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ACUTE VIRAL ENCEPHALITIS IN CHILDREN RISK FACTORS - SYSTEMATIC LITERATURE REVIEW

Bayan Abdu Alzubaidi[1]*, Fatimah Abdullah Aljaser[2], Asma'a Hassan Almalki[2], Nora Abdullah Al Khalid [3], Maria Ahmed Bakry [4], Nojoud Mohammad Hli [4], Ghaida Khaled AlRashed [5], Ahmed Alsayed Farahat [6,] Najwa Hediban Alamri[7], Eman Aied Alosaimi [8]

[1] Ibn Sina National Collage, Jeddah, Saudi Arabia,
[2] King Khalid University, Abha, Saudi Arabia,
[3] Tabuk University, Tabuk, Saudi Arabia,
[4] King Abdulaziz University, Jeddah, Saudi Arabia,
[5] King Faisal University, Al-Hasa, Saudi Arabia,
[6] Arabian Gulf University, Manama, Bahrain,
[7] King Abdullah Medical Complex, Jeddah, Saudi Arabia
[8] Umm Al-Qura University, Makkah, Saudi Arabia

Abstract :
This review is aiming to discuss the acute viral encephalitis in children risk factors, the presented review was conducted by searching in Medline, Embase, Web of Science, Science Direct, BMJ journal and Google Scholar for, researches, review articles and reports, published over the past years. were searched up to November 2018 for published and unpublished studies and without language restrictions, if several studies had similar findings, we randomly selected one or two to avoid repetitive results. On the basis of findings and results this review found Homeless, Mosquitoes, litchi plantations older age, playing outdoors after dinner, pig ownership by the family or next-door neighbours, age and Glasgow Coma Scale on admission.

Keywords: *Acute, Viral Encephalitis, Risk Factors.*

Corresponding author:
Dr. Bayan Abdu Alzubaidi,
Ibn Sina National Collage, Jeddah, Saudi Arabia.

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INTRODUCTION:

Since St. Louis encephalitis virus was first recognized in Houston in 1964, the area has remained endemic with flavivirus activity. [1] In 2002, a West Nile virus (WNV) outbreak was identified in Houston with 105 human cases reported to the Centers for Disease Control and Prevention (CDC). Nationally, 4156 WNV-positive cases were reported. [2]

The vast majority of human cases of WNV infection are asymptomatic. [3] Milder infections can exhibit flu-like symptoms, which can go undiagnosed as WNV infection. Approximately one out of 140 infected persons will develop neuroinvasive disease, including meningitis and encephalitis. [4]

Acute encephalitis is associated with high morbidity and mortality and affects both children and adults. There have been few population-based studies, reporting incidences ranging between 3.5 and 7.4 cases per 100.000 patient-years. [5] Viruses are regarded as the most important etiological agents of encephalitis worldwide. However, in the majority of cases a specific infectious etiology cannot be found. Furthermore, the specific causes of the illness show considerable geographic and age dependent variation. In a population-based study in the United Kingdom, herpes simplex virus (HSV) was the most common virus diagnosed, and the proportion of cases with an identified etiology was significantly lower in children (33%) than in adults (45%). [6] In the California Encephalitis Project, a confirmed or probable infectious etiology was found in only 16% of cases, with HSV-1 most commonly found in adult patients and enteroviruses in children. [7]

In Southeast Asian countries like Cambodia and Vietnam, Japanese encephalitis virus (JEV) has been the leading reported cause of acute encephalitis in children, accounting for 31% to 45% of cases. [8,9]

Acute encephalitis syndrome (AES) is a major public health problem in Asia. The main etiologic agent is the Japanese encephalitis virus (JEV), a positive-sense single-stranded flavivirus transmitted by *Culex* spp. mosquitoes. It is responsible for ≈50,000 encephalitis cases every year in the region .[10]Recently, the Nipah and Chandipura viruses were identified as responsible for acute encephalitis outbreaks in Malaysia and India. [11,12] In addition, many other viral encephalitis cases of unknown etiology exist throughout Asia. [13]

The local population and public health practitioners have anecdotally attributed the emergence of AES to the recent intensification of litchi production in the province: production rose from 870 tons during 1985–1989 to 400,000 tons during 2000–2005. Bac Giang Province has the highest litchi production in Vietnam, three fourths of which is consumed domestically, and the rest is exported mainly to People's Republic of China. [14,15] Vietnamese litchis are mostly of the Thieu variety, which has a short harvest period of ≈1 month during May–July. [16]

