



## Comparative Study of Protein Concentration in Fresh and Smoke Dried Small Indigenous Fish Species

Neeru Agrawal , Bhumika Deshmukh & Shyama Dhruwe

Deptt. of Zoology, Govt. V.Y.T. P.G. Auto. College, Durg

Email: neeru.bhilai@gmail.com

### Abstract

About two million metric tons of fish has been produced in Chattisgarh in last ten years and is available in most markets in fresh, smoked, dried, canned, chilled or frozen forms. Small fish species are also in high demand in food markets. Those fish which grow to a length of approximately 5-25 cm at maturity are referred to as Small Indigenous fish Species (SIS). There is considerable demand for small indigenous fishes both in rural and urban areas of Durg & Bhilai. Due to high palatability, taste and richness in nutrients, five commercially important varieties of freshwater small indigenous fish species (SIS) of Genus *Mystus*, *Puntius*, *Channa*, *Oxygaster* and *Lepidocephalichthys* have been selected for the present research work. Our study is based on comparison of protein concentration in locally consumed fresh and smoke dried small fishes. In the present work quantitative estimation of protein in both types of fishes was done by Lowrey's method. Among the five species studied, protein content varied from 12.6% to 18 % in fresh fishes and 16.8% to 20.8% in dried fishes which is more or less similar to that reported by CSIR. In all five species, protein content observed was high in dried fishes as compared to fresh fishes. This increase of protein in dried fishes may be due to dehydration which causes aggregation of proteins. Our study concluded that protein nitrogen was not lost during smoke drying while protein content increased with the reduced moisture content in the fish samples. Thus smoking can be used as an effective method of fish processing which could be useful in the efficient management of fish resources.

**Key words:** SIS-fish, Smoke dried & Quantitative.

### INTRODUCTION:

Fishes are presently in high demand in food markets, they are widely consumed in many parts of the state because they are easily digestible and are protein rich nutritive food commodity that help to remove malnutrition. There is considerable demand of small indigenous fishes in markets of twin city, Durg and Bhilai. Those fishes which grow to a length of approximately 5-25 cm at maturity are referred to as Small Indigenous fish Species (SIS) (Felts et al. 1996). These small fishes provide food and nutrition, sustenance and supplemental income for majority of people, particularly the poor and disadvantaged. In general fresh fishes are used in culinary. However, drying of fish is also a common practice among various ethnic groups. When a fish is dried and preserved, people can have access to fish products all round the year. Smoke drying is often used as a method of drying and preservation of fishes. It produces commonly acceptable products since it imparts desirable colour and flavour. In the present investigation five commercially important varieties of freshwater small indigenous fish species (SIS) of Genus namely *Mystus*, *Puntius*, *Channa*, *Oxygaster* and *Lepidocephalichthys* were selected and their protein concentrations were compared between fresh and smoke dried fishes.

In India, Thapa et al. (2007); Sharma et al. (2013); Geetha et al. (2014), etc. had worked on quality aspects of traditionally fermented dried fish products. Hossain et al. (1997) reported similar

protein content (16.7%) in Thai sharpunti (*Puntius gonionotus*). According to Hossain et al. (1999) the carcass protein content of SIS varied between 12.49 and 17.41%. CSIR (1962) reported the protein content of some selected fish species in India to be 14.32 -19.8%. The protein content of SIS is also similar to that found in large carp fish species (*rohu*, *Labeo rohita*) and the value was 17.91% (Humayun et al. 1987). Azam et al. (2003) found that the values of protein ranged from 6.52 to 40.69% in 14 species of dried fishes. When the fish temperature is kept below 70°C during this process, the drying time and heat affect very little the protein quality. Exposure to high temperature for very short time (1 to 10 min) will have little effect on protein quality (Keller, 1990). Ninawe and Rathnakumar (2008) reported that dried fish had higher protein than the fresh fish. Increase of protein may be due to the dehydration of water molecule present between the proteins thereby, causing aggregation of protein and thus resulting in increase in protein content of dried fishes. Ogbonnaya and Shaba (2009) reported that protein nitrogen was not lost during drying, so that protein content increased with the reduced moisture content in the fish samples. The shelf-life of smoked fish product is usually extended because smoking of fish accelerates drying which lowers moisture content and thus prevents microbial activities on the fish (Eyo, 2001) According to Dyer, et al. (2011) upto 95% of fish muscle protein can be extracted with 5% sodium chloride.

