CREATING AWARENESS OF HIGHLY PATHOGENIC AVIAN INFLUENZA (HPAI) AMONG POULTRY WORKERS IN NIGERIA: A STRATEGY FOR ENHANCING ECONOMIC DEVELOPMENT AND HEALTH STATUS OF HUMANS

Ibhafidon, O. D.
Olugasa, B. O.
Department of Veterinary Public Health, Faculty of Veterinary Medicine
University of Ibadan, Ibadan, Nigeria.

Meg, A. E.
***Ibhafidon, A.**
Anyanwu, S. N.
Department of Health Education
Alvan Ikoku Federal College of Education, Owerri, Imo State, Nigeria.
**E-mail: ibhafakhere@yahoo.com*

ABSTRACT

Avian influenza viruses that cause Highly Pathogenic Avian Influenza (HPAI) are highly virulent and mortality rate in infected flocks often approach 100%. In Nigeria, cases of Highly Pathogenic Avian Influenza Virus were first reported on February 8, 2006. A lot of avian were lost to the incidence. Human cases of H5NI influenza have been reported in many countries of the world including Nigeria. The fatality rate was more than 50%. Exposure to live chicken and low perceived risk were implicated in the spread of the virus. However, if awareness about Highly Pathogenic Avian Influenza is created the economic loses in ill health of humans associated with it would be averted. This will enhance the chance of Nigeria becoming one of the top 20 world economies by year 2020. In view of the above, this study examined host range of HPAI, transmission of HPAI, clinical signs of HPAI, gross lesions of HPAI, morbidity, and mortality of HPAI, field diagnosis of HPAI, treatment of HPAI, vaccination of HPAI, control and eradication of HPAI, and public health importance of HPAI. Part of the recommendations was that the stakeholders in poultry farming should put all machinery in motion to prevent or forestall outbreak of HPAI.

Keywords: *Awareness, Highly Pathogenic, Avian Influenza, Nigeria, Poultry workers*

INTRODUCTION

Avian influenza is a disease of viral actiology that ranges from a mild or even asymptomatic infection to an acute, fatal disease of chickens, turkeys, guinea, fowls and other avian species, especially migratory water fowl. All known subtypes of influenza 'A' can be found in birds, and feral aquatic birds are the major reservoir for influenza 'A' virus (Fouchier, Muster and Wallensten 2005). Avian influenza strains in domestic chickens and turkeys are classified according to disease severity with two recognized forms; Highly Pathogenic Avian Influenza (HPAI), also known as fowl plagues and Low Pathogenic Avian Influenza (LPAI). The current strain of

H5NI occurring else where in the world were less virulent and therefore, are classified as LPAI strain. All HPAI strains identified update involved H5 and H7 subtypes. Human infections have been associated with both HPAI and LPAI strain (HHS, 2005).

Avian influenza viruses that cause HPAI are highly virulent and mortality rate in infected flocks often approach 100%. Low Pathogenic Avian Influenza (LPAI) viruses are generally of low virulence, but these viruses can serve as progenitors to HPAI viruses. No clinical sign is pathognomonic for avian influenza virus infections and birds of all ages are susceptible. The incubation period varies from between a few hours to three days. Per acute cases show few clinical signs and gross lesions like reduction in egg production which could be slight to severe, increased mortality, diarrhea, dyspnoea, caughing, sneezing, lacrimation, cyanosis of unfeathered parts of the skin and Oedema of the head, comb, and wattles. The systems affected are the respiratory, digestive, nervous and reproductive systems. In humans, symptoms range from typical flu like symptoms of fever, cough, sore throat, muscle aches to eyes infections, pneumonia, severe respiratory diseases and other severe and life threatening complications which may result in death (WHO, 2006).

