

**REVIEW ARTICLE**ISSN:2394-2371
CODEN (USA):IJPTIL**Avian Influenza A: The Bird Flu****K. Prabhu Ram***, Shyam Dixit Dr.Parul Yadav, Dr.J S Sohal**, Dr.N Khare, Dr.G.K.Aseri.

Amity Institute of Microbial Technology, Amity University, Jaipur-303002, Rajasthan, India.

*Presenting author : prabhuramkpr@gmail.com**Corresponding author: jssohal@jpr.amity.edu**ABSTRACT**

H5N1 (Highly Pathogenic Avian Influenza) and LPAI (Less Pathogenic Avian Influenza) caused in both wild and aquatic birds. Avian influenza refers to the disease caused by infection with avian (bird) influenza (flu) Type A viruses. These viruses occur naturally among wild aquatic birds worldwide and can infect domestic poultry and other bird and animal species. Avian flu viruses do not normally infect humans. However, sporadic human infections with avian flu viruses have occurred. This article discusses about structure of virus, flu infection, symptoms in birds, detection of flu virus.

Keywords: - Avian Influenza, flu, LPAI, HPAI, Orthomyxoviridae family.**INTRODUCTION**

Influenza A virus subtype H5N1 (A(H5N1)) from genus of Orthomyxoviridae family, which are single-stranded, segmented RNA viruses that causes influenza in birds and some other mammals. Other influenza causing viruses in birds are H5N2 and H5N8, but H5N1 is most pathogenic. The subtypes are labeled according to

number of H and N antigens. There are two types, HPAI and LPAI viruses can spread rapidly in wild birds and poultry.[1] Most avian influenza A viruses circulating among wild birds and poultry are classified as LPAI A viruses and typically cause asymptomatic infection to mild illness. HPAI viruses can cause severe disease and high mortality in infected wild birds and poultry. Whether a virus is classified as a LPAI or HPAI virus applies to the ability to cause disease in infected poultry, and does not refer to whether it causes disease in humans. Both LPAI and HPAI virus infections of humans have resulted in

Corresponding Author:*Dr. J. S. Sohal**

Amity Institute of Microbial Technology, Amity University Jaipur-303002, Rajasthan, India

E.Mail: jssohal@jpr.amity.edu

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a wide spectrum of illness, from mild to severe and fatal.[2]

Structure of Influenza A Virus

The virus particle is 80–120 nanometers in diameter spherical, some filamentous forms. It consists of segmented pieces of negative-sense RNA (each piece containing either one or two genes which code for a gene product, protein.).[5] The term negative-sense RNA just implies that the RNA genome cannot be translated into protein directly; it must first be transcribed to positive-sense RNA before it can be translated into protein products. The segmented nature of the genome allows for the exchange of entire genes between different viral strains. The Single stranded negative sense RNA has a major advantage that results in antigenic drift i.e series of mutation within genes that alter the antibody-binding sites, thus becomes adapted and highly pathogenic. The avian strains differ from human strains in that they have all the 15 subtypes of HA in contrast to only three in case of humans. The virulent avian influenza H5N1 strains differ from other avian strains in that, there lies a link between HA cleavage and degree of virulence. [6]. The envelope is internally lined by a matrix protein (M) and externally with glycoprotein peplomers-rod shaped haemagglutinin (HA) which are homotrimers of class I membrane glycoproteins and mushroom

shaped neuraminidase (NA) molecules which are tetramers of a class II membrane protein.

Symptoms of flu in birds

The flu infected birds can be observed with the following symptoms,

- sudden death without any signs
- lack of coordination
- purple discoloration of the wattles, combs, and legs
- soft-shelled or misshapen eggs
- lack of energy and appetite
- diarrhea
- swelling of the head, eyelids, comb, wattles and hocks
- nasal discharge
- decreased egg production

CDC, recommends the farmers and poultry keepers to isolate the infected birds before being spread to other birds and inform the animal welfare authority.

Spreading among birds

An outbreak among migratory birds on Lake Qinghaihu, China in May and June 2005 in which more than a thousand birds were affected. Pancreatic necrosis and abnormal neurological symptoms were the major clinical features. [3]

In December 2014 and January 2015, the United States Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS) reported the presence of highly

pathogenic avian influenza (HPAI) H5N2 and HPAI H5N8 viruses in wild birds in a few states.