**MATERIALS AND METHODS:**

Fresh fishes were bought from local market of Bhilai and dried fishes were collected from traditional vendor who used smouldering straw to dry fishes. They were taken to the laboratory in airtight polythene bags where fishes were cleaned and used immediately for further investigation. The protein concentration of fish was determined by Lowry’s method (Lowrey’s et al.1951). To extract protein, whole fish was ground into fine paste/powder without water with the help of porcelain and mortar, After grinding 200 mg of each sample was taken in a separate test tube and centrifuged with 5ml of 5% NaCl at 1000rpm for about 10 minutes. 1 ml supernatant from each tube was used as a sample for quantitative estimation of protein. For accuracy of result samples were prepared in triplicates and the absorbance of each was taken at 720nm with

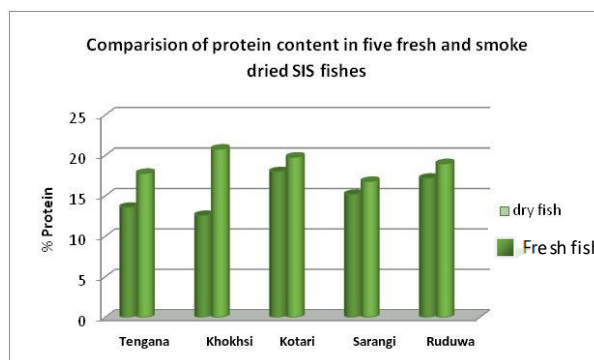
UV-visual spectrophotometer. Concentration of protein in fish sample was computed from standard calibration curve obtained with standard protein (BSA) solution. Results are expressed in percentage. All the chemicals used were of analar grade.

**RESULTS AND DISCUSSION:**

Among the five species studied, protein content obtained varied from 12.6% to 18 % in fresh fishes and 16.8% to 20.8% in smoke dried fishes (Table I) which are more or less similar to that reported by CSIR (1962). The results are similar with the previous study conducted by Azam *et al.* (2003) who found that the values ranged from 6.52 to 40.69% in 14 species of dried fishes. Hossain *et al.* (1997) reported similar protein content (16.7%) in Thai sharpunti (*Puntius gonionotus*). The carcass protein content of SIS fishes varied between 12.49 and 17.41% was also reported by Hossain *et al.*(1999) .

**Table I:** Protein content observed (in %) in five fresh and smoke dried SIS fishes of following genus

Genus studied	Local name	in fresh fish	In smoke dried fish
Mystus	Tengana	13.6%	17.8%
Channa	Khokhsi	12.6%	20.8%
Puntius	Kotri	18%	19.8%
Oxygaster	Sarangi	15.2%	16.8%
Lepidocephalichthys	Ruduwa	17.2%	19%



In all five species, protein content observed was high in smoke dried fishes as compared to fresh fishes. This increase of protein in dried fishes may be due to dehydration which causes aggregation of proteins as reported by Ninawe and Rathnakumar (2008). An increase in protein content was observed in all dried fishes because as per statement of Ogbonnaya and Shaba (2009) protein nitrogen was not lost during drying and therefore protein content increased with the reduced moisture content.

According to traditional manufacturer of dried fishes, heat is applied during drying which causes considerable reduction of microorganisms of various types (Islam,etal.2013). Thus smoke drying can be used as an effective method of fish processing which can be useful in the efficient management of fish resources without losing their protein content.

**CONCLUSION:**

The study was undertaken to analyze the difference in protein content between traditionally smoke dried fishes and fresh fishes. The percentage of protein content in selected dried SIS fishes was found more. From these results it can be concluded that dried SIS fishes used in present study can provide satisfactory nutrition in the form of protein and have advantage over fresh fishes as their shelf life is also increased due to reduction in moisture content.

