



Short communication

A national study of individuals who handle migratory birds for evidence of avian and swine-origin influenza virus infections

Shira C. Shafir^{a,*}, Trevon Fuller^b, Thomas B. Smith^{b,c}, Anne W. Rimoin^a

^a Department of Epidemiology, Fielding School of Public Health, University of California, Los Angeles, CA, USA

^b Center for Tropical Research, Institute of the Environment and Sustainability, University of California, Los Angeles, CA, USA

^c Department of Ecology and Evolutionary Biology, University of California, Los Angeles, CA, USA

ARTICLE INFO

Article history:

Received 15 December 2011

Received in revised form 9 April 2012

Accepted 1 May 2012

Keywords:

Avian influenza

Serosurvey

Microneutralization

Migratory birds

ABSTRACT

Background: Persons with occupational or recreational exposure to migratory birds may be at risk for infection with highly pathogenic avian influenza and other avian influenza viruses since wild birds are the natural reservoir of influenza A. Additionally, bird handlers may host avian and swine-origin influenza (pH1N1) virus co-infections, which generate reassortant viruses with high pathogenicity in mammals.

Objectives: We assessed the prevalence of avian and swine influenza viruses in US-based bird handlers and estimated their exposure to different orders of wild birds including waterfowl (Anseriformes), songbirds (Passeriformes), and shorebirds (Charadriiformes).

Study design: Cross-sectional serologic survey accompanied by a questionnaire to estimate behavioral risk factors. This is first survey of US-based bird handlers who also work at international sites.

Results: 401 participants were recruited and tested over the course of 3 years. One participant with occupational exposure to migratory birds had evidence of past infections with a H5N2 virus antigenically related to A/Nopi/MN/07/462960-02, which is the first case of this influenza subtype in a human host associated with exposure to wild rather than domestic birds. We detected no avian and swine-origin influenza virus co-infections. The exposure of bird handlers to songbirds was four times greater than to shorebirds or waterfowl.

Conclusions: Though rare, the transmission of avian influenza viruses from migratory birds to US-based bird handlers has potentially significant public health and economic consequences.

© 2012 Elsevier B.V. All rights reserved.

1. Background

The Asian lineage of highly pathogenic avian influenza viruses of subtype H5N1 (hereafter HPAIV) was first detected in southern China in 1996 and subsequently has caused much concern among the medical and public health community. Prior to 2002, HPAIV was almost exclusively found in poultry, but since then the virus have been isolated from a number of different species of wild and migratory birds.^{1,2} Because HPAIV currently has low transmissibility but high case fatality, an outbreak in humans is an event with low probability but high potential for negative impact on human health. Since ornithologists and others who work occupationally or

recreationally with migratory birds have substantial exposure to zoonotic reservoirs of HPAIV and other subtypes of avian influenza virus (AIV), this population is at risk for wildlife-to-human AIV transmission.³

2. Objectives

Our goal was to examine the potential for AIV transmission from avian migrants to humans by conducting a serosurvey of individuals with significant and measurable contact with wild bird populations. By pairing serologic analysis of blood samples for evidence of past infection with demographic and bird handling data collection from a questionnaire, we were able to identify sub-clinical cases of AIV infection that may have occurred and behavioral risk factors for the transmission of AIV from wild birds to the study participants. The study is unique in that we also screened participants for pandemic 2009 H1N1 (hereafter pH1N1) because co-infection with AIV and pH1N1 could lead to *in vivo* recombination, generating a reassortant strain with high pathogenicity in mammals.⁴

Abbreviations: AIV, avian influenza virus; HPAIV, highly pathogenic avian influenza viruses of subtype H5N1; MN, microneutralization assay; pH1N1, pandemic influenza A/2009 (H1N1).

* Corresponding author at: Department of Epidemiology, UCLA Fielding School of Public Health, Box 951772, Los Angeles, CA 90095-1772, USA. Tel.: +1 310 206 7942; fax: +1 310 206 6039.

E-mail address: shafir@ucla.edu (S.C. Shafir).

2.1. Study design

Participants were recruited for participation via convenience sampling at three annual meetings (2008–2010) of the American Ornithologist’s Union. Anyone who fulfilled the inclusion criteria (at least 18 years of age, able to give informed consent in English, and affiliated with the wild bird handling community) was offered enrollment in the study. Following informed consent, all participants completed a comprehensive questionnaire about their basic demographic information and vaccination status. Participants were asked specific details about their bird handling habits as well as the locations and the duration of their handling.

