Equine Influenza : An Overview

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Abstract

Equine influenza virus is a leading cause of respiratory disease in the horses. The disease is the OIE listed disease of equines, ponies, mules and donkeys and spreads very fast. The sporadic outbreaks of the disease have occurred all over the country. Many cases have been reported in Delhi, Meerut, Saharanpur, Jaipur, Hisar, Calcutta, Ahmedabad. Nearly all the horses at Matheran (Hill station) were infected with influenza. The disease has spread like wildfire at the stables of Royal Western India Turf Club (RWITC) at Pune and suspended the Mumbai racing season for prolonged period of time resulting in marked economic losses. After affecting racing in Mumbai, Calcutta and New Delhi, the dreaded equine influenza has spread to Karnataka and Mysore. An outbreak of disease has marred the racing season across the country. The disease was first detected in Jammu & Kashmir before entering the central region Horses at the army polo clubs and Delhi equestrian center were also affected. As per the recent survey conducted by the army across India, it has been found that 5400 horses are infected so far, especially thoroughbred most severely. Nearly, 95 % of horses on a major farm in India are suspected of suffering from equine influenza. The government also banned inter-state movement of horses for three months to contain the disease.
Key words: Influenza, Equine, Respiratory Disease, Outbreak,

Etiology

Equine influenza is caused by a type 'A' orthomyxovirus. The viruses are 80 to 120 nanometer (nm) in diameter and consists of a core of eight separate segments of single-stranded RNA surrounded by a spiked arrangement of glycoproteins. These viruses are classified based on the relative numbers of haemagglutinin (H) and neuraminidase (N) glycoproteins in the lipid outer layer (Annon, 2006).

The two major strains known to cause disease in equines are H7N7 (A/eq/Prague/56); first isolated in (Czechoslovakia) in 1956 and H3N8 (A/eq/Miami/2/63) first isolated in Miami in 1963. The two serotypes are immunologically distinct. Of the two subtypes, all reported outbreaks in the past two decades have been caused by strain of EIV-A/equine-2 (H3N8). In the present outbreak, the strain isolated was A/equi-2 (H3N8) in the National laboratory (NRCE, 2008).

Sub-lineages of the two major strains continuously emerged due to antigenic shift (ressortment of the genome resulting in genetic alteration) and antigenic drift (point mutations in the genetic code) causing minor alterations in the H and N glycoproteins. Antigenic drift contributes to the continuing susceptibility of horse to infection and the reduced efficacy of some vaccines (Radostitis *et al.,* 2000).

Status of Equine Influenza in the world

The disease is wide spread throughout the world. In India, previous outbreak occurred in 1987. Approximately, over 83,000 equines suffered from the disease. In 1987, the disease was noticed in north and center India involving six states and two union territories viz., Haryana, Punjab, Madhya Pradesh, Uttar Pradesh, Himachal Pradesh, Jammu & Kashmir, Chandigarh and Delhi. About 80-100 % horses, donkeys and mules were affected at various places.

Most other parts of the world have seen repeated outbreaks. The disease is constantly present though affecting only a small numbers of animals at any one time in the United States, Canada, Europe, Scandinavia and South America. The most recent equine influenza outbreak in Japan started on Aug 15, 2007. Recently, Australia reported the outbreak of the disease in many part of country in 2007. An outbreak involving a modified H3N8 subtype (A/eq/Jilin/89) occurred in China in 1989 causing sever disease with high mortality (Webster and Yuanji, 1991). Other, important outbreaks of the disease have occurred

worldwide, including in Trinidad (1979), Argentina (1985), South Africa (1986) and Jamaica (1989). Morbidity associated with equine influenza in naive populations is estimated at 60 to 90 % and mortality of horses with confirmed infection has ranged from 1 % to 20 %. Higher fatality rates are observed in foals, malnourished or immunocompromised equids and donkeys.

Transmission of disease

Transmission of equine influenza virus occurs by direct contact, inhalation of aerosols of infected material and fomites, including contaminated inanimate objects and peoples moving between infected and uninfected horses. Aerosol spread occurs over distances of 35 meters and is enhanced by the frequent coughing characteristic of the disease. Equine influenza virus in aerosols survives longer (24-36 hours) than human or porcine strain (Radostitis *et al.,* 2000).

