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Nutritional Components of Freshwater Fish *Puntius sophor*ofthe river Kshipra (Madhya Pradesh), India

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ABSTRACT
The knowledge of the biochemical composition of food is of utmost importance to know its nutritional value. In the present world, when people are very cautious about health and diet, this becomes more relevant. The fishes are economical, easily available and known rich sources of protein. Fish contains almost all the nutrients required for good health. Thus, knowledge of its nutritional value is essential. An attempt was made to estimate the Proximate biochemical compositions of body muscles of Puntius sophor collected from Ujjain and Dewas cities of Madhya Pradesh. The evaluation of biochemical composition included the Moisture, Protein, Ash and Carbohydrate contents in the fish samples. Along with these nutrients, few minerals like Potassium (K), Phosphorous (P), Magnesium (Mg), Calcium (Ca), Zinc (Zn), Copper (Cu), and some amino acids were also evaluated in the study. The fish samples collected from Ujjain exhibited better nutritional values than that of the Dewas site.
Keywords: Puntius sophor, *Nutritional Value, Ujjain, Dewas, Proximate Composition, Minerals, Amino Acids.*

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INTRODUCTION

The fish is being consumed by several animals and humans as an important food source in their routine diet. The fishes are a rich source of essential nutrients, comparatively economical and easily available as well. These nutrients from fishes provide necessary strength to fight ailments and nutritional security [14]. The fish nutrients include oils, a rich source of polyunsaturated fatty acids (PUFAs), few minerals like calcium, zinc, iodine, iron, vitamins A and C, etc. It is healthy food. Even in the small and local species also has enough nutritional components that compensate for the regular diet deficiencies. In the present world, where food availability and affordability are a challenge, fishes can be an easy and suitable alternative.

The nutrient analysis of fishes reveals that they are a rich nutritional source, having numerous health benefits. Regular consumption of fish can keep heart diseases away from human beings. It is observed that the small fishes generally consumed as a whole and provide the minerals, vitamins, protein, etc., to the consumers [16]. It has been observed that a fresh fish (on a weight basis) contains about 12-20% protein along with the essential amino acids [1]. These fishes also contain the fat content to the tune of 0.1 to 15%, which varies in different species, geographical regions, seasonal variations, etc., [4]. It indicates that fish plays a vital role in human nutrition. The nutrients, vitamins, and minerals (micronutrients) become important constituents for its consumers. Deficiency of these nutrients may cause some ailments or disorders to the human [13].

Moreover, the fishes are soft, easy to cook and digest. Protein is an essential nutrient for human beings, and fish is an easily available source of protein [20]. A small quantity of 150 gm of fish flesh can provide about 60% protein requirements of an adult human [7].

In the paucity of literature available and considering the importance of fish nutrition, the small fish *Puntius sophor*, from the holy river, Kshipra was selected to evaluate its nutritional values. Further, the nutritive values of fish were compared among the samples collected from two different sites.

The river Kshipra rises from North of Dhar district in Madhya Pradesh and flows in the North of Malwa plateau from the districts of Dhar, Dewas, and Ujjain, in Madhya Pradesh, before joining the river Chambal

at Mandsaur, near Rajasthan-Madhya Pradesh border. The fish *Puntius sophor* is the favored food of the river Kshipra and is being fished by locals.

MATERIAL AND METHODS

The fish *Puntius sophor* was selected for the present study. It is a small fish, approximately 20 to 25 cm long, and weighs about 60 to 70 gm. *Puntius sophore*, is also known as pool barb, belongs to Family Cyprinidae, Order Cypriniformes, and commonly called 'Punti'. These fishes were sampled from two locations from the river Kshipra at Ujjain and Dewas, Madhya Pradesh. About 50 fresh fishes were collected from the local fishermen, sell fishes in local market, at both locations. The fish was identified with a fish identification key [10]. The samples of these fishes were brought to the laboratory for further processing.

Proximate Composition

The proximate composition of a fish is the percent composition of the four main contents, i.e., moisture, protein, fat, and ash.

The moisture content was determined by the conventional method. The fish body constitutes more than 60% water. To estimate water content in the fish samples, about 10 to 20 gm of pooled minced fish meat was taken in a petri dish, duly weighed, and then kept in the oven at 105^0 C overnight. The Petri dish was then taken out and cooled in a desiccator and weighed. After that again, it kept in the oven for half an hour and weighed to get the reproducible weight to calculate percent moisture content [20].

The crude protein is a rich source of essential amino acids (EAA). This not only plays an important role in fish but also to its consumers, including human beings [17]. The crude protein content was evaluated by the Kjeldahl method.

The fat content in fish species built up during the feeding season. The fat is being utilized during spawning or under stressed situations. The fat estimation was done with the help of Soxhlet Method. The fat, soluble in organic solvents, was extracted from the dried (moisture-free) samples using solvents like petroleum ether or ethyl ether, etc. After that, it was evaporated, and the fat was evaluated [20].

The ash content is the grayish-white residue powder that is a remanent after the incineration process. The ash contents were determined [20].

The lipids were evaluated by homogenizing the fish wet muscles with a mixture in a ratio of 2:1 of Chloroform and Methanol. This mixture extracted the total lipid from the tissue into a single-phase solvent. This process disturbs Chloroform-Methanol solution equilibrium, as the fat is soluble in Chloroform [8, 20].

The carbohydrates (gm/100 gm) of the fleshy muscle samples were evaluated [20].