Bird flu infection in India (West Bengal) between 2009 – 2011

The samples were collected from wild, resident, migratory birds and poultry during avian winter migratory season October to March in the years 2009–2011 in West Bengal. belonged to 76 species from 30 avian families. belonged to 76 species from 30 avian families. HA and HI assays were performed for the detection of the flu. [10,12]

Virus detection and identification

1. Hemagglutination (HA) and

hemagglutination inhibition (HI) assays

Allantoic fluid from each egg was tested in hemagglutination assay (HA) to detect the presence of virus HI assay was performed for virus identification using influenza A H1 to H16 reference antisera (OIE/FAO National Reference Laboratory for AI and Newcastle disease, Legnaro, Italy). Identification of AI viruses by reverse transcriptase polymerase chain reaction (RT-PCR). Viral RNA was extracted from the egg-isolates using the RNAeasy Viral RNA Mini kit (Qiagen, Germany). A One-Step reverse transcription-Polymerase Chain Reaction (RT-PCR) (Qiagen, Germany) was carried out for hemagglutinin and neuraminidase subtyping. [11]

2. Hemagglutinin (HA) subtyping

As these isolates were identified by HI as H9 and H4, the HA gene of these isolates were amplified using the type A-specific primers. The partially amplified HA gene was sequenced (359 base pairs for H4 and 673 base pairs for H9) and compared with sequences deposited in databases. Accession numbers of H9 are JX310065 to JX310067 and H4 viruses are JX310059, JX310061 and JX310062. [9]

3. Neuraminidase (NA) subtyping

Samples which were positive for H9 and H4 were amplified using the NA diagnostic (N1 to N9) primers and run on the gel to identify the NA subtype. Sequence of the NA PCR fragments (278 base pairs for N2 and 264 base pairs for N6) were compared with the available NA sequences in databases. Accession numbers of H9 are JX310068 to JX310070 and H4 viruses are JX310060, JX310063 and JX310064. [7]

Bird flu infection in humans

For avian influenza A(H5N1) virus infections in humans, current data indicate an incubation period averaging 2 to 5 days and ranging up to 17 days. [8]

Vaccination of bird flu in humans

If 'bird flu' is suspected in a person, treatment should be started immediately without waiting for laboratory confirmation. Treatment for infection by the H5N1 strain is essentially similar to that employed for infections due to the other influenza

viruses. Unfortunately, the current strain of H5N1 has already shown resistance to amantadine and rimantadine, two of the antiviral drugs commonly used for influenza. However, other antivirals (oseltamavir and zanamavir) are still effective against this strain of H5N1. [6]

REFERENCES

1. Michael A. Jhung, MD, Deborah I. Nelson, PhD. Outbreaks of Avian Influenza A (H5N2), (H5N8), and (H5N1) Among Birds — United States, December 2014–January 2015. *Weekly MMWR Morb Mortal Wkly Rep* 2015;64(Early Release):1 February 6, 2015 / 64(04);111.
2. Uyeki TM. Human infection with highly pathogenic avian influenza A (H5N1) virus: review of clinical issues. *Clin Infect Dis* 2009;49:279–90. Influenza Division, National Center for Immunization and Respiratory Disease
3. Highly Pathogenic H5N1 Influenza Virus Infection in Migratory Birds. J. Liu¹, H. Xiao, F. Lei, Q. Zhu, K. Qin, X.-w. Zhang, X.-l. Zhang¹, D. Zhao¹, G. Wang^{2,4}, Y. Feng^{2,4}, J. Ma², W. Liu² *Science* 19 Aug 2005: Vol. 309, Issue 5738, pp. 1206 DOI: 10.1126/science.1115273.
4. OIE Terrestrial Animal Health Code, Infection with Avian Influenza Viruses, CDC.
5. Bouvier NM, Palese P (2008). "The biology of influenza viruses". *Vaccine*. 26 Suppl 4: D49–53. doi:10.1016/j.vaccine.2008.07.039
6. Avian influenza a (H5N1): A preliminary review. S Padhi, PK Panigrahi, A Mahapatra, S Mahapatra Year : 2004 | Volume : 22 | Issue : 3 | Page : 143-146
7. Tsukamoto K, Ashizawa T, Nakanishi K, Kaji N, Suzuki K, Shishido M, Okamatsu M, Mase M: Use of Reverse Transcriptase PCR To Subtype N1 to N9 Neuraminidase Genes of Avian Influenza Viruses. *J Clin Microbiol* 2009, **47**: 2301-2303. 10.1128/JCM.02366-08.
8. Control of Communicable Diseases Manual 20th Edition. American Public Health Association (2015). APHA Press, Washington DC. ISBN: 978-0-87553-018-5.
9. WHO manual on animal influenza diagnosis and surveillance WHOA INFL, U MANU - Geneva: World Health Organization, 2002 - wpro.who.int. WHO/CDS/CSR/NCS 2002, **5**: 15-62.
10. Avian influenza surveillance reveals presence of low pathogenic avian influenza viruses in poultry during 2009-2011 in the West Bengal State, India Shailesh D Pawar, Sandeep D Kale, Amol S Rawankar, Santosh S Koratkar, Chandrashekhar G Raut,

Satish A Pande, Jayati Mullick and
Akhilesh C Mishra Virology
Journal20129:151 DOI: 10.1186/1743-
422X-9-151© ; licensee BioMed Central
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Published: 7 August 2012.

11. WHO: Manual on Animal influenza diagnosis and surveillance. Follow link, http://www.wpro.who.int/emerging_diseases/documents/docs/manualonanimalaidiagnosisandsurveillance.pdf
12. CDC- <http://aib.sd.gov/pdfs/Avian%20Influenza%2012.2009.pdf>