

Research Papers

***Salmonella* Yeerongpilly in a Chinese owl (*Columba livia domestica*) in Jamaica**

ABSTRACT

Salmonella infection in bird species in Jamaica was studied. This revealed that very low prevalence was found (0.32 %) *Salmonella yeerongpilly* (newly reported in Jamaica) was isolated from a bird collected at a bird aviary in Jamaica. This study showed that there was the presence of *Salmonella Yeerongpilly* in a Chinese owl (*Columba livia domestica*) in Jamaica. This study suggests that a larger investigation in pet birds as *Salmonella* carriers should be carried out in the island and it should be advised mandatory screening or quarantine of birds entering the country.

Keywords: *Free-flying birds, exotic birds, Salmonella Yeerongpilly, Jamaica, epidemiology, salmonellosis*

1. INTRODUCTION

The role of free-flying and exotic birds as potential sources of infection is clearly documented [1-3]. It was reported that the nationwide outbreak of salmonellosis in Norway was originally linked to contaminated chocolate bars. Five years after the outbreak an increased number of isolated cases for the same strain of *Salmonella* was detected. By close analysis, it was discovered that avian wild life including Passerine birds were acting as reservoir for the epidemic *Salmonella* strain [4].

Salmonellosis was reported to be associated with exotic birds in Germany [5]. An estimated 3 to 5% of all cases of salmonellosis in humans are associated with exposure to exotic pets. *Salmonella* serovars that were isolated from patients with salmonellosis were also associated with exotic pets [6]. *Salmonella* was isolated from nine of 60 free-flying sparrows [7]. *Salmonella* Amager was isolated from nestling free-flying peregrine falcons (*Falco peregrinus*) in Sweden in 2000 [8]. A low prevalence of salmonellosis was reported in free-flying avian species in Trinidad [9], and this is the only report of birds that are carriers of *Salmonella* in the Caribbean. This work addresses the issue of prevalence of *Salmonella* in Jamaican bird species.

2. MATERIALS AND METHODS

2.1 Bird specimens

Cloacal swabs and faeces from 31 different species of bird species were investigated for *Salmonella* infection including: Green-naped Lory (*Trichoglossus haematodus*), Chinese owl Pigeon (*Columba livia domestica*), Peach-faced Lovebird (*Agapornis roseicollis*), Black-masked Lovebird (*Agapornis personatus*), Black-capped Lory (*Lorius lory*), Stella's Lorikeet (*Charmosyna papou stellae*), Blue Streaked Lory (*Eos reticulata*), Golden-mantled Rosella Parakeet (*Platycercus eximius*), African Grey Parrot (*Psittacus erithacus*), Eclectus Parrot (*Eclectus roratus*), Cockatiel (*Nymphicus hollandicus*), Budgerigars (*Melopsittacus undulates*), Common Mynah Bird (*Acridotheres tristis*), Sun Conures (*Aratinga solstitialis*), White-winged Dove (*Zenaida asiatica*), Mountain Witch Dove (*Geotrygon versicolor*), Red-legged Partridge (*Alectoris rufa*), White-crowned Pigeon (*Patagioenas leucocephala*), Pea Dove (*Leptotila wellsi*), Long-Tail Ground Dove (*Uropelia campestris*), American Giant Runt Pigeon (*Columba livia domestica*), Little owl (*Athene noctua*), Oriental Frill (*Columba livia domestica*), Southern Dutch Frill Canary (*Serinus canaria domesticus*), Birmingham Rollers (*Columba livia domestica*), Damascene Pigeon (*Columba livia domestica*), Tumbler Pigeon (*Columba livia domestica*), and Eastern Kingbird (*Tyrannus tyrannus*).

2.2 Isolation of *Salmonella* from specimens

The isolation of *Salmonella* was carried out using previously described procedures [10]. The birds were collected at a bird aviary in Jamaica that sells exotic pets. The exterior of the cloaca of the birds was first cleaned with sterilized moistened cotton balls prior to application of the moistened cotton tips of each swab applicator. The swabs were immediately placed in sterile screw cap test tube containing 9 ml of universal pre-enrichment broth. The swab was completely submerged in the broth to ensure optimal recovery of the organism. At least 25g of each type of specimen was dissolved in 250ml of universal pre-enrichment broth (buffered peptone water 1%, Difco).

The inoculated universal pre-enrichment broth was incubated at 37°C for 24 hours following this incubation the pre-enrichment broth was thoroughly mixed using a vortex mixer. A 1ml aliquot of the pre-enrichment broth was added to 9 ml of enrichment broth (Selenite broth, Selenite cystein broth, and Tetrathionate broth) and further incubated at 37°C for 24 hours. After vortexing 0.5 ml and a 3 mm loopful of inoculums were used to inoculate differential plating media such as MacConkey agar, *Salmonella-Shigella* agar selective media Bismuth Sulphite and Brilliant green agar and incubated at 37°C for 24-48 hour.

