

RESEARCH ARTICLE

# Risk Factors for Enterovirus A71 Seropositivity in Rural Indigenous Populations in West Malaysia

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## Abstract

Enterovirus A71 (EV-A71), which is transmitted by the fecal-oral route, causes hand, foot and mouth disease and, rarely, severe neurological complications. In Malaysia, the indigenous rural community (Orang Asli) has a high prevalence of parasitic diseases due to poor sanitation, water supply and hygiene practices. This cross-sectional study compared the seroepidemiology of EV-A71 among rural Orang Asli and urban Kuala Lumpur populations in West Malaysia, and determined the risk factors associated with EV-A71 seropositivity in rural Orang Asli. Seropositive rates were determined by neutralization assay. EV-A71 seropositivity was strongly associated with increasing age in both populations. Rural Orang Asli children  $\leq 12$  years had significantly higher EV-A71 seropositivity rates than urban Kuala Lumpur children (95.5% vs 57.6%,  $P < 0.001$ ), and also higher rates in the age groups of 1–3, 4–6 and 7–12 years. Multivariate analysis confirmed that age  $\leq 12$  years (adjusted OR 8.1, 95% CI 3.2–20.7,  $P < 0.001$ ) and using untreated water (adjusted OR 6.2, 95% CI 2.3–16.6,  $P < 0.001$ ) were independently associated with EV-A71 seropositivity in the Orang Asli population. Supply of clean drinking water may reduce the risk of EV-A71 infection. With significantly higher EV-A71 seropositive rates, younger rural children should be a priority target for future vaccination programs in Malaysia.

## Introduction

Hand, foot and mouth disease (HFMD) is a self-limiting disease which mainly affects children. It is characterized by vesicles on the hands and feet, and ulcers in the mouth. Enterovirus A71 (EV-A71) is one of the major causes of HFMD together with coxsackievirus A16 (CVA-16) and coxsackievirus A6 (CVA-6) [1]. EV-A71 is a positive-sense RNA virus belonging to the genus *Enterovirus* of the family *Picornaviridae*. It is mainly transmitted by the fecal-oral route, and also through direct contact with saliva, vesicle fluid, or respiratory droplets, and humans are the only known natural host [2]. Apart from outbreaks of HFMD and herpangina, EV-A71 is occasionally associated with severe complications including aseptic meningitis, encephalitis and pulmonary edema [3].