Editorial

AVIAN INFLUENZA – IMMINENT THREAT FOR INFLUENZA PANDEMIC

Avian influenza, or "bird flu", is a contagious disease of animals caused by viruses that normally infect only birds and, less commonly, pigs and other species. Pathogenicity of avian influenza viruses vary greatly and ranges from non-pathogenic to highly pathogenic types. Avian influenza viruses are widely distributed in wild birds like water fowls, geese and ducks which serve as the natural reservoir of the virus.

Influenza infection in human beings is an acute viral disease of the respiratory tract. It is caused by Influenza A or B virus that attacks the upper respiratory tract and rarely, the lungs. The infection spreads via airborne transmission or through direct contact with infected secretions. The patients can transmit the infection 3 to 5 days from clinical onset in adults, and up to 7 days in children.

Influenza A viruses are sero-typed on the basis of two surface glycoproteins: haemagglutinin (H) and neuraminidase (N) antigens. A total of 16 H and 9 N types have been reported so far. Thus a large number of antigenic types of the virus exist. Most of the pathogenic avian influenza viruses isolated belong to H5 or H7 type. Influenza A virus genome consists of 8 single stranded negative-sense RNA segments.

The virus has tremendous ability of antigenic variation by antigenic drift due to point mutations in genes encoding the haemagglutinins or neuraminidase. Rarely, antigenic shift can occur by either re-assortment of viral genes of two different influenza subtypes such as avian influenza virus and human influenza virus when both infect the same host like pigs simultaneously or by direct transmission of avian viruses to humans with subsequent adoption to the new host (adoptive mutation). This process of gene-exchange (re-assortment) could produce new influenza viruses containing many different combinations of genes. The phenomenon of re-assortment is well established for Influenza pandemics of 1916-1918, 1938 and 1958.

Among influenza virus subtypes, H5N1 is of particularly alarming for several reasons. H5N1 mutates rapidly with a recognized propensity to acquire genes from viruses infecting other animal species. It has the ability to cause severe disease in humans and has caused the largest number of cases of severe disease and death in humans [1].

Domestic poultry, including chickens and turkeys, are particularly susceptible to epidemics of rapidly fatal influenza. Direct or indirect contact of domestic flocks with wild migratory waterfowl has been implicated as a frequent cause of epidemics. Live bird markets have also played an important role in the spread of epidemics. Birds that survive infection excrete virus for at least 10 days, orally and in faeces, thus facilitating further spread at live poultry markets and by migratory birds. The quarantining of infected farms and destruction of infected or potentially exposed flocks are standard control measures. The first documented infection of humans with an avian influenza virus occurred in Hong Kong in 1997, when the H5N1 strain caused severe respiratory disease in 18 humans with 6 deaths. Genetic studies reveal that the virus had jumped directly from birds to humans which alarmed public health authorities, as it was the first time that an avian influenza virus was transmitted directly to humans resulting in high mortality [2].

To date a total of 217 cases have been reported with 123 deaths with an overall mortality rate of around 57. However, if this virus adopts the ability of human to human transmission, it may trigger an influenza pandemic which commonly ensues after every three decades [3].

Avian influenza (AI) was never reported from Pakistan during 1963-1993, however in 1994-95 there have been confirmed avian influenza outbreaks with moderate to high Pathogenicity H7N3 Influenza A virus. In

1998-99 two major avian influenza outbreaks from NWFP and Karachi were reported. The virus implicated for these outbreaks was Low Pathogenicity H9N2 Influenza A virus. An outbreak of Highly Pathogenic Avian Influenza (HPAI) H7N3 occurred in commercial layers in October-2003 in Karachi. The disease caused high mortality and loss of production, resulting in huge economic losses [4].

On 27th February 2006, two outbreaks of H5N1 among poultry flocks of from 2 districts of NWFP were reported. Till to date a total of 20 outbreaks in poultry flocks have been reported form Islamabad, NWFP and Punjab. Human infections with H5N1 have not been reported in Pakistan up till now. However, the presence of H5N1 virus in the poultry flocks poses a serious public health threat [5].

Combating avian influenza and Pandemic Influenza would be a difficult task in the absence of a broad and collaborative framework for providing human resources, training and supervision and for strengthening health services and logistics with regard to antiviral, vaccines and laboratory supplies. The federal Ministries of Health and Food Agriculture & Live stock have adopted two pronged strategy to control avian influenza at source in animals by active surveillance and culling of the infected flocks for the short- and medium term and simultaneously prepare for pandemic influenza. A comprehensive pandemic preparedness plan has been developed and is being implemented by the Ministry of Health. Besides this, surveillance for influenza. A virus among poultry and humans has been enhanced by respective ministries in view of the current H5N1 outbreaks in poultry flocks. Other steps taken so far include: imposing ban on the movement of poultry in and across the country from affected countries, development of National Health Education plan of action for the control of Avian and Pandemic Influenza and finalization of communication strategy, development and distribution of toolkit for Hospitals/ Institutions along with management guidelines of human cases. Development of SOPs for rapid response to Avian Influenza and its distribution to the provinces and supply of toolkit and Personal Protective Equipment to affected districts.

Keeping in view the epidemiology, natural history, and management issues of influenza A (H5N1) disease in humans, there is an urgent need for more coordination in areas of clinical health services, epidemiology and lab based surveillance among institutions within the country to limit the infection within the birds.

REFERENCES

1. Beigel JH, Farrar J, Han MA, Hayden GF, Hyer R, De Jon DM et al. Avian Influenza A (H5N1) Infection in Humans. Review Article. **N Engl J Med 2005; 353; 13: 1374-85.**
2. Osterholm TM. Preparing for next Pandemic. **N Engl J Med 2005; 352; 18: 1839-42.**
3. Peiris JS, Yu WC, Leung CW et al. Re-emergence of fatal human influenza A subtype H5N1 disease. **Lancet 2004; 363: 617-9**
4. Avian influenza (bird flu): an introduction. DCD Newsletter 2005;7:1-2
5. Preparing for the anticipated pandemic. **DCE Newsletter 2005; 7: 6.**

Lt Gen (R) Karamat Ahmed Karamat, HI (M)
MBBS, Dip. Bact (London), FRC Path (London)
FCPS (Pak), FRCP (Glasgow), FPAMS
Executive Director, National Institute of Health
Islamabad, Pakistan

Dr Birjees Mazher Kazi
MBBS, DCP, M.Phil (Haematology)
Chief Public Health Laboratories Division
National Institute of Health, Islamabad

Dr Mohammad Salman
MBBS, FCPS (Pak)
Scientific Officer (Microbiology)
Public Health Laboratories Division
National Institute of Health, Islamabad