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Characterization of H5N1 influenza A virus that caused the first highly pathogenic avian influenza outbreak in Saudi Arabia

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Saudi Arabia has experienced a highly pathogenic avian influenza (HPAI) H5N1 outbreak in domesticated birds in 2007. From this outbreak, we sequenced forty-three HA and forty-one NA genes of HPAI-H5N1 viruses and performed phylogenetic analyses to compare these sequences with those of other viruses available in the public databases. Molecular characterization of the H5N1 viruses revealed two genetically distinct clades, 2.2.2 and 2.3.1. Amino acid sequence analysis of HA gene indicated that virus from 2.2.2 contained the sequence SPQGERRRK-R/G at the cleavage site while from 2.3.1 contained the sequence SPQRERRRK-R/G. Additionally, we identified a few mutations with amino acid substitutions such as M226I mutation at N-link glycosylation site in two of the isolates which could affect receptor specificity as well as viral pathogenicity. Amino acid sequence of NA gene showed a 20-amino-acid deletion (positions 49-68) in the NA stalk region required for enhanced virulence of influenza viruses and its adaptation from wild birds to domestic chickens. Relaxed clock and Bayesian Skyline Plot analysis based on HA and NA genes of our isolates and closely related global representatives indicated lower substitution rates (2.036×10^{-3} and 2.072×10^{-3} substitutions/nucleotide/year) when compared with earlier reports (4.23×10^{-3} and 4.27×10^{-3} substitutions/nucleotide/year). As close contact between humans and birds is unavoidable, there is a need of a thorough understanding of the epidemiology, factors affecting the spread of the virus and of the viral molecular characteristics of H5N1 viruses circulating in the region.

Biography

Mohammed N Al-Ahdal (a Bio-Pharmacist) has completed his PhD in Microbiology and Immunology from the State University of New York at Buffalo in 1985. He is now the Chairman of the Department of Infection and Immunity at King Faisal Specialist Hospital and Research Center in Riyadh, Saudi Arabia, where he is also a Principal Scientist. He is a Professor of Microbiology and Immunology at the College of Medicine of Alfaisal University in Riyadh, Saudi Arabia and an Adjunct Professor at Sassari University in Italy and at Brunel University in the UK. He has published more than 105 papers in reputed journals and is serving as an Editorial Board Member of some scientific journals.

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