

# Quality of Fish Preparations Served in Catering Establishments of Bombay

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The results of the study carried out on the quality of fish preparations served in catering establishments of Bombay revealed that there is no serious potential health hazard to the consumer. Pathogens like *Salmonella* and *Clostridium perfringens* were found to be absent. Based on organoleptic, biochemical and bacteriological parameters the quality of fish curry was better than that of fish fry. Overall quality of samples from grade I establishments was better in comparison with grade II and III. However, a few samples of poor quality were also observed in grade I. Extraneous matter like hair and dead housefly were observed in a few samples from grade III indicating poor handling practices. The importance of good hygiene and sanitary practices in catering establishments is discussed.

In cosmopolitan cities with growing urbanization and changing socio-economic conditions, the population dependent on hotel foods is increasing. Prepared food items are prone to contamination and can be potential sources of food poisoning. The quality of prepared foods depends mainly on the quality of raw material and the method of handling. The chances of contamination are more in fish since majority of the fish catch comes from inshore water which are highly polluted with sewage and other effluents. Studies on the quality of fresh fish in retail trade have revealed that about 25% of the samples were in advanced stages of spoilage and 7.5% were found to be contaminated with highly pathogenic organisms like *Salmonella* and *Clostridium perfringens* (unpublished data). In published literature, information on the quality aspects of food preparations served in hotels and restaurants in India is inadequate. Rao *et al.* (1978) have carried out a study on the incidence of drug resistant coliforms in some ready-to-serve foods and Sherikar *et al.* (1979) have studied the microbial flora of ready-to-cook pork products. The present study was undertaken to assess the quality of fish preparations served in catering establishments in Bombay.

## Materials and Methods

Samples of ready-to-serve fish preparations like fried fish and fish curry from hotels and restaurants were collected aseptically in sterile stainless steel containers and brought to the laboratory for further detailed investigations. Samples included 15 commonly available fish species. A pie diagram depicting the specieswise distribution of the samples is given in Fig. 1, where each sample is represented by two degrees. On reaching the laboratory, the samples were subjected to physical, organoleptic, biochemical and bacteriological analysis to assess their quality.

Samples were examined for odour, flavour, taste, texture of meat and presence of extraneous matter by a three-member trained panel. Based on the above parameters average scoring was given on a scale ranging from zero to ten. Total volatile nitrogen (TVN) value was chosen as the biochemical index of spoilage and was estimated by the microdiffusion method of Conway (1947). Total bacterial count, counts of *E. coli*, faecal streptococci and coagulase positive staphylococci were determined as per Indian Standards (IS:2237, 1971). AOAC (1975) method was followed for the detection of *Salmonella* and *Clostridium perfringens* was detected by the method of Nambiar & Iyer (1973).

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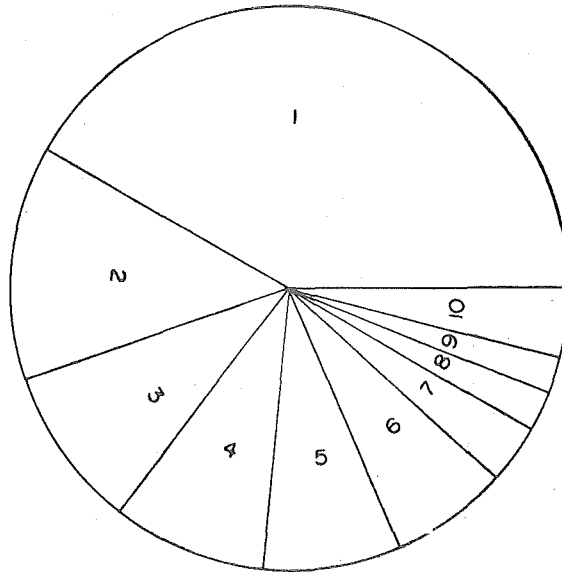


