Quality of edible portion of dressed and powdered small fish and prawns

F.A. Flowra* and A.S. Bhuiyan

Department of Fisheries, Rajshahi University, Rajshahi-6205. Bangladesh

Abstract: A total of six species of fishes and three species of prawns such as *Cirrhina reba, Mastacembelus pancalus, Mastacembelus armatus, Xenentodon cancila, Glossogobius giuris, Hypophthalmichthys molitrix, Macrobrachium malcolmsoni, Macrobrachium lamarrei* and *Macrobrachium dayanum* were used in the study. The average total lengths of the fishes were 157.5mm (*C. reba*), 135.25mm (*M. pancalus*), 104.5mm (*G. giuris*), 199.20mm (*M. armatus*), 190.45mm (*X. cancila*), 238.75mm (*H. molitrix*) and 44.07mm (small prawns). The average after dressing (ADW) and washing weights (WW) were 22.95g (*C. reba*), 12.21g (*G. giuris*), 16.58g (*X. cancila*), 40.97g (*M. armatus*), 13.00g (*M. pancalus*), 410.50g (*H. molitrix*) and 1.05g (prawns). The highest percentage after dressing (ADW) weight and washing weight of *M. pancalus* was 85.20% and lowest in *H. molitrix* which was 62.49%. In small prawns the highest percentage of waste weight (WW) per kg was 91.79% and the lowest in *X. cancila* which was 79.88%. On the other hand in percentage of powder per kg the highest value was found in *X. cancila* (20.12%) and the lowest in small prawns (8.21%). The lowest duration of day was needed in *C. reba* and *X. cancila* (4 days) and the highest duration (7 days) was needed in *M. pancalus* and *M. armatus*.

Key words: Edible portion, Dry fish, Powder fish

Introduction

Fisheries is considered as an important sector in Bangladesh in terms of creating job opportunities, meeting the demand of animal protein, earning of foreign exchange and growth of gross domestic products. Fish and fish products are the major source of animal protein in the diet of the nation but fishes are highly perishable commodities and it occurs spoilage quickly. So, proper knowledge on handling, catching and processing are very much needed. Proper processing and preservation of fisheries species decrease the loss of quality and quantity after catch. Unfortunately, for a long time the fish processing and preservation sectors remained neglected, except a little expansion of export oriented processing. These processing industries virtually have no role in processing and preservation of huge inland or marine catches which are marketed for domestic consumption. Actually, the fishes destined for domestic consumption undergo various indigenous or traditional post harvest processing treatments. The traditional fishermen and processors are lacking of adequate knowledge and facilities for maintaining proper sanitation and hygienic condition during processing and keeping of the products. Improper handling and processing also lead to spoilage, and low quality products impose threats to the public health countrywide. On the other hand, small-scale processors suffer a great economic loss because of the low grade products. In our country, considerable number of works have been done on different processing and preservation methods of fishes and fisheries items by Hussain *et al.* (1992), Kamal *et al.* (2000), Kamal (2001), Nowsad (2001), Nowsad (2002), Clucas (2003), Nowsad (2003), Azam *et al.* (2003), Nowsad *et al.*(2005), Islam *et al.* (2006), Rabbane *et al.* (2006) etc. However, there are very little works on the percentages of usable and waste products during processing of the fish or shrimps. In this aspect the works of Dutta and Hossain (1990) and Hossain *et al.* (1999) can be referred. For proper utilization safe shelf life dry powder of fish and prawns is an easy processing technique.

In this study six popular fish species were used. Most of these species are small sized and people are used to eat whole fish. Preparing these fishes for cooking is quite troublesome and time consuming. Hence, inspite of high quality taste and nutritive values (Chie, 1999), the consumers are not always interested to buy these fishes. Similar is the case for the small sized prawns. But if these fishes are sold after dressing or even as dry powder, these products can attract consumers' interest, and this can increase the

*Corresponding author: flowrabd@yahoo.com

marketing efficiency of the small fishes and prawns.

The present work was designed to determined the percentages of flesh weight of six freshwater fish species and mixed species small prawns after processing, and that of wastes and powder products.

