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SHORT COMMUNICATION

BACTERIAL CONTAMINATION OF FISH SOLD IN FISH MARKETS IN THE CENTRAL PROVINCE OF SRI LANKA

P. S. JAYASINGHE[1*] and R. M. A. G. G. RAJAKARUNA[2]

[1] *Post Harvest Technology Division, National Aquatic Resources Research and Development Agency, Crow Island, Mattakkuliya, Colombo 15.*

[2] *Department of Food Science and Technology, Faculty of Agriculture, University of Peradeniya, Peradeniya.*

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Abstract: This study was conducted to investigate the bacterial, chemical and sensory quality of fish and sanitary conditions of the sales outlets. The *Salmonella* sp.and *Vibrio cholera* were not detected in fish samples investigated during the study. Of the fish samples analyzed 56.6% were found unsuitable for consumption. The sanitary conditions of 50% of the fish stalls were not within the stipulated standards. The estimated levels of total coliform and *Escherichia coli* in the fish samples analysed were 7-2.4x10^3/g and <3-2.4x10^3/g and the estimated maximum and the minimum counts of total bacteria were 3.25x10^2/g and 6.83x10^8/g respectively. The presence of fecal Coliforms and *E.coli* in the tuna samples investigated can be attributed to the fecal contamination of fish from capture upto marketing.

Key words: contamination, health hazard, pathogenic bacteria, pollution, sanitary precaution

INTRODUCTION

The marine fisheries sectors is one of the important sectors of the Sri Lankan economy, contributing to approximately 2.8% of the gross domestic production (GDP) of the island.[1] The importance of fish as a source of animal protein is well understood and the avoidance of unnecessary quality losses and the contamination of harvested fish with pathogenic bacteria are very important. The number and the nature of the bacteria on fish are affected by many factors such as sea water pollution, temperature, method of capture, preservation methods adopted and handling practices. The fish that live in water polluted with human and the animal fecal matter may carry substantial numbers of bacteria such as *Salmonella, V. cholera, Clostridium botulinum, E. coli* and other Coliforms. The quality requirements of consumers have been changing and the recent trend is for high quality products. Therefore, the present investigation was undertaken to evaluate the quality of the fish and the handling practices adopted at several selected sales outlets in three different climatic zones.

METHODOLOGY

The present study was conducted at eight selected towns in three different climatic zones based on the ambient temperature. A=<17 ^{0} C (Hatton and Nuwaraeliya), B=17–25 ^{0} C (Gampola and Nawalapitiya) and C = 25–26 ^{0} C (Dambulla, Galewela, Matale and Kandy).[2] A total of 60 samples of tuna collected during the study were sensory analyzed, observed and scored organoleptically. Approximately 250 g of fish was purchased from each fish stall. Eight fish stalls were visually evaluated for the sanitory facilities available and scored using a scoring system developed previously. The number of fish stalls analyzed from each town varied from 2 – 6.

The samples collected from each fish stall were labeled, sealed in polythene bags and stored in an insulated box containing ice packs. Four visits were made to each sales outlet and a triplicate of the samples were analyzed. Laboratory analysis was carried out according to previously established methods[3] to determine the levels of *Salmonella, V. cholera* , Total Bacterial Count (TBC), Total Coliform (TC) , Fecal Coliform (FC) and the *E. coli.* The Total Volatile Nitrogen (TVN) content of these samples were also determined.[4]

* Corresponding author

RESULTS AND DISCUSSION

The microbiological analysis revealed that, none of the samples investigated contained *Salmonella* and *V. cholera* indicating that the fish marketed in the Central Province were free from highly pathogenic bacteria. However, of the total samples investigated 56.6% were not suitable for consumption. This figure was much higher in the samples collected from the sites with ambient temperature of 17 – 25 ^{0} C and 25 – 26 ^{0} C and were 65.4 and 77.8% respectively. In the <17 ^{0} C climatic zone, 81.2% of the samples were suitable for consumption.

On the average, 56.6% of the fish samples examined during the present study had the TBC > 10^6/g. The estimated percentages of the fish samples containing TBC >10^6/g were very much higher in the temperature zones 17 – 25 ^{0} C and 25 – 26 ^{0} C and were 76.92% and 55.6% respectively. In the <17 ^{0} C temperature zone only 25% of the fish samples analyzed contained TBC >10^6/g. The study indicated that there is a considerable influence of the ambient temperature on the TBC recorded in fish.

About 73.4% of the fish samples investigated during the present study contained the TC counts >10^2/g with a potential of causing health hazards.40% of the fish samples investigated had fecal coliform counts >10^2/g while 35% contained counts <50/g. Most of the samples contained *E. coli* counts >10/g while 16.67% of the fish samples were with counts >10^3/g. The considerably high counts of coliform and *E. coli* recorded in this study indicates high fecal contamination of fish.

Majority of the samples analyzed (87.5%) contained TVN levels <30mg/100g. But in the 17^0 C– 25^0 C and 25^0 – 26^0 C temperature zones, 80.77% and 77.7% of the samples contained TVN levels >30mg/100g and only 19.23% and 22.3% of the samples were found to contain TVN <30mg/100g respectively. Since the above figures were more or less similar to the estimated TVN levels of the majority of fish samples analyzed during the present investigation, it is reasonable to conclude that these were in initial or advanced stages of spoilage.

The combined effect of poor sanitary conditions and high temperature exerted on fish over a long period, increases the rate of spoilage and reduces the nutritional quality of fish at sales outlets. Most of the fish vendors do not have the knowledge on factors affecting fish spoilage and how to regulate the process. Therefore, awareness programmes should be arranged to educate the fish venders on proper handling of fish. This would enable them to acquire quality fish safe for consumption. The study also indicated the importance of taking measures to improve the facilities of fish sales outlets, formulation of a mechanism for proper handling of fish from capture to marketing and also waste management.

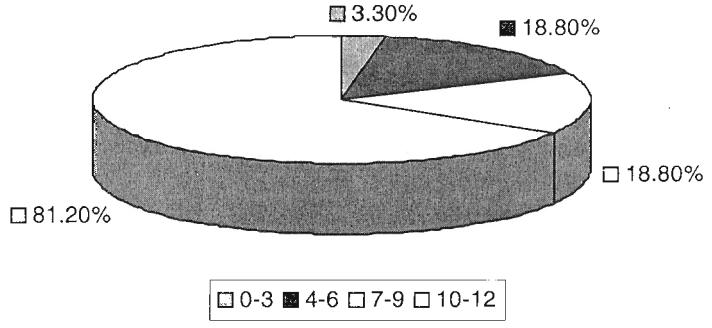

Figure 1: Organoleptic quality (%mean±sd) of fish assessed on a 0-15 scale at sales outlets in the <17^0 C climatic zone in Sri Lanka.

References

1. Anonymous (2001). *Fisheries Year Book*. National Aquatic Resource Research & Development Agency of Sri Lanka, Colombo.

2. Yoshino M. M., Kayane I. & Bandara C.M.M. (1983). Climatic, water and agriculture in Sri Lanka. *Wind and its effect on air temperature, humidity and rainfall in Sri Lanka*. University of Tsukuba, Ibaraki, 305 Japan.

3. Speck M. L. (1984). Alpha technical committee on microbiological methods for foods. In : *Compendium of methods for the microbiological examination of foods*. (Ed. M. L. Speck) pp. 99-318. American Public Health Association, Washington, USA, 1999.

4. Conway (1968). *Microdiffusion analysis and volumetric error*, 5th edition, Lock wood and sons, Crosley, London.