A 10 ml venous blood sample was then collected from all willing participants. Antibody responses to AIV strains were detected by use of a microneutralization (MN) assay^{5–8} (Table 1). We screened H5N2, H7N2, and H9N2 in 2008, H5N2 and H7N3 in 2009, and H5N2, H7N2, and pH1N1 in 2010 to test for avian and swine influenza co-infection. In each year, we selected antisera from different H5N2 and H7 viruses to match the H5N2 and H7 viruses detected in US poultry in the previous 12 months. For example, we used A/Chukar/Minnesota/14591-6/95 (H5N2) in 2008 because antibody positivity to this strain was detected in US poultry workers in the spring of 2008⁹ thus we hypothesized that the strain might also circulate in persons exposed to wild birds due to spillover from poultry to wild birds. Sera were considered positive at a MN titer of $\geq 1:40$ since such titers are correlated with a reduction of 50% of the risk of contracting an influenza infection.^{9–12}

3. Results

In total, 401 participants were enrolled in the study. The majority of study participants (69.08%, $n = 277$) had handled migratory birds for at least 5 years and most exposure to wild migratory birds occurred in the summer (Fig. 1). The most common handling activities were banding and measuring (91.52%, $n = 367$) followed by bleeding (60.60%, $n = 243$) (Table 2). Exposure to avian migrants occurred primarily in the eastern or inland US, but 135 participants (33.67%) reported handling birds internationally, most often in the Americas and Caribbean (Table 3). Songbirds

Table 1

Antibody titers against avian and swine influenza viruses determined by microneutralization assays.

Year	Virus and titer	No. (%)
2008	A/Chukar/Minnesota/14191-7/98 (H5N2) <1:10	183 (100)
	A/Turkey/Virginia/4569/02 (H7N2) <1:10	183 (100)
	A/Turkey/Germany/49 (H9N2) <1:10	183 (100)
2009	A/Nopi/Minnesota/07/462960/02 (H5N2) <1:10	122 (99.2)
	1:40	1 (0.8)
	A/Blue-winged teal/Ohio/07 (H7N3) <1:10	122 (99.2)
1:10	1 (0.8)	
2010	A/Mexico/4108/09 (H1N1) <1:10	47 (48.96)
	1:10	11 (11.46)
	1:20	11 (11.46)
	1:40	5 (5.26)
	1:80	10 (10.42)
	1:160	8 (8.33)
	1:320	3 (3.125)
	1:640	1 (1.04)
	A/Virginia/4529/02 (H7N2) <1:10	96 (100%)
	A/Turkey/Minnesota/38391-6/95 (H5N2) <1:10	96 (100%)

and perching birds were handled by 86% ($n = 344$) of the participants whereas 22% ($n = 87$) and 19% ($n = 77$) were exposed to shorebirds and waterfowl, respectively. Additionally, 15 (3.7%) participants had occupational contact with poultry, while 11 (2.7%) had recreational contact with poultry (such as keeping backyard chickens). Even when using a very sensitive cut-off of 40 for the MN results,¹³ only one individual tested positive (0.25%) for any of the selected AIVs, which was an H5N2 virus antigenically related to A/Nopi/Minnesota/07/462960/02 (Table 1). There was no evidence of AIV and pH1N1 co-infection in this cohort.

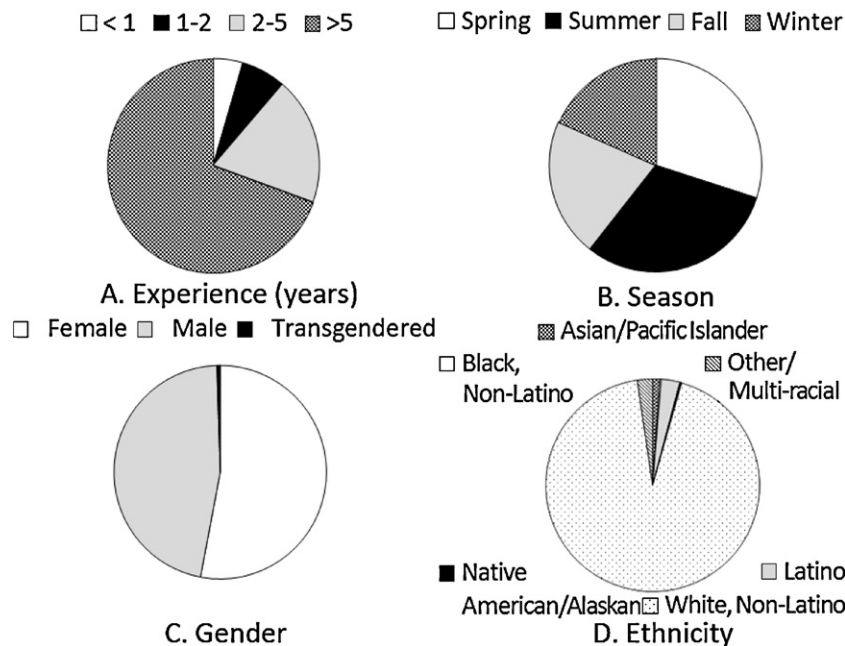


Fig. 1. Participants’ demographic and bird handling characteristics.

Download English Version:

<https://daneshyari.com/en/article/6121682>

Download Persian Version:

<https://daneshyari.com/article/6121682>

[Daneshyari.com](https://daneshyari.com)