

The Effect of Lemon Leaves Extract Treatment on the Nutrient Content and Microbial Properties of Dried Chanda (*Chanda Nama*)

Mohajira Begum^{1,*}, Tanjina Akter¹, Shakir uddin Ahmed², Majeda Begum³

¹Fish Technology Research Section, Institute of Food Science and Technology, Bangladesh Council of Scientific and Industrial Research, Dhanmondi, Dhaka

²Food Microbiology Section, Institute of Food Science and Technology, Bangladesh Council of Scientific and Industrial Research, Dhanmondi, Dhaka

³Bangladesh Council of Scientific and Industrial Research, Dhanmondi, Dhaka

*Corresponding author: mohajira10@yahoo.com

Received August 07, 2013; Revised October 13, 2013; Accepted January 12, 2014

Abstract The experiment deals with the lemon leaves extract for chanda fish (*Chanda nama*) drying. The highest moisture percentage (56.80) and fat percentage (24.39) were observed in control chanda. In contrast, the highest moisture (12.14) and ash percentages (21.82) were observed in market chanda respectively. In addition, the lemon extract treated fishes were also subjected to biochemical composition. In case of control chanda, the highest moisture (8.66), fat (26.89), and ash percentage (15.10) were found that was treated by plant extract with hot water. In contrast, the highest protein (50.01) was achieved by the plant extract with ethanol samples. In case of market chanda, the highest moisture (8.67), protein (52.83), fat (17.52), and ash percentage (25.69) that was treated by plant extract with hot water. Microbial analysis was also conducted. Standard Plate Count (cfu/g), Total coliform (MPN/g), Total fungi (cfu/g) and *E. coli* are in the acceptable range in case of control chanda but not in market chanda. This study suggests the effectiveness of lemon leaves extract on fish drying as it's retain beneficial quality after treated with several extracts. More field trial is needed to make it fruitful.

Keywords: drying, chanda, microbial quality, lemon leaves extract

Cite This Article: Mohajira Begum, Tanjina Akter, Shakir uddin Ahmed, and Majeda Begum, "The Effect of Lemon Leaves Extract Treatment on the Nutrient Content and Microbial Properties of Dried Chanda (*Chanda Nama*)." *Journal of Food and Nutrition Research* 2, no. 1 (2014): 21-24. doi: 10.12691/jfnr-2-1-4.

1. Introduction

Since beginning, fish and fisheries play an important role in the life of Bangladeshi people [1,2]. The demand of fish consumption (20.44 kg / people / year) is high than the current fish consumption (17.52 kg / people / year) [3]. At present, 275 freshwater and 475 marine water fish species, 24 prawns and 36 species of shrimp is available in our country which show the richness of fish and other aquatic resources in our country [4,5]. Due to the availability and a cheap source of protein, rich source of mineral, fatty acid and so on fish are heavily used in the diet of people [6,7,8].

Many reasons affect the spoilage of fish such as temperature, microorganism, autolysis and so on. We have to reduce the rate of spoilage as early as possible after caught and increase the self life of fish [7]. There are various methods of increasing self life such as drying, smoking, salting, fermentation, etc which are found very effective and used all over the world [7,8,9].

Now a days it has been observed that fish treated with several plant extract or other cooking ingredients showed better performance than our traditional processing method.

It has many advantages such as it's a long time preservation method, availability of extract and for the retention of good beneficial property as well [7,8,9,10,11,12]. A lot of antimicrobials are present in animal and plant tissues which are found very effective in treating gastritis, chronic fatigue, poor circulation, rheumatism, diarrhea, menstrual problems, and leucorrhea [8,9].

The present study was carried out to evaluate the potentiality of lemon leaves extract on the dried fish product as to observe it can retain good beneficial property along with presence of microorganisms. Hence forth no study has been found using lemon leaves extract to produce dried fish. So the study might be help the future scientist, fish processors and the local people as a means of preservation process using such type of plant extracts.

2. Materials and Methods

Fresh looking of chanda fish (*Chanda nama*) were selected as raw materials for present study and the fish sample were collected directly from the fish processor and

was brought to the Fish Technology Research Section, Institute of Food Science and Technology (IFST), Bangladesh Council of Scientific and Industrial Research (BCSIR), Dhaka to carry out the investigation. Using tap water the fishes were cleaned degutted and washed again.

2.1. Collection of Plant Materials and Preparation of Plant Extracts

Lemon leaves were collected from BCSIR Campus, Dhanmondi, Dhaka. After collecting these plants, firstly these plants were separated from unwanted substances and washed properly and dried over night in oven at 40°C. After drying, they were powdered by Blender Machine. This is the prepared sample for extraction. These prepared powders were dissolved in 70% ethanol for 72 hours. Then these categories of extract were collected.

