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Popular Article

Role of Avian Zoonosis in human health risks

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Abstract

Zoonosis represent a class of infectious or parasitic maladies transmissible from animals to humans, either directly, through direct contact with the animal, or indirectly, via contact with their excreta or secretions. Avian zoonotic diseases specifically denote illnesses capable of transmission from birds to humans. While birds are renowned for their captivating diversity and vivid plumage, they can harbor an array of pathogens, encompassing bacteria, viruses, parasites, and fungi, some of which possess the potential to induce disease in humans, rendering them reservoirs of zoonotic agents perilous to human health. Occupational cohorts particularly susceptible to bird-related health hazards include veterinarians, proprietors of poultry farms, and breeders of ornamental birds, zoo personnel, and workers within poultry abattoirs. In locales where individuals interface with birds or their excreta and secretions, meticulous precautions must be observed to mitigate or obviate the adverse impacts of avian exposure on human health.

Introduction

Birds play a significant role in transmitting zoonotic pathogens, posing a threat to human health ^{[1][2][3]}. Pet birds like canaries, parakeets, and parrots are known carriers of diseases such as highly pathogenic avian influenza, salmonellosis, and chlamyophilosis, impacting human health ^[4]. Invasive alien bird species also contribute to the transmission dynamics of zoonotic pathogens, with interactions documented in invaded ranges ^[5]. Additionally, migratory birds can carry various disease-causing pathogens across borders, including bacteria, viruses, fungi, and endoparasites, potentially transmitting them to humans and domestic animals. Birds have a number of epidemiological characteristics that make them extremely important hosts in the transmission and maintenance of zoonosis, including their susceptibility to pathogens that are extremely hazardous to humans (such as

highly pathogenic avian influenza virus, West Nile virus and Chlamydia psittaci) and their ability to travel long distances, especially in the case of migratory birds. Urban birds and exotic pet birds, Intensive poultry farming and migratory movements of birds make them potential spreaders of pathogens of public health concern. The fact that the human diet includes poultry products (meat, eggs and their by-products) also means that most human cases of foodborne zoonosis are infections of avian origin. Understanding bird ecology and implementing preventive measures are crucial to mitigate the spread of zoonotic diseases facilitated by birds.

Mode of transmission: There are five transmission categories of zoonosis:

1. Direct transmission: The pathogen is transmitted via direct or indirect contact, and does not pass through the life cycle;
2. Metazoonosis: by biological and mechanical vectors;
3. Saprozoonosis: spread by the alimentary tract;
4. Cyclozoonosis: vertebrates are intermediate hosts and
5. Xenozoonosis: by transplantation of organs from infected animals.

The occurrence of zoonosis hinges on various factors, including the duration and intensity of exposure, the virulence and persistence of the pathogen, the mode of infection and transmission, and the presence of vectors. Human health risks associated with avian contact encompass bacterial, viral, fungal, and allergenic agents. Occupational groups particularly vulnerable to bird-related health issues include veterinarians working on poultry farms, owners and breeders of ornamental birds, personnel in zoological gardens and exotic bird shops, and staff at fairs and exhibitions where birds are showcased. Additionally, employees in the poultry meat processing industry and individuals with incidental contact with free-roaming birds and poultry intended for consumption may also face risks.

Zoonotic agents associated with birds: Zoonosis is classified depending on the etiology of infection into various groups: bacterial, viral, parasitic, and fungal zoonosis. The causative agents avian of zoonotic diseases are

- a) *Bacterial zoonosis*
- b) *Viral zoonosis*
- c) **Parasitic zoonosis**
- d) **Fungal zoonosis**



Table 1: Avian Zoonotic agents, diseases and mode of transmission

Agents	Diseases /Infections	Major mode of transmission of infection from infected birds to humans
Viruses	Avian Influenza	Contact with live infected birds and their secretions and excretions
	West Nile Virus	Infection Bites from infected mosquitoes
	New Castle Disease	Contact with live infected birds and their secretions and excretions
Bacterial	<i>Chlamydiosis</i>	Infected birds' nasal discharges and feces
	<i>Salmonellosis</i>	Contaminated poultry meat, eggs and water
	<i>Mycobacteriosis</i> / Avian Tuberculosis	Direct contact with infected birds, ingestion of contaminated feed and water, or contact with a contaminated fomite.
	<i>Campylobacteriosis</i>	Contaminated meat and water
	<i>Lyme disease</i>	Tick-borne infectious disease caused by the bacterium <i>Borrelia burgdorferi</i> transmitted to humans through the bite of an infected tick from the genus Ixodid, the most common hosts for <i>Borrelia</i> spp. are wild birds, songbirds, sparrows.
	Colibacillosis	Contaminated poultry meat, eggs and water
Parasitic	<i>Giardiasis</i>	Feces of various pet birds
	<i>Cryptosporidiosis</i>	droppings of various birds
	<i>Toxoplasmosis</i>	Contaminated poultry meat Exposure to infected feces or eating raw or undercooked meat
Fungal	<i>Cryptococcosis</i>	Inhaling dust contaminated with bird dropping
	<i>Histoplasmosis</i>	Contact with soil contaminated by bird or bat droppings bat droppings, feces of infected birds, and birds' nests (especially starlings)
	<i>Dermatophytosis</i>	Contact with infected birds, feathers, and skin debris
	Aspergillosis	Inhalation of spores present in soil, water and feed
Chlamydia	Ornithosis	Inhalation of organism shed by infected birds, handling of dead infected birds, nasal discharge, bite and person to person contact

Prevention and control of transmission from birds to human

Zoonotic diseases stem from the intricate interplay between birds, humans, and their environment. Therefore, it's imperative to implement and adhere to effective protocols for managing and preventing these diseases. Key strategies involve limiting human interaction with sick birds and practicing thorough hand hygiene using disinfectant sprays and gels. Identification, quarantine, and treatment of afflicted birds play a pivotal role in curbing zoonotic transmission. Regular cleaning and



disinfection of birds' cages, as well as their food and water bowls, using a bleach solution, significantly mitigate the risk of infection and transmission to humans. Furthermore, it's essential to keep pet birds away from individuals at high risk, such as the elderly, young children, or those with compromised immune systems, to minimize their susceptibility to infection. Vigilant detection and eradication of carriers, as well as biological and mechanical vectors, are crucial for preventing the transmission of zoonotic agents between birds and humans.

Conclusion

Zoonotic diseases linked to pet birds typically pose a minor threat to healthy individuals, but immunocompromised persons face a heightened risk of severe infection from these pathogens. Transmission of zoonosis to humans occurs through exposure to infected pet birds or their excretions and droppings. Identifying and promptly treating sick birds, coupled with rigorous adherence to hygiene protocols, significantly mitigates the risk of zoonotic infections in humans. Prevention measures encompass practicing thorough hygiene, refraining from contact with sick or deceased birds, ensuring poultry products are thoroughly cooked, and employing personal protective equipment when handling birds or their environments.

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