EQUINE ZOONOTIC DISEASES: A REVIEW

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Zoonotic diseases are those diseases that are transferred from animals to humans. Several equine zoonotic diseases affected humans from mild to severe such as vesicular stomatitis, brucellosis, methicillin-resistant staphylococcus aureus, equine Hendra virus, dermatophytosis, leptospirosis, anthrax, giardiasis, rabies, arboviral encephalitis, acute diarrhea, salmonellosis, clostridium difficile, and cryptosporidiosis. These serious diseases did not eliminate due to many reasons. Personal hygiene, protective clothing, recognition of zoonotic agents and identification of potential fomites can reduce zoonotic diseases or prevent the transfer of zoonotic diseases.

Keywords: Zoonotic diseases, infection, nosocomial pathogens, prevention.

INTRODUCTION

Zoonotic diseases are animal diseases that are transferred from animals to humans. Some zoonotic diseases are direct zoonotic diseases that transmit through contact or inanimate vehicle and require one reservoir vertebrate for maintaining the cycle of infection. Zoonotic diseases are variable regarding their seriousness of disease and transmissibility. Some zoonotic diseases are so contagious and lethal use as biological warfare agents such as anthrax and Burkholderia mallei while some causes mild disease. Almost 1407 pathogens infect human beings, out of these 816 are of animal origin (Mark and Sonya, 2005). Expanding international trade, faster and increase moments of animals to new locations, environment changes and many other factors increase the spread of pathogens (Bender and Tsukayama, 2004). The spread of equine diseases to other territories increases due to increase movement of equine for sports, breeding, trade and other purposes (Kumar et al., 2018). This paper discusses some zoonotic equine diseases that may encounter by equine veterinarians.

Vesicular stomatitis: Vesicular stomatitis is a viral disease that occurs in epizootic and enzootic forms in subtropical and tropical areas. It has a significant effect on the financial industry of equine but it causes less threat to equine lives. It belongs to the family Rhabdoviridae and genus vesiculovirus. Vesicular stomatitis virus has two types, VSV–Indiana (IND) and VSV–New Jersey (NJ). These two serotypes generated the neutralizing antibodies are not cross-reactive. There are three subtypes of IND serotype, IND-1 (classical IND), IND-2 (cocal virus) and IND-3 (alagoas virus). This disease has been reported in 1886 and 1897 in South Africa and in 1915 and 1917 in France. The virus is endemic in Central America, Peru, Southern Mexico, Venezuela, Ecuador, Colombia and South America.

Vesicular stomatitis virus transmission occurs through the transmucosal and transcutaneous routes. It can be transmitted through blood-feeding insects and through direct contact with infected animals. Lutzomyia sp. (sandfly) is a proven biological vector in endemic areas while in United States of America, Black fly (Simuliiidae) is a biological vector. All ages of horses are susceptible to vesicular stomatitis virus but in all susceptible horses, lesions do not appear. Vesicular stomatitis virus is the only viral vesicular disease of livestock that infects horses (Kumar et al., 2018). It develops blister-like lesions on the mouth lining, lips, nose and tongue (Cargnelutti et al., 2014). Lesions also develop on the sheath or the coronary bands or udder of horses. Animals may become lethargic, anorectic and have pyrexia. Frothing from the mouth is one of the most obvious clinical signs. Painful ulcers create in the mouth by rupturing the blisters and the tongue surface may slough (American, 2016). In severe cases, the hoof may slough due to lesions on the coronary band. Within two weeks, animals usually recover. There is no specific treatment for vesicular stomatitis. It causes flu-like symptoms characterized by headache, chills, vomiting, nausea, fever, retrobulbar pain, myalgia, lymphadenitis, sub-ternal pain, malaise, pharyngitis, and conjunctivitis in humans. Vesicular lesions may be present on the tongue, buccal mucosa and pharynx. Encephalitis is infrequent, however, may occur in an infant (Kumar et al., 2018).

Brucellosis: Brucellosis is a very important bacterial disease caused by Brucella abortus. Brucella is a gram-negative
coccobacillus bacterium. Horses are relatively resistant to brucellosis but if the disease occurs then it can transmit from horses to humans. Brucella is difficult to isolate. It is diagnosed based on seropositivity. It mainly affects slaughterhouse workers, veterinarians, and butchers. It transmits through direct contact with infected animals or materials with skin abrasion (Gaughan et al., 1988, Cohen et al., 1992).