Following incubation the cultures were examined. Non-lactose fermenting colonies were selected and used to inoculate Kligler iron agar and urea agar slants. After a further 24 hours incubation period at 37°C colonies, which gave the typical *Salmonella/Shigella* agar reaction were further investigated for confirmation, using slide agglutination with somatic "O" and flagella "H" antigens of *Salmonella*. Serological typing was performed to determine the *Salmonella* serovar [11].

2.3 Antibiotic susceptibility test

All *Salmonella* isolates tested were investigated for their antibiotic resistance with the disc diffusion test using the following discs (Difco): gentamicin (10 µg), kanamycin (30 µg), ampicillin (10 µg), amikacin (30 µg), trimethoprim/sulfamethoxazole (1.25/23.75 µg),

chloramphenicol (30 µg), cefazolin (30 µg), cephalothin (30 µg), cefepime (30 µg), cefotaxime (30 µg), streptomycin (10 µg), ceftazidime (30 µg), ceftiofur (30 µg), nalidixic acid (30 µg), ciprofloxacin (5 µg), norfloxacin (10 µg), tetracycline (30 µg) and imipenem (10 µg).

3. RESULTS AND DISCUSSION

The prevalence of *Salmonella* infection in bird species in Jamaica was 0.32%, only one bird was confirmed as *Salmonella* carrier (1 out of 311 birds tested). The *Salmonella* carrier was a Chinese owl (*Columba livia domestica*). The isolate was investigated for its antibiotic sensitivity with the disc diffusion test and the *Salmonella* isolate was a strain susceptible to entire panel of antibiotics tested.

The isolate proved to belong to the *Salmonella* Yeerongpilly serovar that was not previously identified in Jamaica. The typing of this isolate was done at *Salmonella* typing laboratory at the Teaching Hospital of the University of the West Indies. These preliminary findings of the prevalence of *Salmonella* found in pet birds and free-flying birds species in this study are in keeping with previous reports from other countries. In various studies from European countries extremely low prevalence was reported. Several authors have emphasized the role of various bird species in the transmission of *Salmonella* [12-15].

There were no published reports of *Salmonella* Yeerongpilly from any of the other Caribbean countries. This strain was isolated in Queensland Australia in the 1960's prior to a successful *Salmonella* eradication campaign. This strain was probably imported to our island since there is presently no mandatory screening or quarantine of birds entering the island. Scientific evidence has shown that *Salmonella* was the most common bacteria isolated from quarantined imported birds in Canada [16]. An estimated 3 to 5% of all cases of salmonellosis in humans are associated with exposure to exotic bird pets [5].

Limitation of the study

The limitation of the study resides in the small number of pet and free-flying birds tested, totaling 311 birds, but this preliminary results can be benefited in the future with the realization of a larger epidemiological study of *Salmonella* carriers in birds. The results demonstrated the presence of a new strain of *Salmonella* in Jamaica (*S. Yeerongpilly*). In a recent epidemiological study of salmonellosis in poultry and poultry environments in Jamaica we demonstrated the presence of two new strains of *Salmonellae* in chickens: *Salmonella* enterica serotype Augustenborg and *Salmonella* Kentucky that were new to the island [17] and have not been reported in another Caribbean island. However the results of the presence study set a precedent in the study of *Salmonella* carriers in exotic birds and make aware to Health authorities about the problem.

4. CONCLUSION

This study showed that there was the presence of *Salmonella* Yeerongpilly in a Chinese owl (*Columba livia domestica*) in Jamaica. This study suggests that a larger investigation in pet birds as *Salmonella* carriers should be carried out in the island and it should be advised mandatory screening or quarantine of birds entering the country.

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147 **COMPETING INTERESTS**

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149 The authors declared that no competing interests exist.

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151 **AUTHORS' CONTRIBUTIONS**

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153 This work was carried out in collaboration between all authors. Author SC designed the
154 study, did the laboratory work, SC and AJV managed the literature searches, wrote the
155 protocol, and wrote the first draft of the manuscript. All authors managed the analysis of the
156 study, read, corrected and approved the final manuscript.

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159 **CONSENT**

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161 No applicable.

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163 **ETHICAL APPROVAL**

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165 All authors hereby declare that all experiments have been examined and approved by the
166 ethics committee of the University of the West Indies, Mona campus, Jamaica.

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