The most common source of infection and outbreak is the introduction of a new animal into the herd. The incubation period is usually 1 to 3 days. Infected horses shed virus in their respiratory secretions during the incubation period and continue to excrete the virus for 4 to 5 days after clinical signs are observed. It is also possible for an infected animal to shed the virus for 7-10 days after the animal has appeared to recover (Annon, 2006).

Risk Factor

Immunocompromised horses are at higher risk of developing disease. All age groups of horses, including new born foals are susceptible. The greatest risk appears to be between the ages of 2 and 6 months (Nyaga *et al.,* 1980). However, most cases of the disease occur in 2 year old or younger horses.

Outbreaks of disease can occurs at any time of year and their timing probably depends on husbandry and management practices, such as yearling sales, transport of horses for racing and sale and movement of show & breeding animals (Wilson, 1993).

After infection, protective immunity to homologous strains of the virus is present and persists for 1 year. Immunity after vaccination last for a much shorter period of time, 3-4 months and is specific for the subtypes and their strains of virus included in the vaccine.

Economic Importance

Equine influenza is not serious in itself but it causes much inconvenience in racing stables because it occurs in explosive outbreaks and affected horses have to break training. Such outbreaks have capacity to close down the racing industry in a country for a period of months (Powell *et al.,* 1995). An additional cost is incurred because of restriction on movement of horses and associated quarantine periods. Recent outbreaks of equine influenza in India, suspended the racing activity for prolonged period of time, resulting in marked economic losses of equine industry.

Pathogenesis of the disease

The disease is principally one of inflammation of the upper respiratory tract. The virus is inhaled, attaches to respiratory epithelial cells with it haemagglutinin spikes, fuses with the cell and is released into the cytoplasm where it replicates. Initial viral infection and replication occurs mainly in the nasopharyngeal mucosa, but by 3-7 days after infection, virus can be recovered from cells throughout the respiratory tract. Infection of the respiratory mucosa results in death of epithelial cells, inflammation, edema and loss of the protective mucocilliary clearance. Proliferation by bacteria may occur because of the disruption of normal clearance mechanisms and may cause the bronchopneumonia (Radiostitis *et al.,* 2000).

Clinical findings

Outbreaks of equine influenza are characterised by a sudden onset and rapid spread of disease. Clinically, the disease characterized by fever (101-106° F), after an incubation period of 2-3 days. The dominant sign is cough, which is dry and hacking in the beginning and moist later and last for 1-3 weeks. During the early stage of the disease there is watery nasal discharge. There is no marked swelling of the sub-maxillary lymph nodes but may be painful on palpation in the early stages of the disease. Abdominal lung sounds characterized by crackles, wheezes and increased intensity of normal breath sounds. There is depression, anorexia and reluctance to move.

Complications are usually associated with secondary bacterial infection that results in a mucopurulant nasal discharge, persistent fever and markedly abnormal lung sounds. Icterus, encephalitic sings, inco-ordination and myoglobulinuria are reported as rare complications (Wilson, 1993). Colic and edema of the legs and scrotum have also been observed with influenza infection. Young foals lacking adequate maternal antibodies are at risk of developing a rapidly fatal viral pneumonia. Death has been reported as caused by secondary bacterial pneumonia and pleuritis. Fatal intestinal myocarditis can occur during or after infection (Annon, 2006).

Clinical Pathology and Diagnosis

There are no characteristic changes on haematologic or serum biochemical examination of horses clinically affected by equine influenza virus infection. Confirmation of the diagnosis of infection is achieved through virus isolation, indirect demonstration of virus in nasopharyngeal swabs or

serology (Chambers *et al.*, 1995). Isolation of virus provides a definitive diagnosis but virus can also be demonstrated in nasopharyngeal swabs by ELISA, immunofluorsence or PCR (Chambers *et al.,* 1995). In present outbreak of equine influenza, the virus isolated and identified was A/equi2 subtype on the basis of haemagglutination inhibition employing standard strain specific serum as per OIE recommendations (Kickingbird, 2008). The disease has also been confirmed through positive titer of antibodies against equine influenza by Haemagglutination inhibition test in serum samples from Jammu, Delhi and Haryana. The nasal swabs should be collected in phosphate buffered saline containing 40 % glycerol or virus transparent medium at 4° C. The paired serum samples (14-21 days apart) should be collected and send to the laboratory (NRCE) for confirmation of equine influenza infection.

