

A Method to Preserve Fish Muscle Pieces and Mince from Sciaenids

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Fish muscle pieces and mince from sciaenids can be preserved for 72 and 48 h respectively at ambient temperature ($34^{\circ}\text{C} \pm 4.5$) in media containing 8% NaCl, 0.2 % sodium benzoate and 0.5% potassium sorbate. Incorporation of 0.1% sodium bisulphite in this media slightly improved the texture and flavour of minced fish.

Shortage of ice is experienced in many landing centres in India making the short-term preservation of fish difficult especially in heavy fishing seasons. As a result the fish are preserved by salting and/or drying. It is necessary to find an alternative method to keep fish in fresh condition. Heen (1974), Mjelda & Urdahl (1974) and Bligh (1980) found that many chemicals were good preservatives capable of retarding bacterial growth and reducing autolytic enzyme action. This paper reports the use of chemical preservatives like sodium benzoate, potassium sorbate and sodium bisulphite to prolong the shelflife of fresh fish and minced fish at ambient temperature.

Materials and Methods

Saturated solution of sodium chloride was boiled for few minutes, cooled and the clear supernatant liquid was diluted to 4, 8, 16 and 24% salt solution using distilled water. 0.25% sodium benzoate was added to all the above solutions. Another set of solutions with the following composition were also prepared.

- A. 8% NaCl and 0.25% sodium benzoate
- B. 8% NaCl, 0.25% sodium benzoate and 0.5% potassium sorbate
- C. 8% NaCl, 0.25% sodium benzoate, 0.5% potassium sorbate and 0.1% sodium bisulphite

Fresh sciaenids purchased from the local market were gutted, skinned and washed in potable water and cut into pieces of size $2.5 \times 1.5 \times 1$ cm and 50 g each was immersed in 100 ml each of above solutions in clean

flasks and sealed air tight with polythene paper. Minced fish was prepared from skinless fillets of sciaenids using a meat mincer and 50 g each of it was also stored in 100 ml each of different solutions as above. All the samples were stored at room temperature ($34 \pm 4.5^{\circ}\text{C}$).

The samples were analysed at an interval of 24 h. Moisture, fat and NaCl were determined by AOAC (1975) methods. Protein was estimated by microkjeldahl method and total volatile basic nitrogen (TVBN) was determined by Conway microdiffusion method (1947). Alpha amino nitrogen was estimated by the method of Block & Balling (1951) and total bacterial count (TBC) was determined by standard pour plate method using peptone glucose agar media and incubating at 37°C . Organoleptic evaluation was carried out by a taste panel. The samples were cooked for 10 minutes in water for organoleptic evaluation. Analysis of minced fish was carried out after draining out the media over a wire mesh for 10 min.

Results and Discussion

During storage of muscle for 48 h in different concentrations of salt solution containing sodium benzoate, it was found that 8 to 10% salt solution were suitable for retaining moisture content in muscle to almost the original level (Fig. 1). Increase in salt concentration resulted in decrease of moisture and increase of salt in the muscle. Fat content in the muscle was 1.25%.

Table 1 shows the sensory characteristics of preserved fish pieces and minced fish in