Fig. 1. Species distribution of the samples

- 1) Silver pomfret (*Pampus argenteus*)
- 2) Seer (*Scomberomorus guttatus*)
- 3) Black pomfret (*Apolectus niger*)
- 4) Mackerel (*Rastrelliger kanagurta*)
- 5) Dhoma (*Johnius dussumieri*)
- 6) Sardine (*Sardinella longiceps*)
- 7) Hilsa (*Hilsa illisha*)
- 8) Silver bar (*Chirocentrus dorab*)
- 9) Cat fish (*Tachysurus sona*)
- 10) Other fishes:
  - a) Sole (*Cynoglossus dubius*)
  - b) Indian salmon (*Eleutheronema tetradactylum*)
  - c) Catla (*Catla catla*)
  - e) Indian pellona (*Pellona ditchela*)
  - e) Golden anchovy (*Coilia dussumieri*)
  - f) Indian prawn (*Metapenaeus affinis*)

## Results and Discussion

A total of 180 samples comprising an equal number of fried fish and fish curry were examined for their quality during 1983-84. The samples were drawn randomly from 97 restaurants. Based on the prevailing sanitary conditions, hygienic practices and general facilities, hotels and restaurants are allotted different grades by the Municipal Health Authorities. Grade I establishments have the highest hygienic standards followed by grade II and III. Majority of the hotels and restaurants in the city fall under the grade II and III category as they are patronised by the maximum cross section of the population who depend on outside foods. The quality of fish preparations based on organoleptic score, total volatile nitrogen values, total bacterial counts and counts of faecal streptococci is given in Table 1.

### a) Organoleptic score

Organoleptic evaluation, though important from the consumers point of view, can markedly be influenced by the presence of additives, condiments and flavouring agents in case of prepared foods. Taste, texture of meat, and presence of extraneous matter are the important parameters in deciding the organoleptic quality of ready-to-eat fish preparations. Based on acceptability, samples with a mean score of more than seven out of ten were considered as 'good', between seven and five as 'fair', and less than five as 'poor'. Accordingly, out of the 180 samples analysed 31.67% were good, 37.78% fair and 30.55% poor. Percentage of good samples was more in the case of fish curry when compared to fried fish in all the three grades. The unpalatable rancid flavour and taste are the main causes for poor quality of fried fish. This may be due to the poor quality of raw material of cooking medium. In fish curry, unpleasant flavour and taste can be considerably masked by condiments in the gravy. 50% of the fried fish samples from grade I were of good quality while in the case of grade II and III it was less than 20%. No extraneous matter was observed in samples from grade I and II whereas in grade III hair was detected in two fish curry samples and dead house fly in one fish fry sample indicating the unhygienic and careless handling practices.

### b) TVN values

TVN values indicate the extent of spoilage and hence is an objective test to assess the quality of fish preparations. 28.90% of the samples were having TVN values less than 12 mg%, 45% between 12 and 20 mg% and 26.10% more than 20 mg% and could be considered as good, fair and poor, respectively. The quality of fish curry based on TVN values was better than fried fish. The high TVN values in fried fish may be due to bacterial spoilage of fish or better after preparation. Percentage of good samples was highest in grade I followed by grade II and III in case of fried fish which may be due to the quality of raw material used for the preparation. In fish curry good samples were maximum in grade III followed by grade II and I. In grade III hotels the gravy of fish curry contains more condiments due to taste preference. These condiments may inhibit bacterial growth to some extent which is reflected in low TVN values.

### c) Total bacterial count

Total bacterial count indicates the extent of spoilage and contamination. During cooking there is considerable reduction in the bacterial count. A high bacterial count in ready-to-serve fish preparations can be due to higher initial counts, multiplication of bacteria during prolonged storage after preparation or post-process contamination. High bacterial counts are undesirable as they can be potential health hazards. 52.22% of the samples showed counts less than 1000, 31.67% between 1000 and 10,000 and 16.1% more than 10,000 per gram. Generally fried fish samples were having higher bacterial counts than fish curry. Usually fish curry is kept simmering for longer duration thereby inhibiting the bacterial growth. Also some of the ingredients in gravy may act as bacteriostatic agents. Fried fish is kept at ambient temperature after preparation for considerable time and just before serving it is slightly warmed. This time lag between preparation and serving can lead to bacterial spoilage. This explains the higher bacterial counts observed in fried fish compared to fish curry. This correlates with the higher TVN values observed in fish fry samples. Samples from grade I