2.2. Formation of Treatment and Replica for the Experiment

Two types of chanda fish were collected. First one collected directly from the fish processor (raw condition) is termed as control chanda (T₁) and another one collected from the market is called market chanda (T₂). Both were mixed with lemon plants extract, ethanol and hot water. Thus we have two treatments (6 replica, 3 from each).

2.3. Microbiological Test and Proximate Composition

The microbial analysis was done by standard plate count (cfu/g), Total coliform (MPN/g), *E. coli* (MPN/g) and Total Fungi (cfu/g) [13]. The moisture and ash contents of the fish were determined by AOAC method [14]. The protein content of the fish samples were determined by Kjeldhal method. The fat content of the fish samples was determined by Bligh and Dyer method [15]. The analysis was conducted simply using Microsoft Office 2007.

3. Results

Fishes are highly perishable food and necessary conservation for future use [16,17,18]. Objective of all these methods is the same to extend the useful life of the fish so that the fish can be used properly in future. One such method is the "drying", the oldest known method of preserving non-perishable food such as fish. In Bangladesh, sun drying is the preferred method for preserving fish as it is less expensive method. Table 1 represents the proximate composition of raw chanda fish. The highest moisture percentage (56.80) and fat percentage (24.39) were observed in control chanda. In contrast, the highest moisture percentage (12.14) ash percentages (21.82) were observed in market chanda respectively.

In addition, the lemon extract treated fishes were also subjected to biochemical composition. Table 2 represents the proximate composition of lemon extract treated chanda fish.

Table 1. Proximate composition of the controlled and marketed chanda fish were given below:

Sample	Moisture (%)	Protein (%)	Fat (%)	Ash (%)
Control chanda	7.53	56.80	24.39	14.72
Market chanda	12.14	45.82	13.58	21.82

Table 2. Proximate composition of the lemon extract treated controlled and marketed chanda fish were given below:

Parameter	Control chanda		Market chanda	
	Plant leaves extract with ethanol	Plant leaves extract with hot water	Plant leaves extract with ethanol	Plant leaves extract with hot water
Moisture (%)	5.67	8.66	8.07	8.67
Protein (%)	50.01	45.03	46.10	52.83
Fat (%)	24.78	26.89	14.46	17.52
Ash (%)	14.79	15.10	25.65	25.69

Table 3. Microbiological analysis of the control experimental dried fishes

Microbiological parameter	Control Chanda	Market Chanda
Standard Plate Count (cfu/g)	340	TNTC
Total coliform (MPN/g)	Absent	> 240
Total fungi (cfu/g)	< 10	TNTC
<i>Escherichia coli</i>	Absent	Present

TNTC= Too Numerous To Count

In case of control chanda, the highest moisture (8.66), fat (26.89), and ash percentage (15.10) were found that was treated by plant extract with hot water. In contrast, the highest protein (50.01) was achieved by the plant extract with ethanol samples. In case of market chanda, the highest moisture (8.67), protein (52.83), fat (17.52), and ash percentage (25.69) that was treated by plant extract with hot water. The result suggest that in all case lemon plant extract treated with hot water shows better performance than the lemon plant extract treated with ethanol.

In addition, some microbial analysis was also carried to see the extent of viability of the treated food item (Table 3).

From Table 3 it has been observed that, all the parameters Standard Plate Count (cfu/g), Total coliform (MPN/g), Total fungi (cfu/g) and *E. coli* are in acceptable range in case of control chanda but not in market chanda. This indicates that, control chanda treated with lemon extract are in better food condition than the market chanda. It is unknown, why the lemon extracts do not exert much influence on market chanda.

4. Discussion

Hence forth much evidence shows good performance of using plant extract for long term fish preservation. Besides, the extract of plant shows good activities against the microorganisms [8,19,20,21,22].

To observe the biochemical composition, at first the raw fishes have been subjected to moisture, protein, fat and ash determination. Later after treatment, again treated fishes were subjected to biochemical composition (moisture, protein, fat and ash determination). In case of raw fishes, the highest moisture (56.80) and fat percentage (24.39) were observed in market chanda. For the most of the fishes, the highest portion was accompanied by moisture and later by protein content and this may according to the season, collection place, sex, sizes, weight and even in within and between species [3,4,5,7,8,12].