Materials and Methods

Cirrhina reba, *Mastacembelus pancalus*, *Mastacembelus armatus*, *Xenentodon cancila*, *Glossogobius giuris*, *Hypophthalmichthys molitrix* and small prawns of 3 species (*Macrobrachium malcolmsonii*, *M. lamarrei* and *M. dayanum*) were collected randomly from different fish markets in fresh condition from Rajshahi City Corporation. After collection specimens were washed and preserved in refrigerator for morphometric analysis. Different lengths, total length (TL), standard length (SL), and weights total weight (TW), after dressing weight (ADW), wastes weight (WW) were recorded for each species. Lengths were measured nearest to centimeter. Different weights of the fishes were taken with the help of both pan balance and electric balance. Temperature and humidity measured by the digital hygro-thermometer.

All the lengths and weights of each species were expressed as mean.

Drying technique

At first the fish specimens were washed with tap water and soaked with kitchen tissue paper to remove excess water. Then scales, fins, head and viscera were separated from the abdomen, and the remaining body was weighed (ADW). The dressed fishes were boiled with salt. The boiled fishes were spreaded on tray and sundried under fly net.

Preparation of Powder

The dried fishes were kept separately species wise at normal room condition in plastic containers. Within 6-7 days the dry fishes were powdered with a kitchen grinder. Then it was sieved by the "Chaluni", so that the smallest bones were easily separated from the powder. Total scheme of processing for fish powder has shown in Fig. 1. Electronic balance meter was also used for taking weight of and waste of powders (non grinding finest bones).
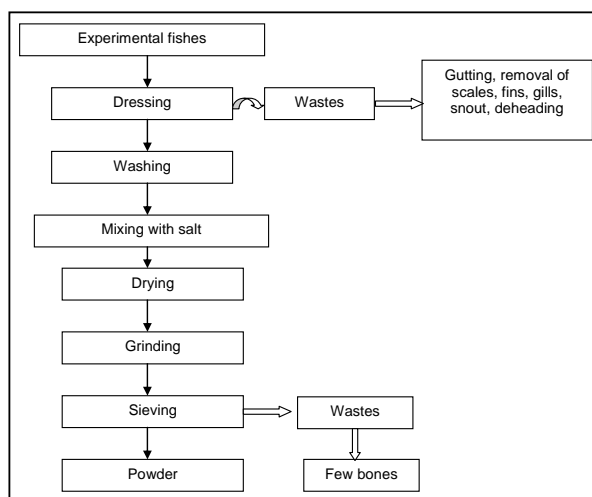
Fig. 1. Schema for the processing of powder of the experimental fishes and prawns.

Results and Discussion

In the temperature and humidity of the drying area were recorded for each species, as all the fishes were not processed at the same day. Temperature and humidity (%) of the air of the drying area and the time taken for proper drying are presented in the Table 1. The highest mean of total length (238.75±64.48mm), total weight (410.50±113.21g) and after dressing weight (624.85±12.93g) were recorded for *H. molitrix*. The lowest values of these parameters were 104.45±21.92mm, 12.21±3.96g (*G. giuris*) and 65.52±2.62g (*M. armatus*) respectively (Table 1). The range of total length, total weight, after dressing weights and their mean with standard deviation of all the 7 species (N=10) are shown in Table 2.

Highest percentage of after dressing weight (ADW) and washing and waste weight (WW) were found as 85.20% and 14.80% respectively in *M. pancalus*. The lowest values found as 62.49% and 37.51% respectively in *H. molitrix* (Fig. 2). The highest amount of waste per kg was found in small prawns (917.90g) and the lowest in *X.cancila* (798.80g). The amount of powder per kg was maximum in *X. cancila* (201.20g) whereas lowest in small prawns (82.10g), and ratio between powder and waste were 1:11.18 and 1:3.97 respectively. The detailed results are shown in the Table 3. Very little information related to this

research work are found. Hossain *et al.* (1999) reported that compared to the total weight, total flesh weight (69.76%) was high in *Amblypharyngodon* *mola* among their six studied fish. Mola fish was found to produce highest percentage of edible parts except the guts and the fins.