**REFERENCES:**

Azam K., Basher M. Z., Asaduzzaman M., Hossain M. H. and Ali M. Y. (2003): Biochemical quality assessment of fourteen selected dried fishes. *Univ. J. Zool. Rajshahi Univ.* 22: 23-26.

- CSIR(1962): Fish and Fisheries. Raw materials, India, Vol. IV: p. 132.
- Dyer W.J., French H.V. and Snow, J.M.,(2011): Proteins in Fish Muscle.: I. Extraction of Protein Fractions in Fresh Fish. *Journal of the Fisheries Research, Board of Canada*, 1950, 7d (10): 585-593.
- Eyo A. A. (2001): Fish processing technology in the tropics. Published by National Institute for Freshwater Fisheries Research (NIFFR), New Bussa, Niger State. pp 37-164.
- Felts, R.A., Rajts, F. and Akhtaruzzaman, M. (1996): Small indigenous fish species culture in Bangladesh. Technical brief. IFADEP Sub-project-2. Development of Inland Fisheries. 4 pp.
- Geetha, S. Govinda Rao, V, Muddula Krishna, N. Ram Sai Reddy, N. and Ramesh Babu, K. (2014): Some Aspects Of Biochemical And Microbial Analysis Of Sun Dry Fish *Trichiurus lepturus* Linnaeus, 1758 From The East Coast Of Visakhapatnam, *International Journal Of Biological Research*, Vol. 4(4) 2014: 462-465.
- Hossain, M.A., Shah A.K.M.A., Rahmatullah S.M., and Sarker, M.S.A. (1997): Effect of supplemental feeding methods on the growth of *puntius gonionotus* (Bleeker) in earthen mini ponds. *Bangladesh f. Fish.*, 20(1-2): (in press)
- Hossain, M.A. Afsana, K. and Azad Shah A.K.M. (1999): Nutritional value of some small indigenous fish species (SIS) of Bangladesh. *Bangladesh J. Fish. Res.*, 3(1): 77-85
- Humayun, M.M., Mazid, M.A., Rahman, M.A. Ghey-suddin S., and Hossain, M.A. (1987): Production of improved quality dried products from rohu fish (*Labeo rohita*). *Bangladesh f. Agril. Sci.*, 37(2): 37-41.
- Islam, Md.T., Shamim, A. Mst. Sultana, A. Tumpa@A.S. and Flowra, F.A. (2013): Nutritional and food quality assessment of dried fishes in singra upazila under natore district of Bangladesh. *Trends in Fishries research .vol. 2 issue 1 (2):* pp 14-17.
- Keller S. (1990): Making profits out of seafood wastes. In: Specifications for marine by-products for aquaculture. Hardy R. W. & Masumoto T., Eds. Alaska Sea Grant College Program, Anchorage, AK, US, pp 109-120.
- Levy S. B. (1992).
- Lowry, O.H., Rosebrough, N.J., Farr, A.L. and Randall, R.J. (1951): *J. Biol. Chem.* 193(1): 265-75.
- Ninawe A. S. & Rathnakumar. K. (2008): Fish processing technology and product development, impact of curing (1st edition) pp (5): 142.
- Ogbonnaya C. & Shaba I. M. (2009): Effects of drying methods on proximate composition of cat fish (*Clarius gariepinus*). *World J. Agric. Sci.* 5(1): 114-116.
- Sharma, P., Kashyap, D. and Goswami, U.C. (2013): Preparation and Storage Of Salted and Dried Products of Freshwater Fish, *GUDUSIA CHAPRA* (HAMILTON, 1822), *The Bioscan* 8(2): 455-458.
- Thapa, N., Pal, J and Tamang, J.P. (2007): Microbiological profile of dried fish products of Assam. In: *Indian J. Fish.*, 54(1): 121- 125, Jan.-Mar., 2007