Japanese encephalitis (JE), a viral disease with a high case-fatality rate (5–20%) and an appreciable fraction of neurological sequelae in survivors (30–50%), is endemic in virtually all countries of Asia. [17] JE is transmitted from animals to humans through mosquito bites. Culex tritaeniorhynchus, the major mosquito vector, breeds by laying eggs in rice fields and the pig is considered the most common amplifying host of Japanese encephalitis virus (JEV). [18]

METHODS:

The present review was conducted November 2018 in accordance with the preferred reporting items for systematic reviews and meta-analyses (PRISMA) declaration standards for systematic reviews. We reviewed all the topics on acute viral encephalitis in children. risk factors such as Homeless, Mosquitoes, litchi plantations older age, playing outdoors after dinner, pig ownership by the family or next-door neighbours, age and Glasgow Coma Scale on admission.

To achieve this goal, we searched Medline, Embase, Web of Science, Science Direct, and Google Scholar for, researches, review articles and reports, published over the past 15 years.

Our search was completed without language restrictions. Then we extracted data on study year, study design, and key outcome on diabetes. The selected studies were summarized, and unreproducible studies were excluded. Selected data is shown in the Table 1.

Inclusion criteria

Inclusion criteria were viral encephalitis: Children, acute

Exclusion criteria

Inclusion criteria were viral encephalitis: elderly, chronic.

Data extraction and analysis

Information relating to each of the systematic review question elements was extracted from the studies and collated in qualitative tables. Direct analysis of the

studies of acute viral encephalitis in children. risk factors.

RESULTS:

113 had encephalitis, including 17 deaths, 47 had meningitis, and 12 were fever cases; 67% were male. Homeless patients were more likely to be hospitalized from WNV compared to the general population. A multiple logistic regression model identified age [odds ratio (OR) 1.1, P<0.001], history of hypertension, including those cases taking hypertension-inducing drugs (OR 2.9, P=0.012), and history of cardiovascular disease (OR 3.5, P=0.061) as independent risk factors for developing encephalitis from WNV infection. After adjusting for age, race/ethnicity (being black) (OR 12.0, P<0.001), chronic renal disease (OR 10.6, P<0.001), hepatitis C virus (OR 23.1, P=0.0013), and immunosuppression (OR 3.9, P=0.033) were identified as risk factors for death from WNV infection. [19]

Risk factors for acquiring WNV infection. Asymptomatically infected persons and uninfected persons were similar with respect to age (medians,37and46years, respectively),sex(34% males in both groups), level of education, type of occupation, length of residence in Bucharest, and location of residence within the city (all). Compared with uninfected persons, P 1 .20 infected persons were more likely to report mosquitoes in the home , to report more mosquito bites per day during P ! .01 the epidemic (medians, 4 vs. 3 bites per day [interquartile ranges: 3–9 vs. 1–4 bites per day], among infected and uninfected persons, respectively, Wilcoxon two-sample test, P !), and, among apartment dwellers, were more likely to have.01 had a flooded basement (; table 1). The association of P 5 .01 infection with mosquitoes in the home remained after controlling for age, residence in the rural agricultural sector of the city, flooding of the basement, number of daily mosquito bites, and amount of time spent outdoors and was consistentlyfound in nearly all subgroups examined. The associations of infection with mosquito bites and flooded basements remained after controlling for age, residence in the agricultural sector, and other variables but were not consistently present in all subgroups examined. No association was found between infection and housing type, age of home, amount of time spent outdoors, exposure to domestic fowl, or the presence of rainwater collection containers around the home. [20]

A retrospective ecologic analysis of data for 2004–2009 involving environmental, agronomic, and climatic factors was conducted to investigate the suspected association between the outbreaks and litchi harvesting. The clinical, biological, and immunologic characteristics of the patients suggested a viral etiology. The ecologic study revealed an independent association between litchi plantation surface proportion and acute encephalitis incidence: Incidence rate ratios were 1.52 (95% CI 0.90–2.57), 2.94 (95% CI 1.88–4.60), and 2.76 (95% CI 1.76–4.32) for second, third, and fourth quartiles, respectively, compared with the lowest quartile. [21]

During 1 July 2001 to 30 June 2004, 264 clinically suspected patients were enrolled in the hospital-based surveillance. Of these, 94 patients were diagnosed as ‘confirmed JE’, seven patients as ‘probable JE’, and 163 as ‘non-JE acute encephalitis.’ All 94 JE cases and 163 controls were included in the analyses. Most of the cases occurred in children aged <10 years. The boy:girl ratio was 1.7:1 in our study. Unlike in other temperate JE-endemic countries, transmission of disease in Bali appeared to be year round. [22]