Table 1. Different parameters of drying method

Species	Parameters		
	Temperature (°C)	Humidity (%)	Time (Days)
C. reba	37-40	85-80	4
M. pancalus	36-39	87-82	7
M. armatus	36-38	88-92	7
X. cancila	38-40	84-79	4
G. giuris	37-40	86-78	5
H. molitrix	36-40	88-91	6
Prawns	37-39	87-91	5

Table 2. Range of total length, total weight and after dressing weight (ADW) of experimental fishes and small prawns per 100g of initial weight

Exp. No.	Species	Range of TL (mm)			Range of weight (g)			Range of weight ADW (g)		
		Min	Max	Mean±SD	Min	Max	Mean±SD	Min	Max	Mean±SD
1	*G. giuris*	89	120	104.45±21.92	9.5	15.1	12.21±3.96	82.0	85.6	83.67±2.55
2	*C. reba*	133	190	157.5±40.31	14.00	40.50	22.95±18.74	65.5	72.0	69.24±4.60
3.	*X. cancila*	158	240	190.45±57.98	13.03	20.40	16.58±5.21	78.98	84.20	81.34±3.69
4.	*M. pancalus*	110	155	135.25±31.82	10.1	16.5	13.0±4.53	84.0	87.2	85.2±2.26
5	*M. armatus*	180	216	199.2±25.46	25.00	53.50	40.97±20.15	63.50	67.20	65.52±2.62
6	*H. molitrix*	155	315	238.75±64.48	200	600	410.50±113.21	608.75	640.30	624.85±12.93
7	Prawns	38	49	44.07±3.89	0.85	1.50	1.05±0.19	66.50	72.50	68.75±1.96
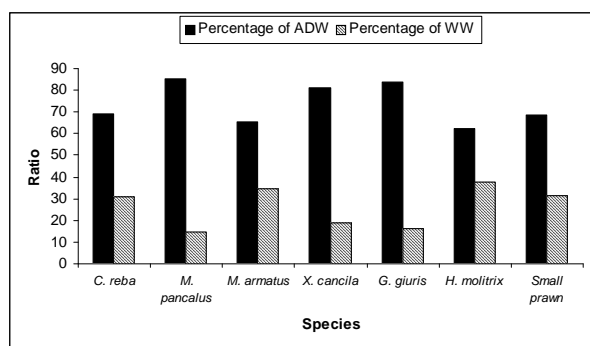
Fig. 2. Relative percentage of after dressing weight (ADW) and washing and waste weight (WW) of experimental fishes and prawns.

For proper drying the lowest time was needed for *C. reba* and *X. cancila* (4 days) and the highest duration (7 days) was needed for *M. pancalus* and *M. armatus* (Table 3). Nowsad (2007) and Flowra *et al.* (2012) reported on drying duration of different dried fishes which were more or less similar with this study.

However, the works of Clucas and Ward (1999), Gopakumar (1999) and Cutting (2002) focus on the techniques of fish processing and preservation for different fishes for producing high quality products and increased shelf life.

Table 3. Ratio between powder and waste of fishes and prawns per kilogram

Species	Constant weight (kg)	Powder (g)	Waste (g)	Ratio between powder & waste
C. reba	1	82.70	917.30	1 : 11.09
M. pancalus	1	198.50	801.50	1 : 4.04
M. armatus	1	131.80	868.20	1 : 6.59
X. cancila	1	201.20	798.80	1 : 3.97
G. giuris	1	112.70	887.30	1 : 7.87
H. molitrix	1	90.40	909.60	1 : 10.06
Small prawns	1	82.10	917.90	1 : 11.18

Conclusion

Powder of fishes can be used in preparing delicious snacks which are more acceptable to all kinds of people, and as fish feed. The dressed small fish and prawns can be prepared by the poor women, and a frozen packaging system can be developed by the fish wholesalers as a cottage industry. Similar attempt can be taken for preparing the fish and prawn powder. Such attempt would provide ready pack for small fish and prawns to the consumers, and an income generating source for poor women community. Sultana (2012) reported the biochemical parameters of these fish and prawns, which suggest that such processed fish and prawns are quite nutritive.

Acknowledgement

References

Azam, K., Basher, M.Z., Aasaduzzaman, M., Hossain, M.M. & Ali, M.Y. 2003. Biochemical quality assessment of fourteen selected dried fish. *Univ. J. Zool. Rajshahi Univ.* **22**: 23-26.

