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Occurrence of pathogenic *Listeria monocytogenes* strains in raw meat and meat products in Sri Lanka

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Listeria monocytogenes, which is a Gram-positive, facultatively anaerobic, cold tolerant, salt tolerant, non-spore forming rod, causes a food-borne illness called listeriosis in pregnant women, newborns, older adults and people with weakened immune systems due to AIDS, diabetes, cancer and kidney diseases. The occurrence of *Listeria* in many dairy food products, raw meat and meat products in other countries has been reported. However, comparable research on the occurrence of *Listeria* in raw meat and meat products in Sri Lanka has not been adequately carried out. Therefore, the objectives of the present study were, to investigate the occurrence of *Listeria* in four meat (raw meats of chicken, beef, mutton and pork) and two meat products (chicken sausages, chicken meat balls), to determine the population level of *Listeria* and to determine the virulence properties of *Listeria* isolates. Samples of raw chicken (30), raw beef (34), raw pork (32), raw mutton (31), chicken sausages (30) and chicken meat balls (33) were aseptically collected and tested for a period of over 3 months. *Listeria* in meat and meat products was first enriched in FDA Listeria Enrichment Broth (LEB; Oxoid Ltd.) and later enumerated using Modified Oxford Agar (MOX; Oxoid Ltd.). Presumptively identified *Listeria* colonies on MOX Agar with dark brown/black halos were further identified using morphological and biochemical tests. The virulence properties of the *Listeria* were determined by examining the hemolysis of Sheep Blood Agar (Oxoid Ltd.) by *Listeria* isolates.

Of the 190 raw meat and meat product samples tested, 29 (15%) samples were contaminated with strains of *L. monocytogenes*. However, only 11 (6%) isolates showed hemolysis of Sheep Blood Agar confirming them to be virulent strains of *L. monocytogenes*. Contaminated raw meat and meat product samples included raw beef (29%), raw mutton (26%) and raw pork (34%). The complete absence of *Listeria* in raw chicken, chicken sausages and chicken meat balls observed in the present study suggests that food factories of these products adopt proper hygienic production practices. The presence of *Listeria* in raw meat samples of beef, mutton and pork thus indicates the un-hygienic practices adopted in processing and handling practices of raw meat in Sri Lanka. The observed population levels of *Listeria* in raw beef, raw mutton and raw pork in the present study ranged from 10^3-10^6, 10^4-10^7 and 10^5-10^8 CFU/g, respectively. The higher *Listeria* population level observed in raw pork can be attributed to the living conditions of pigs in piggeries and in free range enclosures. It can be concluded that raw meats of beef, mutton and pork are possible sources of *Listeria* contamination in Sri Lanka posing a risk of spreading listeriosis. The regulatory bodies in Sri Lanka need to address this issue and introduce proper control measures to prevent the spread of *Listeria* by raw meat in Sri Lanka.

Keywords: Listeria, listeriosis, meat, meat products, virulence