To have a new taste and flavor, several ingredients can be added in any type of preservation method since ancient time in Bangladesh and also other countries of world. So a new fish food item can be prepared after mixing some of the ingredients and that may be eaten as a ready food item. But it should be flavorsome and tasty as like other dried fish. In addition, it should have longer shelf life. Owing to view this, fish can be preserved through icing, drying, smoking, salting and so on. Among them sun drying or simply drying can be made easily using sun light only. And it has longer life storage than some other preservation method. Normally for preservation salt is used as preservative [7,8,9,10,11,12]. But in our experiment, we add some lemon leaves extract with salt to append some flavor and a new smell.

After adding lemon extract, fishes were dried into sun. In case of control chanda, the highest moisture (8.66), fat (26.89), and ash percentage (15.10) were found that was treated by plant extract with hot water. In contrast, the highest protein (50.01) was achieved by the plant extract with ethanol samples. In case of market chanda, the highest moisture (8.67), protein (52.83), fat (17.52), and ash percentage (25.69) that was treated by plant extract with hot water. The result suggest that in all case lemon plant extract treated with hot water shows better performance than the lemon plant extract treated with ethanol. The reason is still unknown why market chanda treated with lemon extract and ethanol showed poor performance than the control chanda. It may be said that, when chanda is dried openly in the market for commercial purposes, hygienic condition is not ensured but in our laboratory facilities we were very careful during making such type of product. It is more evident after dried in the sun with extract. A lot of biochemical changes have been observed before and after evaluation of biochemical composition. Similar type of microbiological result also suggests and strongly recommends our obtained result. Besides, it shows effectiveness to make such type of dried food. Similar type of study was conducted by Begum et al. [10] to the effectiveness of tejpatha leaves extract on dried control & experimental kachki fish. They found that tejpatha leaves extract constitute a feasible treatment option for use in dried fish due to their natural antimicrobials, easy availability in tropical countries and low cost to the consumer. All the estimated parameter was very favorable to health.

At last the fishes were subjected to the microbial analysis which is another powerful technique to identify whether the fish suits for health or not [9]. It has been observed that, all the parameters Standard Plate Count (cfu/g), Total coliform (MPN/g), Total fungi (cfu/g) and *E. coli* are in the acceptable range in case of control chanda but not in market chanda. This indicates that, control chanda treated with lemon extract are in better food condition than the market chanda. It is unknown, why the lemon extracts do not exert much influence on market chanda. Begum et al. [7] has observed less number of microorganism in case of smoked pangus. She found that TVC (cfu g-1) was absent in two treatments where the treatments were made with salt and garlic only and total coliform with *E. coli* was same and *Salmonella* was absent in both of them. Hossain et al. [9] found lowest microbial content in case of smoked hilsha treated with 10% salt, garlic and with coriander. The microbial load has a strong relationship with storage time and temperature [23].

The present research finding will help to evaluate more plant leaves extract to treat with fish and more helpful in fish preservation method. More research should be carried out in this case. As it retained beneficial quality for health, so further field trial is needed to make it more popular among people.

References

- [1] Kabir, K.M.R., Adhikary, R.K., Hossain, M.B., and Minar, M.H., "Livelihood Status of Fishermen of the Old Brahmaputra River, Bangladesh". *World Applied Sciences Journal*, 16 (6): 869-873. 2012.
- [2] Jamali, A.B., Anisuzzaman, M., and Minar, M.H., "Present Status of Fish Marketing in Gopalpur Upazila of Tangail District". *Journal of Aquatic Science*, 1 (2): 24-30. 2013.
- [3] Azim, M.A., Islam, M.R., Hossain, M.B., and Minar, M.H., "Seasonal Variations in the Proximate Composition of Gangetic Sillago, *Sillaginopsis panijus* (Perciformes: Sillaginidae)". *Middle-East Journal of Scientific Research*, 11 (5): 559-562. 2012.
- [4] Minar, M.H., Adhikary, R.K., Begum, M., Islam, M.R., Akter, T., "Proximate composition of hilsha (*Tenualosa ilisha*) in laboratory condition". *Bangladesh Journal of Progressive Science and Technology*, 10 (1): 057-060. 2012 a.
- [5] Begum M, Akhter T, and Minar, M.H., "Analysis of the proximate composition of domesticated pangus (*Pangasius hypophthalmus*) in laboratory condition". *Journal of environmental Science and Natural Resources*, 5.(1): 69-74. 2012 a.
- [6] Minar, M.H., Shamsuddin, M., Bablu, M.G.U., Bhuyan, S.I., "Induced spawning practices of different fishes in the hatcheries of Barisal district, Bangladesh". *Trends in Fisheries Research*, 1 (2): 14-17. 2012 b.
- [7] Begum, M., Akter, T., and Minar, M.H., "Effect of Salt and Garlic on the Quality and Microbial Content of Smoked Catfish (*Pangasianodon hypophthalmus*)". *International Journal of Bio-resource and Stress Management*, 3 (4): 464-467. 2012 b.
- [8] Begum, M., Begum, M., Ahmed, S.U., and Akter, T., "Studies on the Effectiveness of Tejpatha (*Cinnamomum tamala* Nee) Leaf Extract on Dried Kachki (*Corica soborna*) Fish Preservation in Laboratory Condition." *American Journal of Food Science and Technology*, 1 (3): 14-17. 2013.
- [9] Hossain, M., Adhikary, R.K., Mahub, K.R., Begum, M., and Islam, M.R., "Effects of 10% concentrations of Salt, Garlic and Coriander on the Quality of Smoked Hilsa Fish (*Tenualosa ilisha*)". *American Journal of Food Technology*, 7 (8): 501-505. 2012.
- [10] Begum, M., Akter, T., Ahmed, A.T.A., and Khaleque, M.A., "Evaluation of quality and storage of commercially produced dried fish of Tengra (*Mystus vittatus*) with laboratory produced dried fish products". *International Journal of Bio-resource and Stress Management*, 2 (2), 246-249. 2011 a.