WHO (2005) observes that more than 190 human cases of H5NI influenza have been reported from Vietnam, Thailand, Cambodia, Indonasia, China, Turkey, Iraq, Azerbaijan and Egypt. The fatality rate was more than 50%. Low perceived risk and high population exposures to live chickens appeared to be the factors that are contributory to the spread of H5NI in Asia (Fidding, 2005). Most recognized human cases have involved directly with poultry. Types of exposure that have been identified to date include, plucking and preparing diseased birds, handling fighting cocks, playing with poultry (particularly asymptomatic ducks) and consumption of duck blood and possibly undercooked poultry.

In recent past, precisely on 8th February, 2006, Nigeria officially announced cases of the highly pathogenic avian influenza virus H5NI in a poultry at Jaji village located in the Northern State of Kaduna. The outbreak which was the first of its kind in Africa was confirmed by Food and Agricultural Organization (FAO) and the World Organization for Animal Health (WOAH) laboratory for avian influenza in Padova (Italy). The then Nigerian Minister of Agriculture announced on 8th February, 2006 that all suspected birds nationwhide be killed and buried in order to contain the outbreak. He also points out that, the Federal Government had set aside the sum of 1.5 billion naira for compensation at the sum of 250 Naira per bird killed. A lot of birds were killed and so much money was sent on paying compensation to those whose birds were killed. In view of the above, for Nigeria to be among the top 20 world economies by the year 2020, there is the need to create awareness of Highly Pathogenic Avian Influenza among poultry workers in Nigeria. This would help to maintain the health of human beings that will contribute to the economic development of the nation and the birds that will serve as a source of the economic development.

The first case of Highly Pathogenic Avian Influenza (HPAI) outbreak in Africa was recorded in Nigeria on 8th February, 2006. This happened in a village at Jaji

located in the Northern state of Kaduna. Due to low level of awareness of the signs and symptoms, control and eradication measures, so many chickens were lost and the Federal Government spent a lot of money paying compensation to the affected farmers. Cases of infections and death among humans were also recorded at the period. This therefore, makes it necessary to create awareness of HPAI among poultry workers in order to forestall future outbreak on one hand and to enhance the health status of poultry workers and other humans on the other hand.

Host Range of Highly Pathogenic Avian Influenza (HPAI)

Most avian species appear to be susceptible to at least some of the AI viruses. A particular isolate may produce severe disease in turkeys but not in chickens or any other avian species. Therefore, it would be impossible to generalize on the host range for HPAI, for it will likely vary with the isolate. This assumption is supported by reports of farm outbreaks where only a single avian species of several species present on the farm became infected. Swine appear to be important in the epidemiology of infection of turkeys with swine influenza virus when they are in close proximity. Other mammals do not appear to be involved in the epidemiology of HPAI. The infection of humans with an H5 avain influenza virus in Hong Kong in 1997 has resulted in a reconsideration of the roles of the avian species in the epidemiology of human influenza (Alexander, 1987)

Transmission of Highly Pathogenic Avian Influenza (HPAI)

There is a considerable body of circumstantial evidence to support the hypothesis that migratory waterfowl, seabirds or shorebirds are generally responsible for introducing the virus into poultries. Once introduced into a flock, the virus is spread from flock to flock by the usual methods involving the movement of infected birds, contaminated equipment, egg flats, feed trucks and service crews, to mention a few. Preliminary trapping evidence indicates that garbage flies in the Pennsylvania outbreak were sources of virus on the premises of the diseased flocks. Virus may readily be isolated in large quantities from the feaces and respiratory secretions of infected birds. It is logical to assume, therefore, that because virus is present in body secretions transmission of the disease can take place through shared and contaminated drinking water (Esterday and Hinshaw, 1991).

Airborne transmission may occur if birds are in close proximity and with appropriate air movement birds are readily infected via instillation of virus into the conjunctiva sac, nares or trachea. Preliminary field and laboratory evidence indicates that virus can be recovered from yolk and albumen of eggs laid by hens at the height of disease. The possibility of vertical transmission is unresolved, however, it is unlikely that infected embryos could survive and hatch. Attempts to hatch eggs in disease isolated cabinets from a boiler breeder flock at the height of disease failed to result in any AI infected chickens. This does not mean that broken contaminated egg could not be the source of virus to infect chicks often they hatch in some incubator. The hatching of eggs from a disease flock would likely be associated with considerable risk.

