

Bacteriological Quality of Fresh Water Fish from Krishnarajendra Sagar Reservoir

There are relatively few published data on the bacterial flora of freshwater fish (Venkataraman & Sreenivasan, 1953; Sen *et al.*, 1966) and this study was designed to determine the bacteriological quality of freshwater fish, *Labeo rohita* and *L. calbasu* from Krishnarajendra Sagar reservoir.

The fish were obtained soon after catch from Krishnarajendra Sagar reservoir, in Cauvery river near Mysore City, and brought in iced condition to the laboratory in polythene bag, which were previously kept exposed to U.V. light for 30 min. Fish muscle along with skin was taken from various portions of the fish and pooled to form a composite sample. From this 50 g were weighed, comminuted and blended in 450 ml, sterile physiological saline to obtain to decimal dilution. Further decimal dilutions were made using 90 ml sterile saline.

Different microbial groups were enumerated as per recommended procedures (APHA, 1976). Total bacterial count was done using total plate count agar. Coliforms and *Escherichia coli* were enumerated using brilliant green lactose bile broth and eosin methylene blue agar. Baird-Parker agar was used for determining *Staphylococcus aureus*. Detection of salmonella was done using selenite-cystine broth, bismuth sulphite agar, and triple sugar iron agar slants. Salmonella and some *E. coli* isolates were serotyped at the Central Research Institute, Kasauli, Himachal Pradesh.

The aerobic plate count ranged from 6.4×10^4 to 4.8×10^5 /g (Table 1). Coliform bacteria ranged from 120 to 9200 organisms per gram. *E. coli* could be detected in 50% of the samples. The serotyping results of 69 isolates of *E. coli* are shown in Table 2.

Organisms of the coliform and streptococcal groups have been isolated from the intestinal content of various species of freshwater fish caught in relatively clean to moderately polluted waters (Venkataraman & Sreenivasan, 1953; Evelyn *et al.*, 1969). It

Table 1. Bacteriological status of fish muscle

Sl. No.	Total plate count/g	Coliforms MPN/g
<i>L. rohita</i>		
1.	2.60×10^5	1.6×10^3
2.	1.60×10^5	2.4×10^3
3.	1.80×10^5	2.4×10^3
4.	1.25×10^5	1.6×10^3
5.	3.20×10^5	2.4×10^3
6.	1.68×10^5	9.2×10^3
7.	3.80×10^5	5.4×10^2
8.	4.80×10^5	9.2×10^2
9.	1.60×10^5	3.5×10^2
10.	4.10×10^5	4.3×10^2
<i>L. calbasu</i>		
11.	3.60×10^5	3.5×10^3
12.	4.40×10^3	1.6×10^3
13.	6.40×10^4	1.2×10^2
14.	7.80×10^4	2.1×10^2
15.	1.20×10^6	9.2×10^2
16.	1.10×10^5	1.6×10^3
17.	1.60×10^4	1.6×10^3
18.	9.80×10^4	3.5×10^2
19.	1.40×10^5	2.1×10^2
20.	1.60×10^5	5.4×10^2

Note: (a) *Staphylococcus* were absent in all the samples
(b) *Salmonella paratyphi* B was detected in one sample of *L. rohita*

is well substantiated that *E. coli* is not a normal inhabitant of the intestinal tract of marine fish and freshwater fish, but is often found in catches from polluted waters (Lovell *et al.*, 1969).

Certain strains of *E. coli* can cause enteric disease in man, either by elaborating an enterotoxin or by penetrating the intestinal epithelium (Riemann & Bryan, 1979). Two of the isolates (078, 0156) have the potential to elaborate enterotoxin.

Coagulase positive staphylococci form a well defined group, containing the entero-

Table 2. Serotypes of *E. coli* isolated from freshwater fish

Isolate numbers	<i>L. rohita</i>	Serotypes
1		078
2, 4, 5, 6, 7, 9		Untypable
3, 10		029
8		077
11 to 14		041
15		035
16 to 19		041
20 to 41		060
<i>L. calbasu</i>		
42 to 50		0133
51 to 59		0120
60 to 66		0140
67, 68		026
69		0156

toxigenic and potentially pathogenic members of the genus *Staphylococcus*. Apparently *Staphylococcus aureus* was not found in the samples tested.

Out of the 20 samples examined during the time of investigation, one sample contained *Salmonella*. The isolate was serotyped as *S. paratyphi* B. The presence of *Salmonella* in freshwater and marine fish has generally been related to faecal contamination of the water from which they were harvested (Wuthe & Findel, 1972). The effects of environmental conditions were further demonstrated by Geldreich and Clarke (1966) when they related faecal

bacterial population in the intestinal tract of cat fish to varying degrees of contamination.

Considering the overall low incidence of pathogens and practice of terminal heating of the fish before they are consumed, it seems reasonable to conclude that the microbiological hazard potential of freshwater fish is low.

References

- APHA (1976) *Compendium of Methods for the Microbiological Examination of Foods*. (Speck, M.L., Ed.) American Pub. Health Assn., Washington
- Evelyn, T.P.T. & Dermott, L. A. (1969) *Can. J. Microbiol.* 7, 375
- Geldreich, E. E. & Clarke, N. A. (1966) *Appl. Microbiol.* 14, 429
- Lovell, R. T. & Barkate, J. A. (1969) *J. Fd. Sci.* 24, 268
- Riemann, H. & Bryan, F. L. (1979) *Food Borne Infections and Intoxications*, Academic Press, New York
- Sen, R., Pal, R. N. & Gopalakrishnan, V. (1966) *Fish. Technol.* 3, 124
- Venkataraman, R. & Sreenivasan, A. (1953) *Ind. J. Med. Res.* 41, 385
- Wuthe, H. H. & Findel, A. (1972) *Archiv Fur Lebensmittel Hygiene*, 23, 10

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