- [11] Begum, M., Akter, T., Farid, F.B., Nahid, M.N., and Kabir, L., "Shelf-life and quality of smoke cured and sun dried Tapsya (*Polynemus paradiseus*, Linnaeus, 1758) in laboratory condition". *International Journal of Animal and Fisheries Science*, 4 (5): 409-413. 2011 b.
- [12] Tanjina, T., Begum, R., Ahmed, A.T.A., Khaleque, M.A., and Begum, M., "Effect of drying on quality of tengra (*Mystus vittatus*) treated with turmeric and salt". *Unique Research Journal of Biological Science*, 1 (1): 001-005. 2013.
- [13] ICMSF., *Microorganisms in Foods 4: Application of Hazard Analysis and Critical Control point Systems to ensure Microbiological Safety and Quality*. Black well Scientific Publications, UK. 1988.
- [14] AOAC., *Official methods of analysis*. Association of Official Agricultural Chemists, 2nd ed. Washington D.C. 832 pp. 1975.
- [15] Bligh, E.G., and Dryer, W., "Total lipid extraction and purification". *Can. J. Biochem. Physiol.* 37. 99-110. 1959.
- [16] Mahfuj, M.S.E., Hossain, M.B., and Minar, M.H., "Biochemical Composition of an Endangered Fish, *Labeo bata* (Hamilton, 1822) from Bangladesh Waters". *American Journal of Food Technology*, 7: 633-641. 2012.
- [17] Begum, M., and Minar, M.H., "Comparative study about body composition of different SIS, shell fish and ilish; commonly available in Bangladesh". *Trends in Fisheries Research*. 1 (1): 38-42. 2012.
- [18] Ferdous L. Mahfuj, M.S.H., Ahammad, A.K.S, Minar, M.H., and Khan, M.M.R., "Cytological studies and Karyotype analysis of *Oreochromis niloticus* L". *International Journal of Biosciences*. 3 (3): 83-91. 2013.
- [19] Shittu, I.A.J., Bankole M.A., Ahmed, T., Bankole M. N. Shittu, R. K. Saalu C. L. and Ashiru, O.A., "Antibacterial and antifungal activities of essential oils of crude extracts of *Sesamun radiatum* against some common pathogenic microorganisms". *Iranian Journal of Pharmacology and Therapeutics*, 6: 165-170. 2007.
- [20] Pazos, M., Alonso, A., Sanchez, I. and Medina, I., "Hydroxytyrosol Prevents Oxidative Deterioration in Foodstuffs Rich in Fish Lipids". *Journal of Agricultural and Food Chemistry*, 56. 3334-3340. 2008.
- [21] Matos, L.C., "Evaluation of a numerical method to predict the polyphenols content in monovarietal olive oils". *Food Chemistry*, 102: 976-983. 2007.
- [22] Luther, M., "Inhibitory effect of Chardonnay and black raspberry seed extracts on lipid oxidation in fish oil and their radical scavenging and antimicrobial properties". *Food Chemistry*, 104. 1065-1073. 2007.
- [23] Hood, M.A., Ness, G.E., Rodrick, G.E., Blake, N.J., "Effects of storage on microbial loads of two commercially important shellfish species, *Crassostrea virginica* and *Mercenaria campechiensis*". *Applied Environmental Microbiology*, 45 (4), 1221-1228. 1983.