	Hours of storage	Quality of raw meat									Quality of cooked meat									Characteristics of media										
		A			B						C			A			B			C			A			B			C	
Muscle pieces	0	Q1	T1	01	Q1	T1	01	Q1	T1	01	Q1	T1	F1	Q1	T1	F1	Q1	T1	F1	Q1	T1	F1	L1	01	L1	01	L1	01	L1	01
	24	Q2	T1	02	Q2	T1	02	Q2	T1	02	Q2	T1	F2	Q2	T1	F2	Q2	T1	F2	Q2	T1	F2	L3	02	L2	02	L2	02	L2	02
	48	Q3	T1	03	Q2	T1	02	Q2	T1	02	Q3	T1	F2	Q2	T1	F2	Q2	T1	F2	Q2	T1	F2	L3	03	L3	02	L3	03	L3	03
	72	Q4	T2	04	Q3	T1	03	Q3	T1	03	Q4	T2	F4	Q3	T1	F3	Q3	T1	F3	Q3	T1	F3	L3	05	L3	03	L3	04	L3	04
Minced fish	0	Q1		01	Q1		01	Q1		01	Q1	T1	F1	Q1	T1	F1	Q1	T1	F1	Q1	T1	F1	L2	01	L2	01	L2	01	L2	01
	24	Q2		03	Q2		02	Q2		02	Q2	T2	F2	Q2	T2	F2	Q2	T2	F2	Q2	T2	F2	L4	02	L4	02	L4	02	L4	02
	48	Q3		04	Q3		03	Q3		02	Q3	T3	F3	Q3	T3	F3	Q3	T3	F3	Q3	T3	F3	L4	04	L4	03	L4	03	L4	03
	74	Q4		05	Q4		03	Q4		05	Q4	T4	F4	Q4	T3	F4	Q4	T3	F4	Q4	T3	F4	L4	05	L4	05	L4	05	L4	04

Overall quality: Q1 = very good; Q2 = good; Q3 = fair; Q4 = poor

Texture: T1 = firm; T2 = slightly soft; T3 = soft; T4 = very soft

Odour: 01 = normal; 02 = more fish odour; 03 = slight pungent/off smell; 04 = pungent smell

Flavour in cooked meat: F1 = normal cooked flavour; F2 = slight loss of normal cooked flavour; F3 = slight off/ rancid flavour

Nature of media: L1 = clear; L2 = slightly turbid; L3 = turbid; L4 = thickly turbid.

Table 2. Changes in biochemical parameters in muscle pieces and minced fish during storage

	Hours of storage	Moisture %			Protein %			TVBN mg/100g			Alpha amino nitrogen mg/100g			NaCl %			TBC per g		
		A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
Muscle pieces	0	79.71 ±0.42	79.71 ±0.42	79.71 ±0.42	17.25 ±0.24	17.25 ±0.24	17.25 ±0.24	5.49 ±0.15	5.49 ±0.15	5.49 ±0.15	25.1 ±0.65	25.1 ±0.65	25.10 ±0.65	—	—	—	3 × 10 ²	3 × 10 ²	3 × 10 ²
	24	80.5 ±0.45	80.32 ±0.44	80.23 ±0.42	14.34 ±0.20	14.51 ±0.20	14.56 ±0.21	7.88 ±0.21	7.89 ±0.22	7.84 ±0.22	16.5 ±0.42	17.2 ±0.42	19.2 ±0.46	3.8 ±0.16	3.74 ±0.14	3.6 ±0.12	46 × 10 ⁴	17 × 10 ⁴	6 × 10 ⁴
	48	81.15 ±0.47	80.86 ±0.46	80.54 ±0.45	13.85 ±0.19	14.01 ±0.20	14.28 ±0.20	15.45 ±0.32	11.82 ±0.30	11.74 ±0.30	23.9 ±0.52	22.9 ±0.50	23.3 ±0.51	4.05 ±0.20	3.9 ±0.16	3.8 ±0.16	86 × 10 ⁴	67 × 10 ⁴	70 × 10 ⁴
	72	81.76 ±0.50	81.4 ±0.47	81.32 ±0.48	13.25 ±0.18	13.6 ±0.18	13.92 ±0.20	29.97 ±0.51	20.79 ±0.45	23.43 ±0.47	47.3 ±1.50	40.6 ±1.40	45.5 ±1.45	4.14 ±0.20	4.02 ±0.18	3.82 ±0.15	298 × 10 ⁴	160 × 10 ⁴	190 × 10 ⁴
	Minced fish	0	79.71 ±0.42	79.71 ±0.42	79.71 ±0.42	17.25 ±0.24	17.25 ±0.24	17.25 ±0.24	5.49 ±0.15	5.49 ±0.15	5.49 ±0.15	25.1 ±0.65	25.1 ±0.65	25.1 ±0.65	—	—	—	23 × 10 ²	23 × 10 ²
	24	82.5 ±0.53	82.2 ±0.53	81.01 ±0.52	12.2 ±0.20	12.58 ±0.21	12.41 ±0.20	14.64 ±0.35	11.72 ±0.31	10.5 ±0.30	11.21 ±0.40	10.5 ±0.35	10.53 ±0.35	4.12 ±0.18	4.05 ±0.17	4.01 ±0.17	124 × 10 ⁴	93 × 10 ⁴	81 × 10 ⁴
	48	83.16 ±0.55	82.94 ±0.54	82.75 ±0.54	11.7 ±0.17	11.9 ±0.17	11.84 ±0.17	22.6 ±0.46	20.8 ±0.45	19.41 ±0.43	15.2 ±0.44	14.62 ±0.42	13.85 ±0.42	4.2 ±0.20	4.15 ±0.19	4.11 ±0.19	182 × 10 ⁴	141 × 10 ⁴	129 × 10 ⁴
	72	83.8 ±0.55	83.2 ±0.54	82.92 ±0.54	11.3 ±0.15	11.6 ±0.15	11.9 ±0.16	28.9 ±0.50	27.4 ±0.48	26.63 ±0.48	18.54 ±0.48	17.31 ±0.46	16.68 ±0.46	4.31 ±0.21	4.2 ±0.20	4.18 ±0.19	12 × 10 ⁴	10 × 10 ⁴	10 × 10 ⁴