Clinical Signs of Highly Pathogenic Avian Influenza (HPAI)

The incubation period is usually 3 to 7 days depending upon the isolate, the dose of inoculums the species and age of the bird. Infection of HPAI result in marked depression with ruffled feathers, inappetence, and excessive thirst cessation of egg production, and watery diarrhea. Mature chickens frequently have swollen combs, wattles and oedema surrounding the eyes. The combs are often cyanotic at the tips and may have plasma or blood vesicles on the surface with dark areas of ecchymotic haemorrhage and necrotic foci. The last eggs laid, after the onset of illness, are frequently without shells. The diarrhea begins as watery bright green and progresses to almost totally white. Oedema of the head, if present is often accompanied by oedema of the neck. The conjunctivae are congested and swollen with occasional haemorrhage. The legs, between the hocks and feet may have areas of diffuse hemorrhage.

Respiratory signs can be a significant feature of the disease depending on the extent of tracheal involvement. Mucus accumulations can vary. It is not unusual in caged layers for the disease to begin in a localized area of the house and severely affect birds in only a few cages before its spreads to neighbouring cages (Beard 1989). Death may occur within 24hours of first signs of disease, frequently within 48 hours, or be delayed as long as a week, some severely affected hens may recover. In broilers, signs of disease are frequently less obvious with severe depression, , in appetence and a marked increase in mortality being the first abnormalities observed. Oedema of the face and neck, and neurologic signs such as torticollis, and ataxia may also be seen. The disease in turkeys is similar to that seen in layers, but it lasts 2 or 3 days longer and is occasionally accompanied by swollen sinuses. Younger birds may exhibit neurologic signs.

Gross Lesions of Highly Pathogenic Avian Influenza (HPAI)

Birds that die with the per acute disease and young birds may not have significant gross lesions other than severe congestion of the musculature and dehydration. In the less acute form, and in mature birds, significant gross lesions are frequently observed. They may consist of subcutaneous oedema of the head and neck area which is evident as the skin is reflected. Fluid may exit the nares and oral cavity as birds is positioned for postmortem examination. The conjunctivae are severely congested occasionally with petechiation. The conjunctivae are severely congested occasionally with petechiation. The trachea may appear relatively normal except that the lumen contains excessive mucous exadate. It may also be severely involved with haemorrhage tracheitis similar to that seen with infectious laryngotracheitis. When the bird is opened, pinpoint petechial haemorrhages are frequently observed on the inside of the kneel as it is bent back very small petechia may cover the abdominal fat, serosal surfaces and peritoneum, which appears as if it were finely splattered with red paint. Kidneys are severely congested and may occasionally be grossly plugged with white urate deposits in the tubular (Esterday and Beard, 1984).

In layers, the ovary may be hemorrhagic or degenerated with darkened areas of necrosis. The peritoneal cavity is frequently filled with yolk from ruptured ova, causing severe airsacculitis and peritonitis in birds that survive for 7 to 10 days. Hemorrhage may be present on the mucosal surface of the proventriculus - particularly at the juncture with the gizzard. The lining of the gizzard peels easily and frequently reveals hemorrhages and crosions underneath. The intestinal mucosa may have hemorrhagic areas - especially in the lymphoid foci such as the caecal tonsils. The gross lesions are not distinctly different from those observed with Velogenic Viscerotropic Newcastle Disease (VVND). The lesions in turkeys and domestic ducks are similar to those in chickens but may not be as marked (Esterday and Beard, 1984).

