INCIDENCE OF *Salmonella spp.* IN MEAT AND MARINE PRODUCTS IN KOCHI

Sreeja.S[1] and Salilkutty[2]
State Laboratory for Livestock, Marine and Agri products (SLMAP)
Maradu, Nettoor P.O. Cochin

ABSTRACT

Salmonella spp. is a leading cause of foodborne bacterial illness in humans. The current level of contamination by Salmonella spp. in different categories of food of animal origin submitted to the State Laboratory for Livestock, Marine & Agri Products were evaluated in this study using the Enzyme Linked Fluorescent Assay (ELFA) technique. Samples were analysed as per standard methods validated by the AOAC and USFDA (BAM-FDA, 1998). The positive results were further confirmed by conventional cultural method (CCM) and biochemical identification of isolates. Salmonella was detected in 2.4% of 716 samples examined.

INTRODUCTION

Foodborne infections are an important public health concern worldwide. Most of them have a zoonotic origin and have reservoirs in healthy food animals from which they spread to an increasing variety of foods. Therefore, foods of animal origin are considered major vehicles of foodborne infections (Todd E.C,1997)and in industrialized countries they are subjected to compulsory control plans to detect microbial contamination. National epidemiologic registries continue to underscore the importance of Salmonella spp. as a leading cause of foodborne bacterial illness in humans. The detection of this pathogen is a part of the routine microbiological testing of foodstuffs in India as per Prevention of Food Adulteration (PFA) standards. The aim of the present study was to evaluate the current level of contamination by Salmonella spp. in different categories of food of animal origin based on the routine testing performed on export food samples submitted to the laboratory.

MATERIALS AND METHODS

The samples were analysed based on standard operating procedures (SOPs) founded on standard methods validated by the AOAC and USFDA (BAM-FDA, 1998). 25 grams of the sample was added to 225ml buffered peptone water, blended for 2 minutes in a stomacher at 400rpm and incubated for 22-26 hours at 35°C. After incubation 1ml of the suspension was transferred to 10 ml selenite cystine (SC) broth and incubated for 6-8 hours at 35°C for seafood samples and 16-20 hours for raw meat samples. In parallel 1 ml of the pre enrichment broth was also transferred to 10ml of tetrathionate broth (TTB) and incubated for 6-8 hours at 42°C.After incubation 1ml of SC broth and 1ml TTB was transferred to 10 ml each of M broth. The M broths were then incubated at 18 hours for 42°C. These were then homogenized and 1ml from each M broth was taken into a test tube which was then kept in a water bath at 95-100°C for 15 minutes. The boiled broth was mixed and 0.5ml was loaded into sample well on Vitek Immunodiagnostic Assay System (VIDAS Biomerieux) Salmonella, which is a qualitative test for detection of Salmonella using the Enzyme Linked Fluorescent Assay technique.

The positive results were further confirmed by conventional cultural method (CCM) and biochemical identification of isolates.

RESULTS

716 export samples, which included 64 raw buffalo meat samples, 619 seafood samples and 33 samples of agricultural products brought to the laboratory for a period of 5 months, were screened for Salmonella spp based on standard methods. As

[1&2] Veterinary Surgeons, State Laboratory for Livestock, Marine and Agri products (SLMAP) Maradu, Nettoor P.O. Cochin

per Microbiology standards of PFA, Salmonella should be absent in 25g of the sample. Salmonella was detected in 2.4% of 716 samples examined and the detection rates ranged from 1.6% for raw meat to 0% for other agricultural products. Low rates were observed in seafood (0.8%). The results are presented in the table. The positive samples were confirmed on Bismuth Sulphite Agar (BSA), Xylose Lysine Deoxycholate Agar (XLD) and Hektoen Enteric Agar (HEA).

DISCUSSION

The widespread occurrence of Salmonella spp. in natural environment coupled with the intensive husbandry practices used in meat, fish and shellfish industries and the recycling of offals and inedible raw materials into animal feed has favoured the continued prominence of this human bacterial pathogen in global food chain (Bell C and Kyriakides A. 2005). Sea food items are the highest foreign exchange earner and account for more than 70% of the total earnings of Indian marine export products. Cochin, the economic capital of Kerala is a major fish-landing center in south west coast of India and seafoods account for 90% of statewide exports. Compared to meat a low prevalence of 0.8% was seen in seafood samples. This is in agreement with the findings of Busani et al., (2005) who reported a prevalence of 0.5% in sea foods.

The factor most commonly associated with Salmonella infection is consumption of raw or undercooked food (Butt A.A, 2005). A low prevalence rate of 1.6% in raw meat in this study is contrary to the findings of Maharjan M et al.,(2006)who reported a higher prevalence of 13.5% in buffalo meat from local markets. This may be attributed to the fact that the samples analysed were those meant for export and not representative of domestic consumption. The use of mini-VIDAS made the detection of Salmonella less time consuming and easy. In todays growing export demand, the use of meat scraps and offals potentially contaminated with typhoid and paratyphoid Salmonellae and of Salmonella contaminated animal feeds and faeces in aquaculture is common (D'Aoust J Y and Maurer J. 2007). This may be one of the reasons for contamination of seafood samples with Salmonella.

The ubiquitous distribution of this pathogen in environment, its physiological adaptability, virulence and prevalence in global food chain predicate the need for continued vigilance and stringent controls at all levels of food production and processing (D'Aoust J Y, 1994). In the present study efforts to identify the serotypes in positive cultures were not attempted and the prevalence of Salmonella spp. in the area was based only on routine tests of export samples. Moreover seasonal changes in the prevalence could not be studied as screening was only for a short period. Hence further research should be taken up to estimate the true prevalence of Salmonella spp. in domestic seafood and raw meat and to identify the prevalent serovars in the area.

REFERENCES

Bacteriological analytical manual.Food and Drug Administration. 1998. Eighth edition. Gaithersburg, Md.: AOAC International.

Butt A.A, Aldridge K.E and Sanders C.V. 2005. Infections related to ingestion of seafood Part I: Viral and bacterial infections. *Lancet Infect Dis.* 5:69-70

Bell C and Kyriakides A. 2005. Salmonella Foodborne pathogens: Hazards, risk analysis and control. (eds Blackburn C.W and McClure P.J). First edition. Woodhead Publishers. pp 307-331

Busani L et al 2005 Prevalence of Salmonella enterica and Listeriamonocytogenes contamination in Foods of Animal Origin in Italy**.** *Journal of Food Protection* 68:8 1729-1733

D'Aoust J Y.1994.Salmonella and the international food trade. *Int J Food Microbiol* 24:11-31

D'Aoust J Y and Maurer J. 2007.Salmonella species. Food Microbiology: Fundamentals and Frontiers. (eds Doyle M.P and Beuchat L.R) Third edition. ASM Press, Washington D.C, pp187-236

Maharjan M, Vandana J, Durga D J, and Poornima M. 2006. Prevalence of Salmonella species in various raw meat samples of a local market in Kathmandu. Annals of the New York Academy of Sciences 1081: 249-256

Todd, E. C. 1997. Epidemiology of foodborne diseases: a worldwide review. *World Health Stat Q.* 50:3050