Temporal dynamics and the influence of environmental variables on the prevalence of avian influenza virus in main wetlands in central Chile

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Abstract

Although wild birds are considered the main reservoir of the influenza A virus (IAV) in nature, empirical investigations exploring the interaction between the IAV prevalence in these populations and environmental drivers remain scarce. Chile has a coastline of more than 4000 kilometres with hundreds of wetlands, which are important habitats for both resident and inter-hemispheric migratory species. The aim of this study was to characterize the temporal dynamics of IAV in main wetlands in central Chile and to assess the influence of environmental variables on AIV prevalence. For that purpose, four wetlands were studied from September 2015 to June 2018. Fresh faecal samples of wild birds were collected for IAV detection by real-time RT-PCR. Furthermore, a count of wild birds present at the site was performed and environmental variables, such as temperature, rainfall, vegetation coverage (Normalized Difference Vegetation Index (NDVI)) and water body size, were determined. A generalized linear mixed model was built to assess the association between IAV prevalence and explanatory variables. An overall prevalence of 4.28% +/- 0.28% was detected with important fluctuations among seasons, being greater during summer (OR = 4.87, 95% CI 2.11 to 11.21) and fall (OR = 2.59, 95% CI 1.12 to 5.97). Prevalence was positively associated with minimum temperature for the month of sampling and negatively associated with water body size measured two months before sampling, and NDVI measured three months before sampling. These results contribute to the understanding of IAV ecological drivers in Chilean wetlands providing important considerations for the global surveillance of IAV.

Palabras clave

Palabras clave de autor: Chile; generalized linear mixed model; influenza virus; NDVI; wild birds
KeyWords Plus: WATER INDEX NDWI; WILD BIRDS; SURVEILLANCE; TRANSMISSION; INFECTION; DRIVERS; ECOLOGY; SWINE

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