Human brucellosis can vary from acute to undulant form. Neurological abnormalities may occur in humans. Zoonotic transmission of brucella from horses to humans has fewer chances; however, preventive measures should be taken. Prevention of brucellosis is possible by the reduction of human and animal contact, prompt recognition of potential cases, taking care of important precautions (gown, surgical mask, gloves and protective eyewear) and careful handling of laboratory materials (Elfaki et al., 2005).

**Methicillin resistant staphylococcus aureus (MRSA):** MRSA is a nosocomial pathogen in human hospitals due to antibiotic resistance (Goetz et al., 1999). MRSA infection in horses and their transmission from humans to animals has been also reported (Hartmann et al., 1997, Seguin et al., 1999). Personnel at referral hospitals are at higher risk of exposure to MRSA. Judicious antimicrobial use and personal hygiene by equine veterinarians can control MRSA transmission from horses to animals (Weese, 2002).

**Equine Hendra-virus (morbillivirus):** This virus was reported in Queensland (Murray et al., 1995). The per-acute respiratory disease developed in affected horses. Copious frothy yellow nasal discharge is a common terminal feature. Fruit bats act as a reservoir of this virus. The incubation period of this virus is 8-10 days in horses (maximum 16 days). This disease differently diagnoses with acute circulatory catastrophes, shipping fever, acute bacterial infections, poisoning and intoxications such as anthrax (Control, 2000).

In humans, predominant signs of this disease are like influenza (Williamson et al., 1998). The transmission of this virus is required close contact with affected horses. Clinically, this disease has not been reported outside of Australia. Veterinarians must use gloves and protective glasses during an examination of recently imported horses from Australia within 16 days (Control, 2000).

**Dermatophytosis (ringworm):** Dermatophytosis (ringworm) is a fungal disease caused by Trichophyton species or Microsporum. Trichophyton equinum is most involved in horses. In horses, dermatophytosis varies from mild or sub-clinical to severe lesions mimicking pemphigus foliaceus (Stammard and White, 2002). Dermatophytosis is transferred to humans from horses through direct and indirect routes (Huoivinen et al., 1998). We can prevent transmission of ringworm by personal hygiene, environmental disinfection, recognition and quarantine of infected animals. 10% bleach solution or stabilized carbon dioxide disinfectant should be used for contaminated instruments or areas. Gowns and gloves should be used for the examination of infected animals (Weese, 2002).

**Leptospirosis:** It is a bacterial disease caused by serovars of leptospira interrogans. It is the widest spread zoonotic disease in the world (Levett et al., 2006). The most common sign of leptospirosis in horses is uveitis; however, stillbirth and abortion are also a serious problem in horses affected by leptospirosis (Khosheh et al., 2012). Renal dysfunction in a male horse (stallion) and neonatal mortality have been also reported. Serological evaluation, PCR, culture, histological examination and dark field microscope is used for the detection of Leptospira. Leptospirosis transfers between animals and humans through body fluid, infected urine and contaminated soil or water (Levett et al., 2006).

Leptospirosis in humans varies from asymptomatic infection to sepsis and death. Nausea, vomiting, myalgia and headache are commonly reported in humans; however, a cardiac, gastrointestinal, ocular, neurological and respiratory infestation can also occur (Levett et al., 2006). Transmission can be eliminated by waterproof barrier clothing, identification of infected animals and reducing contact with infected animals (Weese, 2002).

**Anthrax:** Anthrax is an acute infectious disease caused by Bacillus anthracis (B. anthracis). B. anthracis is a spore-forming bacterium. Affected horses with B. anthracis show signs like subcutaneous edema, dyspnea, pyrexia, colic and die suddenly. Warm and dry condition is favorable for growth of B. anthracis. Clinical forms of anthrax in humans including cutaneous, gastrointestinal and pulmonary (inhalational) forms. Cutaneous form is the most usual form in humans (Freedman et al., 2002).

Transmission occurs from horses to humans through spores via ingestion, inhalation or contact with abrasions. Transmission of spores can be eliminated by wearing impermeable gloves, protective clothing, over boots and minimizing the contact with suspected horses. The carcass of a dead animals infected with anthrax should be buried to stop transmission of B. anthracis spores. 5-10% bleach should be used for infected instruments (Wright et al., 2005).

