Osteobrama cotio	74.81±0.32	14.12±0.29	2.04±0.09	2.94±0.12	6.09±0.17	5.19±0.18
Mystus cavious	73.33±0.21	13.31±0.21	3.81±0.11	4.27±0.12	5.46±0.21	5.59±0.14
Channa marulius	72.06±1.32	16.76±0.34	2.12±0.09	3.18±0.13	5.88±0.29	5.81±0.21
Channa punctatus	73.01±1.02	16.41±0.16	2.22±0.14	3.24±0.17	5.12±0.31	5.64±0.22

All values are mean ± S.E of mean.

The carbohydrate contents ranged between 5.12±0.31 to 6.22±0.12. The minimum carbohydrates (NFE) content was reported in *C. punctatus* (5.19±0.31) and maximum in *C. nama* (6.22±0.12). In general, in fishes NFE is not observed. The absence of NFE in the fish may show that they do not accumulate carbohydrate in their tissue and used as major source of energy. The NFE content observed during analysis of these fishes might develop from basic source such as glycoprotein and glycolipids. The result of the present study for NFE content also has similarity with the finding of Bob-Manuel *et al.* (2011). The energy contents (KJg^{-1}) ranged between 5.19±0.18- 5.81±0.21 among different fish samples. Various workers also reported the proximate composition is more or less similar with the present finding (Mahanty *et al.,* 2014, Suganthy, 2015, Hasan *et al.,* 2017, Herawati *et al.,* 2017 and Jena *et al.,* 2018). In overall, these variations in various contents might be due to difference in species, age, size, environmental conditions and food availability etc.
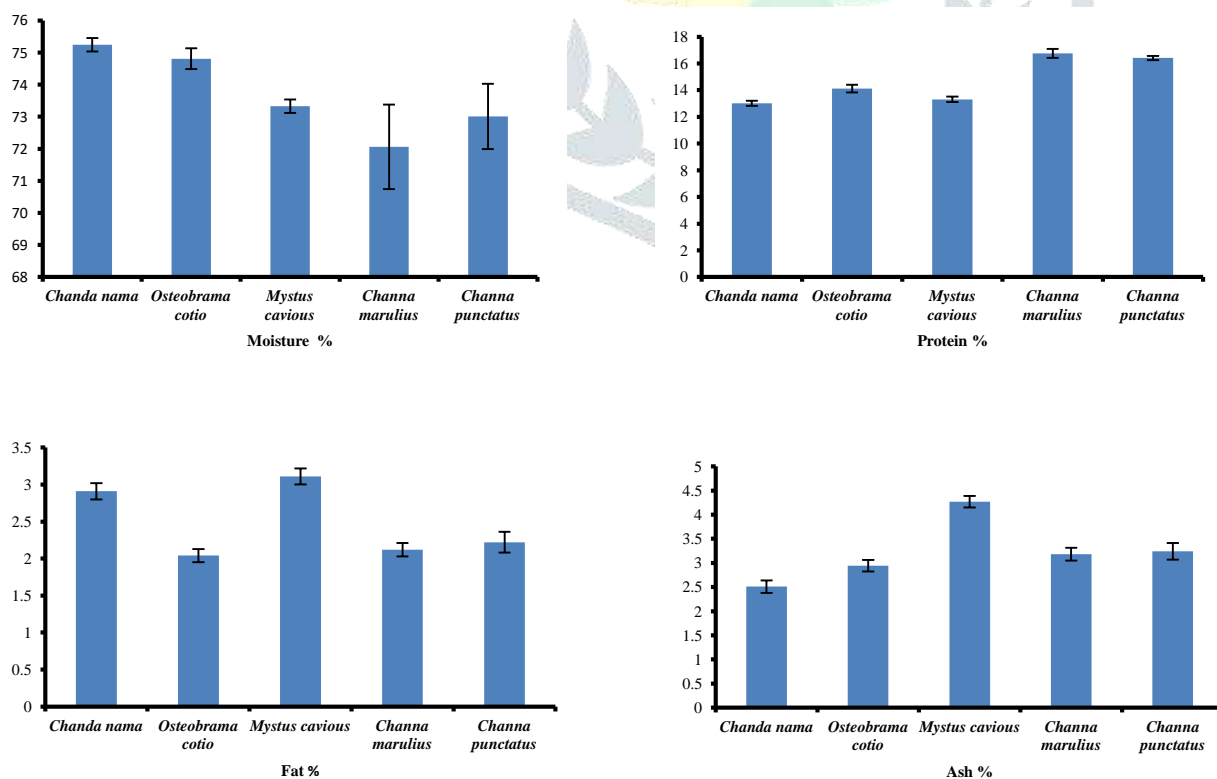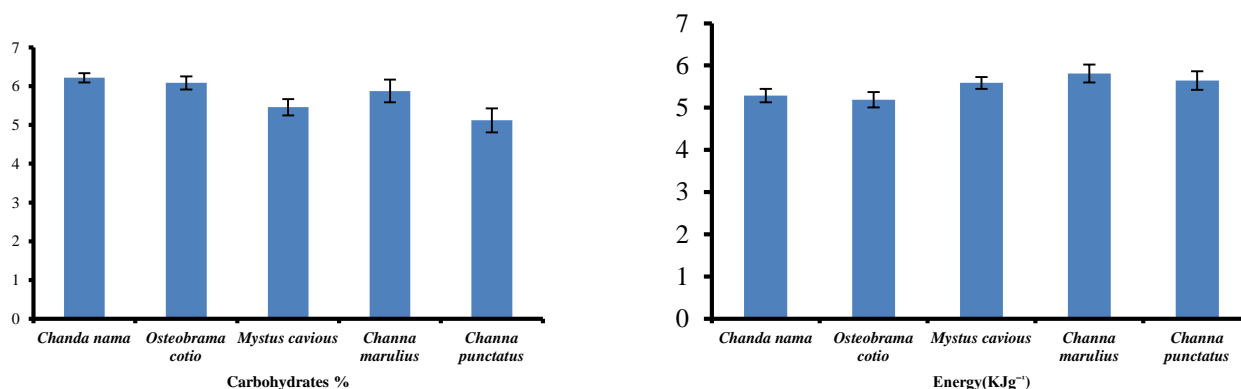
Fig. Body composition of fish species of Kali Bein rivulet