Treatment

There is no specific treatment for influenza virus infection of horses and the treatment is largely supportive. Good husbandry and nutrition may assist horses in mounting an effective immune response. Pneumonia is more severely affected horses should be treated with broad spectrum antibiotics, such as sulfonamides (15-30 mg/kg, PO, IM or IV every 12 hours), Ceftiofur (2.2 mg/kg IM, every 12 hours) or Procaine penicilium (20,000 IU per kg IM, every 12 hours) with or without gentamicin (6.6 mg/kg IM every 12 hours) to avoid secondary bacterial infection. Supportive treatment includes rest for 3 -4 weeks and provision of a dust free environment.

Prevention and Control

Quick and timely diagnosis is the best option to control the infection as the disease spreads very rapidly. The NRCE develop guidelines for control of equine influenza infection.

Control measures during on outbreak include detection of infected animals by rapid laboratory test, quarantine, restriction of movement, disinfection of promises and equipments and create public awareness.

A) Detection of infected animals and their quarantine:

1) The major strategy required for effective control of the disease is strict quarantine and controlled movement of equine influenza infected animals within the state as well as outside the state. Interstate movement of the equine should be stopped completely for 6 wks.

2) The newly infected animal can keep shedding the virus till 21 days and OIE recommends 28 days isolation of the infected animals. The infected animals should be kept at minimum distance of 100 meters from healthy animals.

3) Persons attending to the infected animals should not in any way go near to the healthy animals. The utensils, water troughs, feed should also not get mixed between healthy and infected animals.

4) Vaccination strategies for healthy stock can be adopted only in addition to quarantine and movement control to limit the rate of spread.

B) Disinfection of premises/hands/utensils:

The influenza virus is fragile and can be quickly inactivated by exposure to ultraviolet light or sunlight and by heating. Phenyl (1%), Chloroxylenol (Dettol) (1 %), Chlorohexidine (1-2 %), formalin (0.2-0.5 %) when applied for 20-30 minutes are effective in inactivating the virus. The exposed parts such as hands should be washed with soap and warm water. Clothing, equipments surfaces and hands should be cleaned and disinfected after the exposure to horses known or suspected to be infected. Inside surfaces of vehicles used for transportation should be cleaned of and spread with a disinfectant.

C) Public awareness:

Awareness in the horse industry is a must to gain co-operation and build confidence in controlling the disease. All state Animals Husbandry Departments and NGO's working for the welfare of the equines and organized industry should be fully aware about the disease, measures to be taken to control the disease. This will help in close monitoring and surveillance by seeking active help from individual horse owners and organized industry to identify fresh cases and act suitably and promptly.

Vaccination

Vaccination against equine influenza is common in countries where the disease occurs. The vaccination may be effective in limiting the severity of clinical illness and morbidity during an outbreak (Powell *et al.,* 1995). Vaccine efficacy is limited by the short duration of immunity induced by vaccination and the poor immunity induced by vaccines to challenge by heterogenous virus. Vaccination of clinically normal horses in the face of an outbreak may enhance the immunity of at risk horses and is probably safe (Radostitis *et al.,* 2000).

The recommended vaccination schedule is as follows-

1) Vaccination of foals at 6 months of age.
2) Two vaccinations initially at 21st days apart and not more than 92 days apart.
3) A booster vaccination 5-7 months later then,
4) Annual booster.

Thus, the disease can be control by adopting recommended control measures such as detection of infected animals, quarantine restriction of movement, disinfection of premises and equipments, vaccination and create public awareness during the outbreak.

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