UNIVERSITI PUTRA MALAYSIA

EQUINE HERPESVIRUS TYPE 4 INFECTION: SEROEPIDEMIOLOGY, PATHOGENESIS AND THE EFFECT ON RACING PERFORMANCE

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By

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Faculty: **Veterinary Medicine**

Equine rhinopneumonitis is an equine respiratory disease caused by equine herpesvirus type 4 (EHV-4). This study provides the first information on the disease status in Malaysia. Serological survey conducted on 1,023 blood samples, representing 23% of equid population in Malaysia (including Sabah and Sarawak) reveals a moderate seroprevalence rate of 60%. However, the prevalence ranges between 0 and 100%. The state that has 0% prevalence maintained the ponies as a closed herd in contrast the states that have 100% prevalence, which are active in importing equids.

Sero-prevalence to EHV-4 varies significantly between states, districts, stables, horse and pony types and age but not affected by upgrading of pony blood through cross breeding. Based on the equid types, thoroughbred racehorse has the highest prevalence of 100%, followed by the warm-blooded horse at 46.8% while pony and pony crosses has the lowest prevalence of 36.9%.

Intranasal infection of EHV-4 on serologically negative local yearling ponies results in a disease characterised by clinical signs of nasal discharge and fever. The fever is not typical of the hyperthermia caused by viral infection since the biphasic temperature increment is absent. Transient leukopaenia is absent while the arterial oxygen and carbon dioxide partial pressures are not altered. All the changes reflect the mild nature of the EHV-4 infection.

The histological and ultra-structural examinations of the mucosa of the respiratory tract indicated a substantial damage of the upper respiratory tract and tracheal mucosa. Multifocal erosion and extensive accumulation of serous, mucus and dead cells on epithelial surface have been observed. Changes in the nucleus include swelling, nucler lysis, nuclear membrane disintegration and dilation of

perinuclei membrane. In the cytoplasm, the changes observed include vacuolar degeneration, mitochondria swelling with disintegrated cristaea and accumulation of fluid in cytocavity.

Following intra-nasal inoculation, the infectious virus is rapidly transported to the upper respiratory tract and primary bronchiole. By day 7 post-infection, expression of antigen in sub-mandibular lymph node is markedly reduced as compared to day 3, suggesting a quick elimination of EHV-4 antigen.

Successful detection of EHV-4 antigen from the nasal swab samples using nested PCR at 24-48 hours post-race provides evidence that racing could reactivate latent infection and increase the risk of pony contracting the disease. The EHV-4 infection is found to have a negative effect on racing performance. Racehorses that are sero-negative had higher chances of improving or maintaining finishing position. The effect is more prominent in pony where sero-positive pony is less likely to win the race.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai keperluan untuk Ijazah Doktor Falsafah

JANGKITAN HERPESVIRUS EKUIN JENIS 4: SEROEPIDEMIOLOGI, PATOGENESIS DAN KESAN KE ATAS PRESTASI BERLUMBA

Oleh

KAMARUDIN MD ISA

Julai 2002

Pengerusi: Prof. Dr. Mohd Zamri Saad

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Rhinopneumonitis ekuin adalah penyakit sistem pernafasan kuda yang disebabkan oleh herpesvirus ekuin jenis 4 (EHV-4). Kajian ini memaparkan maklumat, buat kali pertamanya, mengenai status penyakit ini di Malaysia. Bancian ke atas 1,023 sampel darah yang mewakili 23% populasi ekuid di Malaysia (termasuk Sabah dan Serawak) mendapati seroprevalen yang sederhana pada tahap 60%. Namun begitu, julat seroprevalen adalah luas, daripada 0% hingga

100%. Negeri yang menunjukkan seroprevalen terendah (0%) mempraktikkan pengurusan tertutup sedangkan negeri yang tinggi prevalen (100%) aktif mengimport ekuid.

Seroprevalen adalah berbeze di antara negeri, daerah, kandang, jenis kuda dan usia tetapi tidak dipengaruhi oleh kacukan kuda padi. Berdasarkan jenis kuda, kuda lumba baka thoroughbred mempunyai kadar tertinggi, iaitu 100%, diikuti kuda darah panas lain (46.8%) manakala kuda padi mempunyai kadar terendah (36.9%).

Jangkitan EHV-4 melalui hidung dikalangan kuda padi berumur setahun yang negatif sera menyebabkan penyakit dengan tanda-tanda demam dan berhingus. Akan tetapi demam tidak seperti jangkitan biasa oleh virus di mana peningkatan suhu badan dua kali tidak berlaku. Sel darah putih pula tidak berkurangan dan tekanan separa oksigen dan karbon dioksida darah tidak terjejas. Ini menunjukan yang jangkitan disebabkan EHV-4 adalah sederhana.

Walau bagaimanapun, pemeriksaan histologi dan microskop elektron mendapati lesi pada mukosa salur pernafasan atas agak buruk. Hakisan terjadi di banyak tempat sementara pemendapan

lendiran serta sel mati dipermukaan salur pernafasan hingga ke trakea turut berlaku. Begitu juga perubahan pada nukleus dan sitoplasma sel terjangkit menunjukan yang sel mengalami degenerasi dan kematian.

Sebaik sahaja virus masuk ke dalam hidung, ia merebak dalam saluran pernafasan atas dan turun sehingga bronki utama. Menjelang hari ketujuh, antigen kelihatan berkurangan di dalam nodus limfa sub-mandibular yang meggambarkan pemusnahan virus yang cepat.

Penyertaan lumba dikenal pasti sebagai faktor yang mengaktifkan jangkitan pendam dan mendedah kuda kepada jangkitan baru. Ini dibuktikan dengan terkesannya antigen EHV-4 dari sampel calitan hidung menggunakan teknik nested PCR. Jangkitan EHV-4 memberi kesan negatif kepada prestasi berlumba. Kuda seronegatif berpeluang tinggi untuk mengekal atau meningkatkan prestasi berbanding kuda seropositif. Kesan jangkitan ke atas kuda padi adalah lebih ketara di mana kuda padi seropositif berkemungkinan rendah untuk menang perlumbaan.

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