



## **Effect of Different Cooking Methods on Nutritional values of fresh Water Fish *Nemacheilus botia***

**Sanjay M. Nikam<sup>1</sup> and Pratiksha S. Jadhav<sup>2</sup>**

<sup>1</sup>NVP Mandel's Arts, Commerce and Science College, Lasalgaon.

<sup>2</sup>SNJB's KKHA Arts, SMGL Commerce and SPHJ Science College Chandwad, Ms. India 423101

<sup>1</sup>nikamsm2007@rediffmail.com

<sup>2</sup>getajadhav273@gmail.com

### **ABSTRACT:**

To fulfil the demand of nutrition human are depends on various sources. Fish is one of the demanding food in the world. It plays vital role in the nutritional diet. Quality of fish is depends on the available nutritional components mainly that include Protein, Carbohydrate and Lipids, Vitamins, Fatty acid. Nutritional values of the cooked food may be minimised due to cooking practices. Hence the present investigation is under taken with an objective of, to study nutritional value before and after cooking, to recommend the best cooking method for the selected fish species. This study was performed to investigate the effect of different cooking method on Nutrition of *Nemacheilus botia*. Uncooked Fresh Fish, Boiled Fish, Fried Fish, Roasted Fish and Steamed Fish are the different cooking treatment were considered to fulfil the objective of the study. The nutrient contents are changed due to application of different cooking treatment, losses of nutrient is taken place and retention of some nutrients like protein also occurred. Different cooking methods are affecting the quantity of total protein. This study also showed fat and carbohydrate content were significantly changed by four cooking method.

**Keyword:-**Nutrients, protein content, *Nemacheilus botia*. Cooking methods.

Received 12.11.2022

Revised 23.11.2022

Accepted 10.12.2022

### **INTRODUCTION:**

Fish are rich source of protein and less fat commonly use as food in many part of the world. Fish has an excellent source of animal human protein in human diet. For present study *Nemacheilus botia* (Hamilton 1822) was selected because these species is easily available all over Indian fresh water river water.

The principal components of fish are water, protein, lipid and carbohydrates. (1) Cooking losses and, consequently, total lipids, increased directly with the cooking time and internal temperature reached by meat. (2). No such work undertaken before on protein estimation of *Nemacheilus botia* during different cooking method. So, these is the need of research to find out protein changes (restore) during different cooking method, For many years fishes have been used for determine the pollution status of water.(3) Fish are always cooked for inactivation of pathogen and for enhancement of palatability. Different cooking procedures including cooking procedures including boiling, frying, roasting and steaming will induce a cascade of physiochemical reactions. Heat treatment induces the protein oxidation which leads to variety of changes at molecular level.(4) Fishes are the main source of animal protein for human diet.(5) Fishes has an important role in the human life medically as well as economically. Fish are the valuable source of high-grade of protein and other nutrients for human diet. Most of fresh water fishes are available in India and its adjacent countries like Pakistan, Bangladesh and Shrilanka etc. The fishes also attracted the attention of taxonomist, zoo-geographers, naturalist as it is the most diverse group of vertebrates which possess different behaviours in its feeding and breeding physiology. In our society the nutritive value of fish is more recognised as compare to meet and crab. (6)

*Nemacheilus botia* is important local commercial fish species, which are appreciated not only because of their small size, highly valuable but also their boneless flesh with excellent quality and taste. They occur in the variety of habitats in the lakea, pond and river in Nashik region of Maharashtra state. The average length of *N.botia* is 5 to 6 cm. They have 3 paired fins and 2 unpaired fins. Freshwater fish *N.botia* selected for the present study, occur in north Maharashtra region. Healthy adult fish were collected from river for study.