**Giardiasis:** It is the most common intestinal parasite of humans. In foals, 71% infection rate has been reported (Xiao et al., 1994). Diarrhea is the most common sign of giardiasis in horses. Zoonotic transmission of Giardia occurs through the fecal-oral route. Personal hygiene of humans prevents transmission of Giardia. Glutaraldehyde or bleach is used as a disinfectant (Weese, 2002).

**Rabies:** It is a highly fatal neurological disease caused by a lyssavirus. Rabies is the best-known zoonotic disease. Veterinarians have fewer chances of the transmission of rabies from horses as compared to ruminants and small animals. Paralytic and dumb forms of rabies are more prominent; however, a furious form is not as common as in other species like dogs and cats. Rabies can be differentiated from acute encephalitis or undifferentiated neurological
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disease. For prevention, serological evaluation of antibodies titer of rabies vaccine should be performed every two years to ensure the protection from rabies (Singh et al., 2017).

Arboviral Encephalitis: Many mosquitoes born arboviruses are known to cause encephalitis in horses, including West Nile virus (WNV), Venezuelan equine encephalitis virus (VEEV), western equine encephalitis virus and eastern equine encephalitis virus (Weaver et al., 1999). Clinical signs of arboviral encephalitis vary from inapparent to per-acute, severe encephalomyelitis with sudden death. These viruses are transmitted indirectly through mosquitoes. Limited evidence presents that this virus is transmitted through the handling of the affected animal carcass during spinal cord sampling. Three pairs of gloves should be worn on hands, an inner pair of disposable gloves, a middle pair of waterproof gloves and an outer pair of Kevlar or metal gloves. Goggles should be used and a disposable “half-mask” high-efficiency particle arresting (HEPA) respirator should be used. This virus is killed with aldehydes, bleach, moist and dry heat, ethanol and drying (Weese, 2002).

Acute Diarrhea: Diarrhea is described as the increased water content in the feces distinguish from homeostasis. In horses, several pathogens cause diarrhea. An etiological agent of diarrhea is typically identified in very few cases of horses. Idiopathic is unknown causes of disease, it may be infectious or zoonotic (Oliver and Stampfl, 2006).

Salmonellosis: It is a common enteric disease caused by Salmonella enterica subspecies enterica. This is a gram-negative bacterium (Weese et al., 2001a). Typical sign of salmonellosis in horses is acute toxic enterocolitis; however, chronic diarrhea, septicemia and fever of unknown origin may occur. Fetal culture can be used for the diagnosis of salmonellosis in humans. Transmission of salmonellosis occurs through the fecal-oral route. Personal hygiene can decrease the transmission of disease from equines to humans. Salmonella is sensitive to aldehyde, phenol, iodine and bleach (Fone et al., 1994).

Clostridium difficile: It is an anaerobic bacteria that cause colitis in horses and humans. Equine Clostridium difficile-associated diarrhea ranged from mild self-limiting to per-acute and rapidly fatal. It is diagnosed based on the identification of bacterial toxins in fecal material. Personal hygiene can prevent the transmission of C. difficile from horses to humans. 5-10% bleach solution used as a disinfectant against C. difficile (Weese et al., 2001b).

Cryptosporidiosis: It is a protozoal pathogen caused enteric disease in equines and humans. Cryptosporidium Parvum most commonly affects foals and immunodeficient horses (Netherwood et al., 1996). The most common sign of cryptosporidiosis in humans is profuse watery diarrhea; however, self-limiting prolonged fatal disease can occur in immunocompromised people. Cryptosporidium is non-sensitive to many disinfectants but can kill at extreme temperatures; less than 20°C or greater than 60°C (Majewska et al., 1999).

Conclusion: This paper did not explain all possible zoonotic diseases that are encountered by equine veterinarians in the field. Some diseases encounter immunocompromised individuals that are not zoonotic in a normal situation. Early identification of zoonotic diseases, use of barrier precautions, personal hygiene and body fluids can reduce the transmission of zoonotic diseases. Veterinarians can play an important role in the detection of potential zoonotic diseases due to their close contact with both owners and animals. There is also increasing concern about the use of zoonotic pathogens as an agent of bioterrorism. Veterinarians should focus on the early recognition and detection of bioterrorism-associated outbreaks of zoonotic diseases.

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