Morbidity and Mortality of Highly Pathogenic Avian Influenza

The prognosis for flocks infected with HPAI is poor. Morbidity and mortality rates may be near 100 percent within 2 to 12 days after the first signs of illness. Birds that survive are usually in poor condition and resume laying only after a period of several weeks.

Field Diagnosis of Highly Pathogenic Avian Influenza

Highly pathogenic avian influenza is suspected with any flocks where sudden deaths follow severe depression in appetence, and a drastic decline in egg production. The presence of facial oedema, swollen and cyanotic combs and wattles, and petechial hemorrhage on internal membrane surfaces increases the likelihood that the disease is HPAI. However an absolute diagnosis is dependent upon the isolation and identification of the causative virus. Commercially, available type 'A' influenza have recently shown promise as a possible rapid diagnosis test for poultry.

Specimens for Laboratory

Specimen sent to the laboratory should be accompanied by a history of clinical and gross lesions, including any information on recent additions to the flock. Diagnosis depends upon the isolation and identification of the virus from tracheal or cloacal swabs, faeces or internal organs. Specimen should be collected from several birds. It is not unusual for many of the submitted specimens to fail to yield virus. Swabs are the most convenient way to transfer AI virus from tissues or secretions of the suspect bird to brain and heart infusion broth or other cell culture maintenance medium containing high levels of antibiotics. Dry swabs should be inserted deeply to ensure obtaining able epithelial tissue. Trachea, lung, spleen, cloaca and brain should be sampled. If large numbers of dead or live birds are to be sampled cloaca swabs from up to five birds can be pooled in the same tube of broth. An alternative technique is to place 0.5cm3 of each tissue into the broth. Blood for serum should be collected from several birds. If the specimens can be delivered to a laboratory within 24hours, they should be placed on ice. If delivery will take longer, quick freeze the specimens and do not allow them to thaw during transit (Beard, 1989).

Laboratory Diagnosis of Highly Pathogenic Avian Influenza

Nine to Eleven day - old embroyonated chicken eggs are inoculated with swab or tissue specimen. Avian influenza virus will usually kill embryos within 48-72 hours. If the virus isolated is identified as a type 'A' influenza virus through AGP (Agar Gel Precipitation) or ELISA (Enzyme Linked Immunosorbent Assay) tests, it is then tested using a battery of specific antigen to identify its serologic identity (HA and NA type). Sera from infected chickens usually yield positive antibody tests as early as 3 or 4 days after first signs of disease. Other laboratory test for HPAI include; viral culture, reverse transcription polymerase chain reaction rapid antigen testing and immunofluorescence.

Differential Diagnosis of Highly Pathogenic Avian Influenza

Highly pathogenic avian influenza is easily confused with VVND (Velogenic Viscerotropic Newcastle disease), because the disease signs and postmortem lesions are similar, and may also be confused with infectious laryngotrachitis and acute bacterial diseases such as fowl cholera and Escherichia coli. However, in an area where AI is prevalent, such as during an outbreak, sound presumptive diagnoses can be made by flock history, signs and gross lesions.

Treatment of Highly Pathogenic Avian Influenza

Amantadine Hydrochlorine has been licensed for use in humans to treat influenza since 1966. The medication is effective in reducing the severity of influenza Type 'A' in humans. Experimental evidence indicated possible efficaciousness in poultry when the drug was administered in drinking water to reduce disease losses, but drug-resistant viruses quickly emerged, negating the initial beneficial effects. Thus, the drug is not recommended for use in poultry.