The effect of different cooking methods on protein, carbohydrate and lipids of *Nemacheilus botia* have been studied but there is no required literature available on protein content of *Nemacheilus botia* induced by different cooking method. That's why in this paper we aim to evaluate the effect of different cooking methods (boiling, steaming, roasting frying) on proteins, carbohydrate and lipid of *Nemacheilus botia* fish meal. Proteins are estimated using Lowery et al. methods.(7)

#### **Aims and objectives:-**

- It aims at finding the nutritive values restored after cooking.(8)
- To find out beneficial cooking method for restored protein after cooked condition. (8)
- This study aims to compare the protein values of the local fresh water fish *Nemacheilusbotia* before and after cooking

#### **Study Area**

The present investigation is undertaken considering the review of the work done from the selected study area. Selected study area is Chandwad Tahasil of Nashik District.

### **MATERIAL AND METHODS**

#### **2.1 Sample preparation and cooking:**

Selected fish species were collected from River located in Chandwad. Collected species were acclimatized to the condition by keeping them in bucket filled with river water and procured to laboratory. Sample fish were washed with tap water several times to remove adhering dirt. Subsequently samples were divided into six sections. One group was left uncooked while other group cooked by different method like boiling, frying, roasting and steaming. (8)

**2.1.1 Boiling treatment:** Boiling method was applied in the study for the conventional cooking of selected sample. In this case sample to be boiled at 99-100°C water temperature and this temperature of water was maintained till the sample was tendered. (8)

**2.1.2 Frying treatment:** The fish fillets were fried in open frying pan at temperature of approximately 180°C for 10 minutes. Soyabean oil was used as medium for frying. (8)

**2.1.3 Dry Roosting treatment:** The fish fillets were regularly placed on open dry roosting pan performed at 180°C till fillets completely roasted. (9)

**2.1.4 Steaming treatment:** In case of steaming treatment fillets were uniformly placed on a stainless steel tray and put tray into steamer and cooked with 76-80°C water vapour for 8 minutes. (10)

#### **2.2 Proximate composition analysis**

Proximate composition analyses for homogenized sample of cooked and uncooked fish fillets were done in triplicate for carbohydrate, protein and lipid contents. The carbohydrate content was determined by Anthrone method, whereas protein content was determined by Lowry et al. Method and lipid was extracted by Estimation of Free Fatty Acids. (8)

##### **2.2.1 Estimation of Carbohydrates by Anthrone Method.**

For the estimation of carbohydrates 100 mg of fish sample was taken into boiling tube. Hydrolysis of sample was carried out by keeping it in boiling water bath for three hours in presence with 5 ml of 2.5 N HCl and then cooled to room temperature. After that sample was neutralized with solid sodium carbonate until the effervescence ceased. Volume was made up to 100 ml using distilled water and centrifuged the sample at 3000 RPM for 15 minutes. The supernatant of sample was used for analysis of carbohydrate. Then 4 ml Anthrone reagent was added to the sample solution. Then it was heated for 8 minutes in boiling water bath. Cooled rapidly when green to dark green colour appeared. The reading was taken at 630nm by spectrophotometer. (8)

##### **Calculation:-**

Amount of carbohydrate present in 100mg of the sample =  $\frac{\text{mg of glucose}}{\text{volume of test sample}} \times 100$

##### **2.2.2 Estimation of Protein by Lowry Method:**

For the estimation of protein 200 mg of fish sample was taken and 20 ml of phosphate buffer, containing sodium dihydrogen phosphate ( $\text{NaH}_2\text{PO}_4$ ) and disodium hydrogen phosphate ( $\text{Na}_2\text{HPO}_4$ ) was added and homogenised finely. Then it was kept overnight. Then it was cold centrifuged at 500 RPM for 20 minutes. From the collected supernatant 1 ml was used for analysis. Then 5ml of Lowry reagent was added to the supernatant and allowed to incubate for 10 minutes. After that 0.5 ml of Folin-ciocalteu reagent was added and incubate for half hour until a dark colour appeared. Then reading was taken at 660 nm by spectrophotometer. (8)