Chie, S. 1999. Relationship between chemical composition and crystalline structure in fish bone during cooking. *Journal of Clinical Biochemistry and Nutrition*, **26**(3): 173-182.

Clucas, I.J. 2003. Mission report on technical backstopping on low cost fish processing, quality control and food safety aspects. GOB/UNDP/FAO Project: BGD/97/017. 31pp.

Clucas, I.J. & Ward, A.R. 1996. *Post-harvest Fisheries Development: A Guide to Handling, Preservation, Processing and Quality*. Chatham Maritime, Kent ME4 4TB, United Kingdom. 429pp.

Cutting, C.L. 2002. Fish Processing and Preservation. Published by Agrobios, India. 353p.

Dutta, S.K. & Hossain, M.A. 1990. Production of head-off boiled exoskeletonless dried prawns. *Bangladesh J. Zool.*, **18**(1): 91-97.

Flowra, F.A., Mohmud, M.S. & Mondal, R.C. 2012. Traditional fish drying activities and socio-economic status of dried fish processors of Chalan beel area, Sirajganj, Bangladesh. *Bangladesh J. Prog. Sci. & Tech.* **X**(1): 65-68.

Gopakumar, K. 1999. *Tropical Fishery Products*. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi, Calcutta. 183pp.

Hossain, M.A., Parween, S. & Mortuza, M.G. 1999. Estimation of edible contents of some freshwater fish species. *Univ. j. zool. Rajshahi Univ.* **18**: 169-171.

Hussain, M.M., Karim, A., Alam, Z., Islam, M.S., Khan, A. & Hossain, A. 1992. Effect of pre-treatment on the drying of ghonia fish *Labeo gonius* in the open sun and in a solar tent. *Bangladesh J. Zool.* **20**: 231-238.

Islam, D., Mustafa, M.G., Wahed, M.A. & Khaleque, M.A. 2006. Effects of different storage conditions on the quality and shelf life of tunnel and sun dried *Pampus argenteus*. Abstract of the 2nd Fisheries Conference and Research Fair, held on 18-19 January, Bangladesh Fisheries Research Forum (BFRF), BRAC, Dhaka.106 pp.

Kamal, M. 2001. The suitability of under-utilized marine fish for the development of Surimi-based value added products. Completion report. *Bangladesh Agricultural Research Council*. pp. 1-77.

Kamal, M., Rahman, M.M., Yesmin, L., Islam, M.N., Nurullah, M. & Mazid, M. 2000. Studies on the post mortem changes in shrimp and prawn during ice storage: ii. Biochemical aspects of quality changes. *Bang. J. Fish. Res.* **4**(1): 91-96.

Nowsad, A.K.M.A. 2001. Development of value-added products from by-catch and under utilized fisheries organisms and pilot market testing of product acceptability among rural communities. SUFER Project (Support for University Fisheries Education and Research), DFID. Completion report, pp. 1-39.

Nowsad, A.K.M.A. 2002. TOT Manual on community based utilization of fish for better quality and higher income. Food and Agriculture Organization of the United Nations. BGD/97/017. 90pp.

Nowsad, A.K.M.A. 2003. A new method of fish drying in a solar dryer (in Bengali). Food and Agriculture Organization of the United Nations. BGD/97/017.

Nowsad, A.K.M.A. 2007. *Participatory Training of Trainers-A New Approach Applied in Fish Processing*. Bangladesh Fisheries Research Forum, Dhaka. 328 pp.

Nowsad, A.K.M.A., Ali, F.M. & Azad, K.A.M. 2005. Development of value-added products from by-catch and underutilized fisheries organisms and pilot market testing of product acceptability among rural communities. *Bangladesh J. Fish*. (Special Issue, 2004), **27**: 31-32.

Rabbane, M.G., Mustafa, M.G., Wahed, M.A. & Khaleque, M.A. 2006. Investigation of deteriorative changes during freezing preservation of Pabda (*Ompok pabda*) and Chapila (*Gudusia chapra*) fish. Abstract of the 2nd Fisheries Conference and Research Fair, held on 18-19 January, Bangladesh Fisheries Research Forum (BFRF), BRAC, Dhaka. 111pp.

Sultana, S. 2012. Flesh estimation of some SIS fish. *J. Life Earth Sci*. **7**: 105-108.