Note: TBC is mean and other values are means ± standard deviation of six determinations

raw and cooked state and the preservation media. Fish pieces and minced fish had a shelflife of 72 and 48 h respectively in media B and C. Minced fish in C had slight better texture and flavour than that in B, during 48 h of storage. Table 2 shows changes in biochemical parameters during storage. Increase in moisture and decrease in protein were noticed in all cases, but the total weight increased upto 24.5% in the case of fish pieces and 30% in minced fish. There was considerable decrease of alpha amino nitrogen in all samples at the initial stage of storage. Rapid increase in NaCl, TVBN and TBC was noticed in minced fish. A sharp change in TBC was noticed in fish pieces after 48 h of storage. Fish pieces in B showed lesser TVBN and TBC than that in C at the end of 72 h. Minced fish in B contained more TVBN content and TBC than that in C at the end of 48 h, but no difference was noticed at 72 h. The fish muscle was found edible organoleptically even at a high TBC; similar results were reported by Shewan (1961) during iced storage of cod and haddock,

and Liston (1980) during storage of English sole fillets at 0 to 2°C.

The results show that fish pieces and minced fish can be preserved for 72 and 48 h respectively in media containing NaCl, sodium benzoate and potassium sorbate. Addition of sodium bisulphite slightly improved the texture and flavour of minced fish, but shelf life remained the same.

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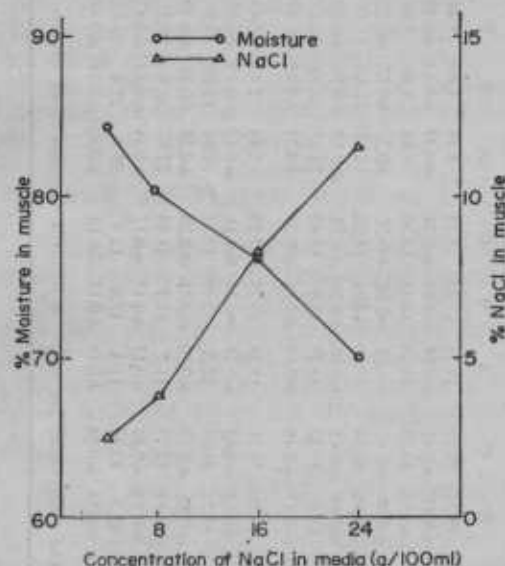


Fig. 1. Changes in moisture and NaCl contents in muscle with the change in NaCl concentration in media