##### **2.2.3 Estimation of Free Fatty Acids.**

Dissolved 5gm of sample in neutral solvent contained in 250ml conical flask. After that few drop of phenolphthalein indicator was added in it. Then this contain was titrate against 0.1N potassium

hydroxide until pink colour was persist up to fifteen seconds. Then these reading was taken as titrate value. (11)

**Calculation:-**

$$\text{Free Fatty acid value (mg KOH/g)} = \frac{\text{Titrate value} \times \text{Normality of KOH} \times 56.1}{\text{weight of the sample (g)}}$$

**2.2.4 Determination of energy content by energy conversion factor.**

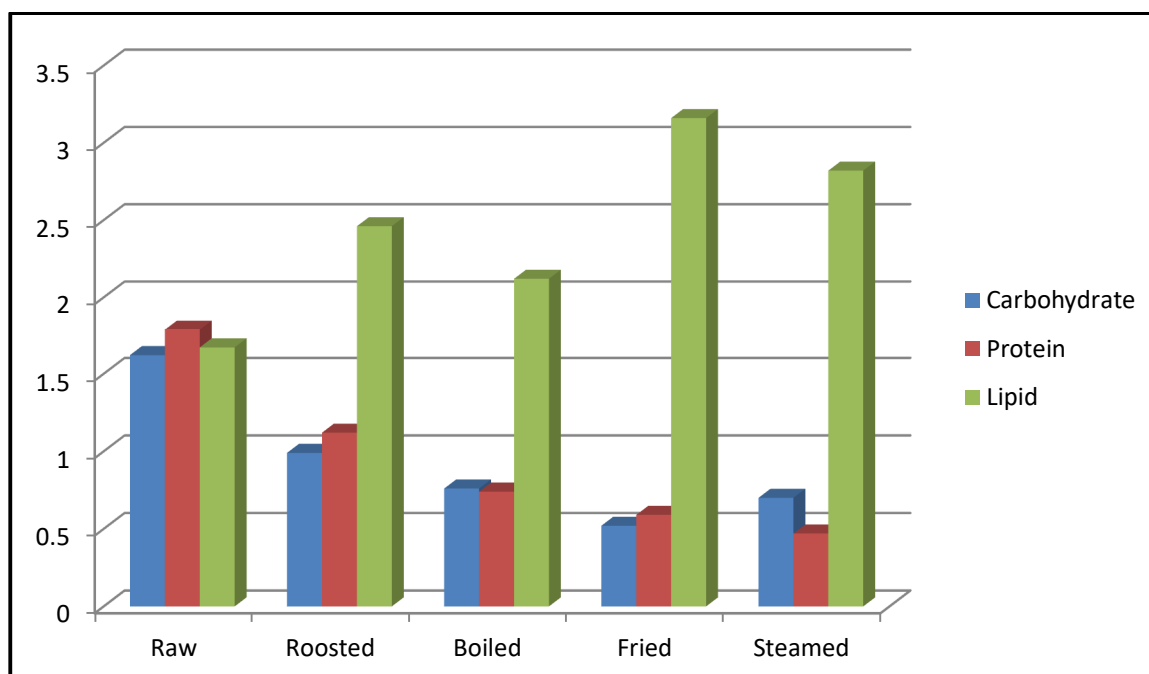
The energy content of the fish sample was determined by the summation of the amount of energy from triplicate form that is carbohydrate, protein and fat. The carbohydrate and protein content were multiplied by the conversion factor 4.1 and 4 respectively and fat contain was multiplied by 9.3 and the total calories content was represented in K cal per 100mg of a sample. (8)

**RESULT AND DISCUSSION:**

Effect of various cooking methods on quantity of the selected nutritional content is found remarkable change table-1. Mean value of three reading of the studied parameters are considered for confirmation of the cooking method effect. Values of the parameters are compared between fresh (before cooking) and cooked food. Results of the cooking practice indicates that there is loss of the protein and Carbohydrates compared to fresh sample. Lipid content is found increased in all cooking methods except Boiled method. While total energy content is found remarkable in all the cooking method except Boiling.

