

Causes of failure to eradicate avian influenza in Egypt

Aim

In this mini-review we have presented some causes of failure to eradicate avian influenza virus in Egypt since 2006.

Introduction

HPAI is a disease of global concern because of the threat posed to food security in regions that are dependent on poultry as a main source of protein and livelihood. An additional concern is that the H5N1 virus may mutate and cause a human influenza pandemic in which millions of human lives would be threatened.¹⁻⁴ Egypt experienced the disease since the first introduction of highly pathogenic Avian Influenza HPAI H5N1 in 2006. The virus widely extended in very short time and infected commercial production sectors and backyards.^{5,6} Failure to eradicate the virus immediately after its introduction results in establishment of an endemic state. Continued virus replication in endemic areas, and the spread from infected birds to other birds and other species in infected zones increase the risk of generating potentially pandemic AIV.

Materials and methods

AIV is influenza a virus (IAV) of *Orthomyxoviridae*. It has a segmented negative-sense single-stranded RNA genome. The translation products of segments 1-3 assemble into the viral transcriptase complex.⁷ The rapid evolutionary pattern of AIV is a result of its high rate of transcriptase errors, recombination, and reassortment.^{7,8} This rapid mutation is sometimes associated with adaptation to multiple host species (including humans, animals, and birds).⁷ It can also lead to change in virulence characteristics. The existence of susceptible wild animal and bird species adds further layers of complexity to AIV epidemiology.⁹ The emergence of the mutated Egyptian H5N1 mutations was observed early in 2007,¹⁰ despite the implementation of the massive vaccination. Protection from the appearance / reactivation of AIV mutations in endemic areas is partially hampered by one or more of the following factors:

- i. The time required to update virus seeds
- ii. Vaccine production capacity
- iii. Time to import vaccines from international suppliers
- iv. Use of "leaking vaccines" and¹⁰
- v. Multiple, often antigenic.⁷

The use of leaks and multiple vaccines allows multiple antigens to replicate the virus and subsequent mutations in partially protected herds. This situation can be exacerbated by inadequate and / or unequal application of vaccines in endemic areas, poor herd conditions (e.g. poor quality of fodder, housing, management, health status, etc.).¹¹ On the other hand, a review of the way in which so many commercial vaccines are used in endemic areas may provide an opportunity to reduce the impact of the diversity of viruses, particularly in emergencies.¹² Updated vaccine seed is the optimal approach to

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provide protection against emerging AIV strains. However, the success of vaccine application is often limited through logistics to produce vaccines and deliver them to affected areas. The existing knowledge related to molecular biology and AIV evolution has been used to propose a rapid and feasible intervention tool in the face of emerging viruses.

Conclusion

Incorrect application of vaccine-based control strategies contributes to AIV diversity and results in complication of the epidemiological situation. The Egyptian situation is a clear example of this problem. Although vaccination against AIV H5N1 was adopted in Egypt since 2006, severe avian influenza (AI) associated with HP AIV H5N1 continue to be reported in vaccinated flocks. Phylogenetically-divergent H5N1 viruses, which are only partly antigenically cross-reactive, co-circulate in Egypt. The Egyptian situation poses a threat to the rest of the world.

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Conflict of interest

The author declares that there is no conflict of interest.

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