Vaccination of Highly Pathogenic Avian Influenza

Inactivated oil - emulsion vaccines, although fairly expensive, have been demonstrated to be effective in reducing mortality, preventing disease, or both, in chickens and turkeys. These vaccines may not, however, prevent infection in some individual birds, which go on to shed virulent virus. More economical viable vaccines prepared using naturally virulent or attenuated strains have the disadvantage of the possible creation of reassortant influenza viruses with unpredictable characteristics. These reasortants could result when a single host bird is simultaneously infected with both the vaccine and another AI virus. Owing to the segmented nature of the influenza virus genome, a ressortment of genetic material can readily occur, creating new influenza viruses. The basic draw back to any vaccine approach for the control of HPAI is the large number of HA subtypes that can cause the disease. Because there is no cross-protection among the 15 known HA subtypes, either a multivalent vaccine will be needed or vaccination postponed until the prevalent disease - causing subtype in the area is identified. A recombinant fowl poxvirus vaccine containing the gene that codes for the production of the H5 antigen has recently been licensed. The use of a recombinant insect virus containing the gene for either the H5 or H7 antigen has been used to make these vaccine proteins in insect cell cultures (Bead and Stone 1979).

Control and Eradication of Highly Pathogenic Avian Influenza

The practice of accepted sanitation and biosecurity procedures in the rearing of poultry is of utmost importance. In areas where waterfowl, shorebirds, or sea birds are prevalent, the rearing of poultry on open range is incompatible with a sound AI prevention programme (Halvorson et al, 1983). Appropriate biosecurity practices should be applied, including the control of human traffic and introduction of birds of unknown disease status into the flock. Cleaning and disinfection procedures are also recommended.

Public Health Importance of Highly Pathogenic Avian Influenza

The AI viruses are Type 'A' influenza viruses and the possibility exists that they could be involved in the development, through genetic reassortment, of new mammalian strains. An influenza virus isolated from harbour seals that died of pneumonia had the HA and NA surface antigens of an influenza virus isolated from turkeys a decade earlier (Halvorson et al, 1983). Human disease historically has been caused by three of HA subtypes (HI, H2 and H3) and two subtypes of NA (N1 and N2). More recently, human disease has been recognized to be caused by additional HA subtypes, including H5, H7 and H9 (Fouchier, 2004). The infection and deaths of six of eighteen humans infected with an H5 avian influenza virus in Hong Kong in 1997 has resulted in a reconsideration of the portentous role that the avian species have on the epidemiology of human influenza. Previously, there was only one report of a human becoming infected with an H7 AI virus.

It is impossible to predict the importance of AI virus in determining the strains of virus that infect humans (http://www.vet.uga.edu/). WHO has officially recognized more than 190 human cases of H5NI influenza: cases have been reported from Vietnam, Thailand, Cambodia, Indonesia, China, Turkey, Iraq, Azerbaijan and Egypt. The case - fatality rate is more than 50%. Low perceived risk and high population exposures to live chickens appeared to be factors that are contributing to the spread of H5NI in Asia (Fielding, 2005). Most recognized human cases have involved direct contact with poultry. Types of exposures that have been identified to date include:

a) plucking and preparing diseased birds
b) Handling fighting cocks
c) Playing with poultry (particularly asymptomatic ducks)
d) Consumption of duck blood and possibly undercooked poultry.

CONCLUSION AND RECOMMENDATIONS

There is general low level awareness of Highly Pathogenic avian influenza among poultry workers in Nigeria. They are not conversant with the signs and symptoms, control and eradication measures of avian influenza. The reason for this is not far fetched. It is because the disease is novel in Nigeria. This therefore makes it important to create awareness of highly pathogenic avian influenza among poultry workers. Based on the aforementioned, the following recommendations have been proffered:

i. Health education of poultry workers and the general public aimed at creating

awareness of signs and symptoms, preventive and control measures of highly pathogenic avian influenza should be intensified by Ministry of Health, Ministry of Agriculture and other health related agencies including Nigerian Veterinary Medical Association.

ii. Government at all levels should intensify efforts in creating awareness on biosecurity against highly pathogenic avian influenza.

iii. The government should be strict and sincere on their policy control on movement of poultry and poultry products into the country and within the country.

iv. Ministry of Agriculture should educate poultry workers and general public on the dangers inherent in plucking and preparing diseased chickens, playing with poultry, particularly asymptomatic ducks and consumption of undercooked poultry.

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