

Short Communication

Occurrence of *Listeria monocytogenes* in smoked fish in Sokoto, Nigeria

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The present study was conducted to determine the prevalence of *Listeria monocytogenes* in smoked fish in Sokoto, Nigeria. A total of 115 different species of smoked fish from the various retail outlets and market places within the metropolis were analysed for the presence of *L. monocytogenes* using ISO culture method. Out of the 115 samples analysed, 29 (25%) were positive for *L. monocytogenes*. Other *Listeria* species isolated in this study are *L. grayi* 13 (11%), *L. innocua* 10 (9%) and *L. ivanovi* 15 (13%). The remaining 48 (42%) of the sample were negative for *Listeria* species. The study shows that *L. monocytogenes* and other *Listeria* species are common contaminant of smoked fish, and this may pose serious public health implications.

Key words: Smoked fish, *Listeria monocytogenes*, contamination, public health.

INTRODUCTION

Listeria spp. are considered ubiquitous organisms and are widely distributed in the environment (Jones and Seeliger, 1992). *Listeria monocytogenes* has been recognized for many years as a facultative pathogenic bacterium that causes serious illness in man and animals called listeriosis (Schuchat et al., 1991; Furowicz, 1992; Anon, 1999). The majority of human listeriosis cases occur in pregnant women, neonates, immunosuppressed individuals and the elderly (Farber and Peterkin, 1991; Ertas and Seker, 2005). Listeriosis affects most often the pregnant uterus, central nervous system or blood circulation (Furowicz, 1992; Portnoy et al., 1992; Chodorowska Kuklinska, 2002). A new form of the disease characterized by mild disorders of the gastrointestinal system and short incubation period has also been recognized (FAO, 1999). Consumption of foods contaminated with *L. monocytogenes* is the primary route of transmission for listeriosis (Farber and Peterkin, 1991;

Furowicz, 1992; Anon, 1999; FAO, 1999). Although other routes of transmission have been described, indis-

tinguishable strains have been isolated from epidemic cases and from those implicated in food, clearly identifying the role of food in the epidemiology of listeriosis (Schuchat et al., 1991; Anon, 1999; FAO, 1999).

While *L. monocytogenes* causes relatively few human disease cases, particularly compared to many other food borne pathogens (Mead et al., 1999), it appears to be commonly present in raw and ready-to-eat foods. Several studies have implicated *L. monocytogenes* in fish (Farber, 1991; McLauchlin and Nichols, 1994; Huss et al., 1995). The public health implication of this organism cannot be over emphasized as smoked fish and other sea foods are infrequently associated with human listeriosis (Lennon et al., 1984; Fuchs and Surendran 1989., Riedo et al., 1990., Ben Embarek, 1994; Eklund et al., 1995; Ericsson et al., 1997; Jørgensen and Huss, 1998).

This study was conducted to determine the prevalence of *L. monocytogenes* in smoked fish in Sokoto, Nigeria.

MATERIAL METHODS

Sampling procedure

One hundred and fifteen different species of smoked fish from the various retail outlets and market places within the metropolis were

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analysed for the presence of *L. monocytogenes*. The samples were collected into separate sterile polythene bags and transferred to the veterinary Public Health Laboratory at the Usmanu Danfodiyo University, Sokoto.

Isolation and identification procedure

The culture method was on the basis of International Standard (ISO 11290-1, 1996). 25 g of each of the collected samples was transferred to 225 ml of half-Fraser broth (Oxoid, CM0895). After the 24 h incubation of the primary enrichment, 1 ml of the culture obtained was transferred to a tube containing 10 ml of Listeria enrichment broth (Oxoid, CM0862). The tubes were incubated for 24 – 48 h at 37°C. One or two loop of *Listeria* enrichment broth culture were streaked onto Listeria selective agar (Oxford formulation, Oxoid, CM0856), the plates were incubated for 48 h at 37°C. Plates were then examined for typical *Listeria* colonies; halos and suspicious colonies were transferred onto tryptic soy agar (TSA) (Difco) and incubated for 24 h at 37°C. Suspected *Listeria* colonies were identified by biochemical tests including Gram stain, motility, oxidase, β -haemolysis, catalase, carbohydrate fermentation tests (xylose, mannitol, rhamnose) and MR-VP reaction as described by Seeliger and Jones (1986).

RESULTS AND DISCUSSION

Based on the bacteriological evaluation of the 115 smoked fish collected from various retail outlets and markets, 29 (25%) were positive for *L. monocytogenes*. Other *Listeria* species isolated in this study are *L. grayi* 13 (11%), *L. innocua* 10 (9%) and *L. ivanovi* 15 (13%). The remaining 48 (42%) of the sample were negative for *Listeria* species.

L. monocytogenes is a food borne bacteria pathogen that is ubiquitous in nature and shows the ability to persist in the food processing environment for prolonged time. *L. monocytogenes* belong to the recently emerging psychrotrophic pathogenic bacteria that are capable of growing even at temperature near 0°C (Shinemann and Harrison, 1994). It is well known that low temperature and microaerophilic conditions enhance growth of psychrotrophic microorganisms such as *L. monocytogenes*.

Our results show that the smoked fish in Sokoto metropolis are contaminated with *L. monocytogenes*. The presence of *L. monocytogenes* on smoked fish may have resulted from contamination from post processing and during storage. The bacterium can also be transferred to the processed smoked fish by the processors (Kerr et al., 1993). The prevalence of *L. monocytogenes* in smoked fish in this study was 25%. This rate is relatively higher than most of the published works. The presence of *Listeria* spp. in fish has been reported by a number of researchers (Farber, 1991; McLauchlin and Nichols, 1994; Huss et al., 1995; Mead et al., 1999). In many countries, *L. monocytogenes* has been isolated from raw fish, smoked fish and other fishery products. However, it was observed that some differences in the geographic distribution or prevalence on different types of products exist (FAO, 1999; Shinemann and Harrison, 1994).

Food borne illness due to *L. monocytogenes* is of se-

rious economic and public health importance. The fatality rates may be up to 30% in individuals with underlying chronic disease conditions such as cirrhosis, as well as in pregnant women, the immunocompromised persons, the elderly and infants (Mead et al., 1999; Aureli et al., 2000; Chukwu et al., 2006). The implication of this result is that *L. monocytogenes* is a common contaminant of smoked fish. Smoked fish is quite frequently contaminated with *L. monocytogenes* (<http://www.onefish.org>), although the detected quantities are low. Until now, neither epidemic outbreaks nor sporadic cases of listeriosis due to the consumption of smoked fish were reported in Nigeria. Experimental study has shown that the bacterium can grow in hot smoked trout at 8 - 10°C (<http://www.onefish.org>). There is therefore an increasing infection risk for the consumers by storing such fish for a long time, especially when the product temperature is altered.

The findings in this study also indicate that human listeriosis could be a problem in Sokoto. Lack of adequate and well equipped clinical and laboratory diagnostic procedures in the metropolis and lack of any report indicating an epidemiological link of *L. monocytogenes* and man through consumption of contaminated food products such as smoked fish and other ready to eat food products may be a contributory factor to the problem.

In conclusion, the results obtained from this study demonstrate the presence of *L. monocytogenes* and other *Listeria* species in smoked fish in Sokoto, Nigeria. The presence of this pathogen on smoked fish is an indication that the hygiene and safety of such smoked fish is compromised. Therefore, suitable processing parameters and post processing handling should be treated as important control measures to minimize or eliminate the hazard associated with *L. monocytogenes*.

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