Isolation and Identification of Salmonella from The Environment of Traditional Poultry Farms in Khartoum North

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Abstract

This study was conducted to investigate the incidence of Salmonella species in feed and environment of open system poultry farms in Khartoum North area during the period from August to November 2009. A total of 80 samples were collected from six poultry farms of layers and broilers located in Al-Halfaya, Shambat, Hillat Kuku and Al-Zakiab areas. The samples included: poultry feed from feeders, litter, drinking water and from drinkers. Isolation of Salmonella was carried out on Desoxycholate citrate Agar (oxid CM 35) after enrichment in selenite-f-broth. Four Salmonella isolates (5%) of total samples were identified according to their microscopic, cultural and biochemical characteristics. The isolates were recovered from two farms: three isolates were recovered from a farm located in Al-Halfaya (layers) and one isolate recovered from a farm located in Shambat (broilers).

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Antimicrobial sensitivity of the four *Salmonella* isolates was carried out to 10 different antimicrobial agents on Mueller and Hinton Agar Medium using disc diffusion method. All isolates were sensitive to chloramphenicol, ceftizoxime, amikacin and resistant to gentamycin, tetracycline, ampicillin\ sulbactam and piperacillin\ tazobactam.

**Introduction**

Members of the family *Enterobacteriaceae* are Gram-negative, non-spore forming rods. Some of them are human and animal pathogens producing intestinal infection and food poisoning. The genera of pathogenic importance in poultry include *Salmonella* and *Escherichia* (Holt *et al.*, 1994).

Avian salmonellosis is an inclusive term designating a large group of acute or chronic diseases of fowl caused by different species of the genus *Salmonella* including *S. pullorum* (Pullorum disease), *S.gallinarum* (Fowl typhoid), *S. arizonae* (Arizonae infection), *S. enteritidis* and others (Paratyphoid infection) (Carter and Wise, 2004).

Fecal contamination of egg shells with paratyphoid organisms during the process of laying or from contaminated nests, floors, or incubators after laying is of foremost importance in the spread of the disease (Hofstad *et al.*, 1978).
Salmonellosis in poultry resulted in continuous increase of public health problems as stated by Corrier et al. (1990). Contamination of poultry meat with Salmonella was investigated by many scientists in Sudan as well as in many countries. In Sudan, Mamon et al., (1992) isolated *Salmonella enteritidis* from 10 embryonated eggs. Yagoub and Mohammed (1987) studied the occurrence of *Salmonella* in poultry carcasses in Khartoum state; 23 serotypes were identified and most of them were *S. monas* and *S. amek*.

**Materials and Methods**

**Samples collection**

The specimens were collected from poultry farms in Khartoum North area. Twenty seven samples from feed, 27 from litter, 27 and 26 drinking water were detected from three broiler farms and three layer farms during the period between August to November 2009. All samples were placed in ice in a thermos flask and immediately transported to the Department of Microbiology, Faculty of Vet. Medicine (university of Khartoum) and kept at 4º C.

**Bacteriological investigation**

**Culture media**
Dehydrated culture media were obtained from Oxoid Ltd U.K. and they were prepared as instructed by the manufacturer,
Identification of Clinical Isolates

Primary Identification

Primary identification of isolates was based on colonial morphology, catalase production, glucose utilization, oxidation-fermentation (O/F) and motility tests. The smell of the culture was also tested. This was followed by microscopic examination of Gram-stained smears. All tests were done as described by Cowan and Steel (1975).

Secondary Identification

Secondary identification was done using biochemical tests such as: Urease, Indole, Methyl Red (MR), Voges Proskauer (V.P), Citrate utilization, Hydrogen sulphide (H2S) Production and Sugar fermentation. (Cowan and Steel, 1975).

Antibiotic Susceptibility pattern

Antibiotic susceptibility of isolates was made by disk diffusion method using commercially prepared discs (Oxoid). The disks examined after 24 hours for zones of inhibition which were measured in mm. The isolates were described as resistant, intermediate and sensitive to different antimicrobial agents according to Bauer et al., (1966).

Results

Four salmonella spp were isolated from three litter samples from AL.Halfaya farm (layer) and from one water sample from shambat farm (broiler).
The isolated salmonella tested against antibiotics and it showed variable susceptibility to antibiotics.

**Discussion**

Salmonellosis is a major public health concern and continues to have a serious economic importance in the poultry industry in all countries (Morales and McDowell, 1999).

The present study *Salmonellae* isolates were isolated together with other bacterial genera as *Serratia, Proteus, Citrobacter, Enterobacter, Yersinia, Kluyvera* and *Hafnia*. Although all collected samples in the study were cultured first in the selenite-f-broth, Gram-negative bacteria other than *Salmonella* were isolated. This can be explained by the fact that selenite-f-broth enriches the growth of *Salmonella* and *Shigella* but do not kill other enteric bacteria which under other conditions (subculture in DCA) can grow.

The Salmonella isolation rate (5%) was comparable to that reported in other studies. From the viewpoint of public health, human salmonellosis was reported to increase recently in France and United States of America (Barrow et al., 2003). Yagoab and Mohammed (1987) examined 1488 samples and isolated 58 *Samonellae* which comprised 3.9% of total isolates. In another study Ezdihar (1996) examined 610 samples from poultry in the Sudan and isolated 45 Salmonellae which counted for 7.4% of the total isolates. The later study
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showed higher isolation rate compared to the finding of this study and that may be due to the large difference in the number of samples collected in both studies.

References