Table 1. *Quality of fish preparation from catering establishments\**

Grade of catering establishments	Product	Organoleptic score		TVN mg/100g	Total plate count/g	Faecal streptococci/g					
		>7	7-5				<5	<10 <sup>3</sup>	10 <sup>3-4</sup>	>10 <sup>4</sup>	Nil
I	Fry	50.00	33.33	16.67	33.33	66.67	33.33	0.00	66.66	16.67	16.67
	Curry	66.67	0.00	33.33	33.33	83.33	16.67	0.00	50.00	33.33	16.67
II	Fry	17.65	43.10	37.25	9.80	47.06	35.29	17.65	35.29	29.42	35.29
	Curry	46.81	29.79	23.40	44.68	58.58	23.40	17.02	55.32	14.89	29.79
III	Fry	18.18	45.46	36.36	6.06	42.42	36.36	21.22	40.54	16.22	43.24
	Total	31.67	37.78	30.55	28.90	52.22	31.67	16.11	41.67	21.66	36.67

\*The values given in the table represent percentages of the samples analysed

restaurants had low bacterial count and none had counts more than 10,000 per gram. Fish fry and curry samples with counts less than 1000 per gram were maximum in grade I followed by grade II and III. This may be due to quality of raw material as well as general sanitary and hygienic conditions prevalent in these establishments.

#### d) Faecal streptococci

Faecal streptococci being more resistant compared to *E. coli* is a better indicator to assess faecal contamination in prepared fish. The presence of faecal streptococci in high numbers in ready-to-serve fish preparations indicates the poor hygienic practices and the possible presence of other potential enteric pathogens. In 41.67% of the samples faecal streptococci were absent and in 36.67% the counts were more than 100 per gram. Percentage of fried and curry samples with counts more than 100 per gram were highest in grade III followed by grade II and I. In the case of fried fish the percentage of samples showing absence of faecal streptococci was highest in grade I followed by grade II and III, whereas in the case of fish curry it was highest in grade II followed by grade I and III.

#### e) *E. coli*

*E. coli* was detected in two samples only out of which one was fried fish from grade III and the other fish curry from grade I. The counts in both were more than 20 per gram. *E. coli* being very sensitive to treatment, the chances of its detection in cooked products are rare except in cases of postprocess contamination.

#### f) Coagulase positive staphylococci

Coagulase positive staphylococci was detected in four samples only and the counts were less than 100 per gram. All the samples were fried fish two from grade III and one each from grade I and II. The incidence of coagulase positive staphylococci in fried fish may be due to contamination from the hands of the workers before serving. In the case of fish curry the chances of contamination from the hands of workers are rare since while serving it is not coming in direct contact.

#### g) Pathogens

Pathogens like Salmonella, and *Clostridium perfringens* were not detected in any of the samples. The total absence of these pathogens in ready-to-serve fish preparations from hotels and restaurants indicates that there is no serious potential health hazard to the consumers.

Results of this study revealed that samples of good, fair and poor quality fish preparations are being served in catering establishments in Bombay irrespective of their grades. The practice of keeping fried fish at ambient temperatures after preparation for longer durations should be discouraged as it leads to bacterial spoilage thereby adversely affecting their quality. Even though pathogens were not detected during this study the incidence of faecal indicator organisms in more than 50% of the sample is an indication of the poor state of sanitary conditions and hygienic practices prevalent in catering establishments. The presence of extraneous material like hair and dead housefly in some samples is due to gross negligence and carelessness which is highly undesirable. Creating a general awareness among workers about the importance of hygiene and sanitation is very essential to prevent contamination in prepared foods.

The authors wish to express their sincere thanks to Dr. M. Arul James, Scientist-in-Charge for his valuable suggestions and to Shri M.R.Nair, Director, Central Institute of Fisheries Technology, Cochin-682 029 for his kind permission to publish this paper.

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