Minerals and Amino Acids Estimation

Further, to analyse the minerals, whole fish body samples were used. The micronutrients were evaluated by the Perkin-Elmer Atomic Absorption Spectrophotometer using a modified method [5].

Amino acids were also evaluated by the standard method [2].

RESULTS AND DISCUSSION

Proximate Composition

The biochemical composition was carried on the fish muscles of *Puntius sophor* to estimate nutritional values. The experiments for evaluating the proximal compositions were conducted using various standard methods and the observations were tabulated (on a weight basis).

Proximate Contents (%) → / Location ↓	Moisture	Protein	Fat	Ash	Carbohydrates
Ujjain (MP)	74.28	21.76	2.03	2.2	1.45
Dewas (MP)	69.35	18.32	2.4	1.91	1.06

TableI. Proximate composition in *P.sophor* at respective locations

The moisture constitutes the maximum part of the nutrients in the fish, which spread throughout the body. It becomes the medium for transportation of nutrients, cell maintenance, and also for energy transfer. The moisture contents of fish fillet were estimated. The average moisture contents of the fish samples from Ujjain and Dewas were 74.28% and 69.35% respectively.

The proteins are the most essential biomolecules. These are made up of amino acids and are the essential source of energy. The crude protein contents were observed in the fish samples from Ujjain, were 21.76% and was 18.32% for samples from Dewas.

An inverse relationship exists between the moisture and the fat contents, which means the high-water contents are associated with the low-fat contents and vice versa. The fat contents of *P. sophor* at Ujjain and Dewas were 2.,03% and 2.4%, respectively.

The ash contents of the fish samples were found at 2.2% and 1.91% for Ujjain and Dewas sites, respectively.

The carbohydrate contents of *P. sophor* were also found to be higher in Ujjain than at the Dewas site and were 1.45% and 1.06% respectively.

Mineral Estimation

Fish flesh is a rich source of almost all the minerals. Calcium and Phosphorus are significant parts of the skeleton and also has essential metabolic and physiological roles. Muscle tissues contain Potassium, Magnesium, Zinc, Copper, Iron, etc. The ash obtained was further estimated for mineral constituents. The minerals evaluated from the fish samples of Ujjain and Dewas locations were tabulated in Table II. These minerals were found higher in Ujjain than in Dewassites.

Sampling Sites	K	P	Mg	Ca	Zn	Cu
Ujjain	697±4.24	245±4.24	137±4.24	151±5.66	22.2±4.53	4.08±0.11
Dewas	643±4.24	241±5.66	108±5.66	115±4.24	17.5±0.71	3.8±0.28

TableII. Comparative mineral contents of *P.sophor* (mg/100g)

Amino Acid Evaluation

The essential amino acid spectrum is an index of the biological values of the fish protein. The essential amino acids were released by the fishes when it undergoes some stresses or adverse conditions. The essential amino acid composition of fishes from both sites were shown in Table III.

Amino Acids	Ujjain	Dewas
Aspartic acid	3.3±0.14	2.64±0.37
Glutamic acid	6.34±0.23	5.61±0.41
Serine	1.63±0.24	1.32±0.14
Glycine	2.1±0.57	1.93±0.09
Histidine	2±0.19	1.19±0.16
Arginine	2.28±0.19	2.15±0.06
Threonine	1.51±0.35	1.45±0.16
Alanine	2.79±0.1	2.65±0.01
Proline	2.49±0.14	2.25±0.16
Tyrosine	1.44±0.31	1.32±0.19
Valine	2.24±0.31	2.12±0.31
Methionine	1.24±0.24	1.19±0.16
Cysteine	0.65±0.07	0.32±0.03
Isoleucine	2.1±0.17	1.95±0.07
Leucine	3.15±0.31	2.05±0.31
Phenyl amine	1.95±0.07	1.87±0.09
Lysine	3.5±0.22	3.34±0.08

Table III.Amino acid compositions of *P.sophor*(g/100g).

The present study findings were found in accordance with previous investigations [9, 16, 18, 19] for various fish species of different locations.

The comparison of the fish samples from both the sites showed that the proximate composition of nutrients, minerals, and the amino acids were better in the fish samples obtained from the Ujjain site than from the Dewas site. This indicated the enhanced growth and development of the fishes at the Ujjain site. This might be due to the comparatively better water quality at the time of fish sampling.

It is a well-known fact that the fish nutrient composition depends upon water quality, feed availability, age, sex of fish, geographical region, seasonal variations, starvation, temperature, reproduction stage, etc. [6, 11, 15].

The present study results suggested that the fishes from the Ujjain location exhibited better nutritional values than that of the Dewas location. This might also be due to the physicochemical parameters of the river waters at respective locations [12, 21].

The changes in the physicochemical parameters may be due to water pollution. Dewas, being the industrial town may have industrial effluents and other pollutants in the river. This might have hampered the food sources of the fish fauna, resulting reduction in nutritional values of the fish from the Dewas site. However, further studies are required to find out the exact cause of the depletion of nutrients in the fish.

CONCLUSION

The study indicated that the fish samples of *P. sophor* from two locations showed variations in its nutritional components. These may be mainly due to the nearby waste disposal sources. Ujjain is a holy town and Dewas is an industrial town. There is a need to check the pollution levels at both places to improve the nutritional values of the food fishes. It is recommended further in-depth studies to establish the facts about the differences in the nutritional values and their improvement.

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