

EXPLORING THE RELATION BETWEEN AVIAN COMMUNITIES AND AIV ECOLOGY IN SOUTHERN AFRICA USING THE EPIDEMIOLOGICAL FUNCTIONAL GROUP CONCEPT

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Abstract

The ecology of hosts is crucial in understanding mechanisms of pathogens transmission and spread in complex multi-hosts systems^{3,6}. This paradigm is used to infer epidemiological interactions¹ in the context of Avian Influenza Virus (AIV) maintenance and spread waterfowl communities in 3 southern African ecosystems. We counted and sampled waterfowl community every two months during two years in three sites (Chivero-Manyame catchment in the periphery of Harare in Zimbabwe, Barberspan waterbody in Gauteng province and Strandfontein wastewater treatment work in Cape Town, both in South Africa).

The standard analysis of PCR results on the dynamics of AIV in these three avian communities is presented, with an overall AIV prevalence of 2.51% out of 4977 birds sampled and no highly pathogenic strains detected. However, this type of analysis is not efficient at explaining the variability in AIV presence/absence through the year in the different waterfowl communities.

We define the concept of Epidemiological Functional Groups (EFGs) using an analogy with ecological functional groups in community ecology. With this concept, we build two EFGs for the waterfowl community in Southern Africa: 1) EFG1 refers to bird classification and their known (or unknown) role in AIV epidemiology (Anseriforms, Charadriiforms, Other orders); 2) EFG2 is based on known movements of bird species (resident, nomadic, migratory, palearctic migrant). The analysis of the epidemiological data using this ecological classification of hosts brings a more detailed understanding on AIV ecology in Southern Africa: it varies between the three sites under study with different avian communities determining different pathogen patterns. If duck species seem to play an important role in the epidemiology of AIV in southern Africa as in other parts of the world^{4,5}, other bird species, not usually targeted in surveillance efforts, seem also to play a role in the maintenance of AIV.

Our results present the first longitudinal study of AIV in waterfowl in southern Africa and indicate the need to adapt AIV surveillance in this region to this new body of knowledge. Surveillance cannot only focus on Anseriforms but should also target under-sampled bird families that show ecological traits in favor of AIV circulation (e.g., gregariousness, mixing habits)². We advocate that the use of waterfowl census to support epidemiological data is of primary importance to understand the epidemiology of pathogen in multi-hosts avian systems.

Selected literature

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