First Isolation of *Salmonella* Hessarek from *Sturnus vulgaris* in Turkey: A Case Report

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Abstract

In this paper, the first isolation of *Salmonella enterica* subsp. *enterica* serovar Hessarek (*S. Hessarek*) was reported from *Sturnus vulgaris* in Çorum, Turkey in 2010 and 2015. Eleven dead *Sturnus vulgaris* were necropsied, and *S. Hessarek* was isolated from seven of dead bird's tissue samples. The automated ribotyping was performed for epidemiologic typing of the all seven *S. Hessarek* isolates. The number and relationship of bands obtained by ribotyping were analyzed with a similarity index by using the Dice coefficient and unweighted pair group method with mathematical averaging (UPGMA) in GelCompar TM software. The six isolates from 2015 were evaluated as closely related. But, the other isolate apart from them was unrelated. In conclusion, we thought that there were two unrelated *S. Hessarek* outbreaks in a studied region.

Keywords: *Salmonella* Hessarek, *Sturnus vulgaris* (Common Starling, European Starlings), Turkey, Wild birds

INTRODUCTION

*Salmonella* agents have a broad range of animal hosts, especially wild birds that are known as natural hosts for *Salmonella* throughout the world. The transmission of *Salmonella* agents from infected wild birds to the environment has a common risk for animals and humans [1,2].

Starlings, small wild birds, are among the most widespread birds in Europe and in the urban environment, and have been nominated to the list of the “100 World’s Worst” invaders by the Invasive Species Specialist Group [3,4]. Starlings damage agriculture by consuming crops destined for human and livestock consumption [5-7]. In addition to the influence of animal and human health, these birds cause economic loss to agriculture; for example the economic loss in the U.S. was estimated at $800 million annually [8,9].

Salmonellosis can occur in starlings most commonly their omnivorous diet due to feed on the ground, food contaminated with fecal matter and live or feed in contaminated water [10,11]. Thus starlings can catch the disease and die or further excrete the disease through their feces to livestock, especially poultry and egg producers, and to humans [12,13].

*Salmonella enterica* subsp. *enterica* serovar Hessarek (*S. Hessarek*) is not a common serotype in Turkey. It was
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originally isolated from a Common Raven (Corvus corax) in Iran [14] and numerous occasions in outbreaks of septicaemic salmonellosis in starlings [15]. It has also been reported that S. Hessarek caused an epidemic of salmonellosis amongst Blackbirds Turdus merula [16].

This paper describes two mortality events involving Salmonella Hessarek in Sturnus vulgaris in Turkey and epidemiological typing of the isolates.

CASE HISTORY

Case Definition

The area involved in both mortality events is a park called Hıfzı Veldet Velidedeoğlu Park (formerly called Yunus Emre Park) in the town of Çorum (40°33'18.8″N, 34°58'5.17″E, Turkey), where eleven Sturnus vulgaris were found. Five of dead birds in 2010 and six dead birds in 2015 were found. Starlings fed from trash in the park and mortalities were detected in this place.

Necropsy

Necropsies were performed on all dead birds. Among all of the examined birds, the most consistent lesion was necrosis loci on the internal organs (spleen, liver, and heart).

Microbiological Examination

Tissue samples were inoculated on 5% blood agar and incubated aerobically at 37°C. The presumptive colonies of Salmonella were identified by biochemical tests: Triple Sugar Iron (Oxoid, CM0277), urea hydrolysis (Oxoid, CM00538), H$_2$S, indole production, ONPG (β-galactosidase; Oxoid, DD0013), lysine decarboxylase (Oxoid, CM038) and Voges-Proskauer (Oxoid, CM0043) tests [17]. Then all presumptive Salmonella positive isolates were confirmed serologically with polyvalent and monovalent specific somatic and flagellar antisera (Statens Serum Instut, Denmark) and serotyping was performed based on the Kauffmann-White scheme [18]. A total of seven Salmonella spp. were isolated from only liver samples and these isolates were identified as S. Hessarek, named A, B, C, D, E, F (strains were isolated in 2015), and G (strain was isolated in 2010). But, there was no isolation from spleen and heart samples.

Molecular Typing

Ribotyping was performed as described in the user manual of RiboPrinter (Dupont Qualicon, Wilmington, DE, USA) [19]. The number and relationship of bands obtained by ribotyping were analyzed with a similarity index by using Dice coefficient with optimization and position tolerance set at 1-1.5%, respectively, and unweighted pair group method with mathematical averaging (UPGMA) in using Gelcompar II (version 6.5; Applied Maths, Saint-Martens-Latem, Belgium) software. According to the automated ribotyping, seven isolates separated into one cluster and one unique ribotype with a coefficient of similarity of 70%. The cluster included six isolates (A-F) that had been isolated in 2015. The unique ribotype, included one isolate (G) that had been isolated in 2010 (Fig. 1, Fig 2). The isolate A and B were showed 100% similarity. Also, the isolates C to F were 100% similar. The similarity of these two groups was 95.2%.

DISCUSSION

In this study, Salmonella Hessarek was isolated from starlings for the first time in Turkey. Salmonella Hessarek was isolated from dead starlings at an interval of five years.
Similarity is high between two S. Hessarek isolates in 2010–2015. It is showed that similar strains could lead to birds in two cases and these strains could be persistent in this area. Therefore, it was revealed that migrating birds were exposed continuously to these strains. A similar study was performed in wild birds, Song Thrushes, in Spain [20]. S. Hessarek was isolated from wild birds in two cases and had high similarity between isolates with pulsed field gel electrophoresis (PFGE).

Salmonella Hessarek was isolated for the first time in Iran from a raven (Corvus corax) in 1953 [4]. However the first isolation of S. Hessarek from European Starlings in Isreal was notified that starlings as a reservoir for human [15]. Birds can acquire these pathogens from contaminated environments and spread it directly to humans or indirectly by contaminating commercial livestock vehicles [21]. In particular, the transmission route of Salmonella to humans occurs both by direct contact to contaminated fecal materials and by consumption of their contaminated meat [22].

In conclusion, this knowledge may help to further identify potential epidemic Salmonella Hessarek in the wild, and control measures against the migration routes of wild birds avoid transmission of this infection both in humans and animals.

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REFERENCES

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