**Table-1. Effect of cooking methods on quantity of nutritional parameters.**

Sr.No.	Sample	Carbohydrate	Protein	Lipid	Total energy content
1	Raw Sample	1.62	1.79	1.67	29.25
2	T <sub>1</sub> – Roosted Sample.	0.99	1.12	2.46	31.41
3	T <sub>2</sub> – Boiled Sample.	0.76	0.74	2.12	25.79
4	T <sub>3</sub> – Fried Sample.	0.52	0.59	3.16	38.06
5	T <sub>4</sub> – Steamed Sample.	0.70	0.47	2.82	30.97



**Fig. 1:- Average amount of Carbohydrate, Protein and Lipid**

**CONCLUSION**

From the results it is concluded that, the study provides information about the nutritional properties and its quantity of *Nemacheilus botia*. Cooking practices can affect the quantity of the protein, Fats and

Carbohydrates. Based on the quantity of protein carbohydrate and Lipid (fatty acid) the most efficient mode of cooking is roasting method.

#### REFERENCES

1. Steiner-Asiedu, M., Julsharm, K. and Lie, O. (1991) Effect of Local Processing Methods (Cooking, Frying and Smoking) on Three Fish Species from Ghana: Part 1 Proximate Composition, Fatty Acids, Minerals, Trace Elements and Vitamins, Food Chem: Vol 40, No.3, 309-321
2. Alfaia, CM., Alves, S.P., Lopes, AF, Femandes, M.J., Costa, A.S., Fontes, CM. and Prates, J.A. (2010) Effect of Cooking Methods on Fatty Acids, Conjugated Isomers of Linoleic Acid and Nutritional Quality of Beef Intramuscular Fat. Meat Sci, Vol.84, No.4, 769-777
3. S.M. Nikam(2011) Study of acute toxicity of metasyttox on the freshwater fish *Nemacheilus botia*, from Kedrai dam in Maharashtra, India Biology and Medicine 3(4):13-17
4. Lyulin Hu,a Sijie Ren, et al. (2017) Proteomic study of the effect of different cook methods on protein oxidation in fish fillets. The Royal Society of Chemistry, (7) 27496-27505
5. Nissa et al.,(2021)Proteomics in fisheries and aquaculture: An approach for food securityFood Control 127(1):108125
6. Dr.Kapil T. Patil (2018) Comparative Study of the Protein Content of selected fresh water Fishes and crab from Girna dam, Nashik, Maharastra ,IJCRT Volume 6, Issue 2, ISSN: 2320-2882,pp 597-600
7. Lowry, OH. Rosenbrough, NJ Farr, AL and Randall, RJ 1951 Proteom measurement with FolinPhenolReagent Journal of Biological Chemistry 193 265-275
8. Udiya Jana (2017) Comparative analysis of nutrient content between Prawn (*Fenneropenaeus indicus*) and Lobster (*Prortunussanguinolentus*), preserved and cooked under different conditions., International Journal of Food Science and Nutrition, 2(1) pp.90-96
9. Salman Ali et al. (2021) Effect of cooking method on nutritional and quality characteristic of fish, Pakistan Journal of Agricultural Research, 34 (2) pp.325-328.
10. Isabel Castro-Gonzalez (2015) Effect of six different cooking techniques in the nutritional composition of two fish species previously selected as optimal for renal patient's diet Journal of food science and technology, 52(7): 4196-4205.
11. S.Sadasivam, A. Manikam Biochemical Methods,Practical Book, Third edition pp 21.

#### CITATION OF THIS ARTICLE

Sanjay M. Nikam<sup>1</sup> and Pratiksha S. Jadhav<sup>2</sup> : Effect of Different Cooking Methods on Nutritional values of fresh Water Fish *Nemacheilus botia*. Bull. Env.Pharmacol. Life Sci., Spl Issue [1]: 2023:522-525.