Discussion: Fishes are very good sources of proteins, providing very important component to chiefly carbohydrates based main diet among people around the worlds. *Chanda nama, Osteobrama cotio, Mystus cavious, Channa marulius and Channa punctatus analysis* revealed that these are rich in protein and low in lipid contents. Differences in biochemical composition among different fish species and within the same species depends upon age, sex, fishing ground, season, spawning cycle and food supplies.

References:

Abdullahi, S.A.; Abolude, D.S. and Ega, R.A. (2001). Nutrient quality of four oven dried freshwater catfish species in Northern Nigeria. *J. Tropical Biosciences*, 1(1): 70-76.

Ali, M., Salam, A., & Iqbal, F. (2001). Effect of environmental variables on body composition parameters of Channa punctata. *Journal of Research Science*, *12*(2): 200-206.

AOAC. (1995). Official Method of Analysis, Association of Official Analytical Chemists and W Horwitz (Editor) Washington. D.C.

Bob-manuel, F.G. and Alfred-Ockiya, J.F. (2011). Evaluation of yeast single cell protein (SCP) dites on growth performance, feed conversion and carcass composition of Tilapia *Oreochromis niloticus* (L.) fingerlings. *African journal of Biotechnology,* 12(46): 7473-7478.

Breck, J. E. (2014). Body composition in fishes: body size matters. *Aquaculture*, *433*, 40-49.

Debnath, C., Sahoo, L., Singha, A., Yadav, G. S., Datta, M., & Ngachan, S. V. (2014). Protein and Mineral compositions of some local fishes of Tripura, India. *Indian Journal of Hill Farming*, *2*(1): 210-218.

Dempson, J. B., Schwarz, C. J., Shears, M., & Furey, G. (2004). Comparative proximate body composition of Atlantic salmon with emphasis on parr from fluvial and lacustrine habitats. *Journal of fish biology*, *64*(5), 1257-1271.

Henken, A.M., Machiels, M.M.A., Dekker, W. and Hoggendoom. (1986). The effect of dietary protein and energy content on growth rate and feed utilization of the African catfish *Clarias gariepinus* (Burchell, 1822). *Aquaculture,* 58: 55-74.

Herawati, T., Yustiati, A., Nurhayati, A., & Mustikawati, R. (2018, April). Proximate composition of several fish from Jatigede Reservoir in Sumedang district, West Java. In *IOP Conference Series: Earth and Environmental Science*, 137(1), 1-7.

Hossain, M. N., Afroz, H., Haque, M. Z., & Begum, M. (2015). Evaluation of nutritional properties of some small indigenous fishes species in Bangladesh. *International Journal of Biosciences*, *6*(6), 102-109.

Hussain, B., Sultana, T., Sultana, S., Ahmed, Z., & Mahboob, S. (2018). Study on impact of habitat degradation on proximate composition and amino acid profile of Indian major carps from different habitats. *Saudi journal of biological sciences*, *25*(4): 755-759.

Jena, D., Jena, A.K., Panda, A., Parhi, J., Biswas, P. and Pattanaik, S.S. (2018). Proximate analysis of some small indigenous fish species (SIS) of Tripura, India. *Journal of Entomology and Zoology Studies,* 6(4): 470-474.

Kumar, A.M. and Padmavati, G. (2017). Proximate and elemental composition of Stolephorus commersonnii (Lacepede, 1803) from costal water of south Andaman. *Indian Journal of Geo Marine Science,* 46(5): 1000-1007.

Mahanty, A., Ganguly, S., Verma, A., Sahoo, S., Mitra, P., Paria, P., Sharma, A.P., Singh, B.K. and Mohanty, B.P. (2014). Nutrient profile of small indigenous fish Puntius sophore: proximate composition, amino acid, fatty acid and micronutrient profiles. *National Academy Science Letters*, 37(1): 39-44.

Mazumder, M. S. A., Rahman, M. M., Ahmed, A. T. A., Begum, M., & Hossain, M. A. (2008). Proximate composition of some small indigenous fish species (SIS) in Bangladesh. *International Journal of sustainable crop production*, *3*(4): 18-23.

Nowsad, A. K. M. (2007). Participatory Training of Trainers, Bangladesh Fisheries Research Forum, Mymensingh, Bangladesh.

Shah, S.Q.A., Hussain, M.H., Ali, M. and Salam, A. (2017). Effect of stress conditions on body composition parameters of farmed Rohu (*Labeo rohita*). *Turkish Journal of Fisheries and Aquatic Sciences,* 17: 471-476.

Sonavane, A.E., Koli, J.M., Patange, S.B., Naik, S.D. and Mohite, A.S. (2017). Proximate composition and fatty acid profiling of Indian mackerel (Rastrelliger kanagurta) off Ratnagiri, west coast of India. *International Journal of Pure and Applied Bioscience*, 5(4): 920-924.

Suganthi, A., Venkatraman, C. and Chezhian, Y. (2015). Proximate composition of different fish species collected from Muthupet mangroves. *International Journal of Fisheries and Aquatic Studies*, 2(6): 420-423.