Children less than 16 years of age presenting with acute encephalitis of presumed viral etiology were enrolled. Diagnostic efforts included viral culture, serology and real time (RT)-PCRs. A confirmed or probable viral causative agent was established in 41% of 194 enrolled patients. The most commonly diagnosed causative agent was Japanese encephalitis virus (n=50, 26%), followed by enteroviruses (n=18, 9.3%), dengue virus (n=9, 4.6%), herpes simplex virus (n=1), cytomegalovirus (n=1) and influenza A virus (n=1). Fifty-seven (29%) children died acutely. Fatal outcome was independently associated with patient age and Glasgow Coma Scale (GCS) on admission. [23]

Table (1) Results from Sequencing Studies.

Author and year	Sample	Risk factors	Key point
K.MURRAY 2006.[19]	172 confirmed WNV cases hospitalized in Houston between 2002 and 2004	Homeless	Homeless patients were more likely to be hospitalized from WNV compared to the general population.
Linda L 1999.[20]	Serum samples were collected from 959 persons	Mosquitoes	Disease prevention efforts should focus on eliminating peridomestic mosquito breeding sites and reducing peridomestic mosquito exposure.
Juliette P 2012.[21]	88 AME patients hospitalized during 2006–2009	litchi plantations	This ecologic study confirmed the suspected association between incidence of acute encephalitis and litchi plantations and should be followed by other studies to identify the causative agent for this syndrome.
W. LIU 2010.[22]	All 94 serologically confirmed JE cases (cases) and 163 cases of encephalitis or aseptic meningitis without JE (controls) identified in Bali during 2001–2004 were included in the study	older age, playing outdoors after dinner, pig ownership by the family or next-door neighbours	Multivariate analysis identified proximity to rice fields (, pig ownership and older age as being independently associated with the risk of JE. Because rice cultivation and pig rearing are essential to the economy of Bali, JE immunization is the best intervention for prevention of JE in Bali
Le va T2010.[23]	194 enrolled patients	age and Glasgow Coma Scale on admission	The recognition of GCS and age as predictive factors may be helpful for clinicians in managing the patient.

DISCUSSION:

The outbreak of WNV in the late summer of 1999 in New York City represented the first known occurrence of WNV in the Western Hemisphere [5, 13]. In 2002, WNV was first detected in the Houston metropolitan area [1]. Based on previous seroprevalence estimates that one out of 140 WNV-infected persons will develop meningoencephalitis [4] we can roughly estimate that at least 22000 Houstonians became infected between 2002 and 2004. Our research presents the only known large-scale case-control study that attempts to identify risk factors for developing encephalitis from WNV infection. [19]

In the first part of this study, we found WNV infection to be associated with specific features of the residential environment, namely, presence of mosquitoes indoors and flooded apartment building basements. The association of infection with mosquitoes in the home suggests a peridomestic route of transmission consistent with the ecology of Culex pipienspipiens. This species typically is found in urban settings, is the predominant mosquito species in Bucharest, and was the likely epidemic vector [3]. The abundance of mosquitoes indoors undoubtedly reflected the scarcity of home air conditioners and window screens in Bucharest, factors that have been associated with risk of acquiring StLE virus infection [6]. [20]

We found evidence for a spatiotemporal association between the outbreaks of unknown encephalitis in Bac Giang Province and litchi cultivation. The ecologic regression analysis demonstrated that the annual risk for AME in a commune increased with the proportion of litchi-cultivated surface and that the epidemics occurred earlier in the districts that harvested litchis during May–June than in those that harvested litchis during June–July. [21]

Our multivariate analyses found only three variables to be associated with the risk of JE in children in

Bali: pig ownership by their family or next-door neighbours, close proximity of household to a rice field, and older age. JE has been reported to have a higher incidence in males than in females [1, 2]. Gender, however, was not significantly associated with JE in the current study. That the average age of controls was significantly younger than that for JE cases (2.81 vs.4 .14 years, P=0.0004) may reflect the fact that younger children might be more vulnerable to and at higher risk of other causes of acute viral encephalitis such as measles, mumps, enteroviruses [13, 14]. There was no association between age and the annualized incidence rates of JE in Bali in a cohort study of children aged <7 years [5]. We found no association between JE infection and use of mosquito bed nets, and mosquito screens on windows in the analyses. In endemic areas, especially in tropical regions, exposure to mosquito bites is consistent and intensive; temporary and intermittent protections does not work sufficiently to interrupt disease transmission. [22]

Acute encephalitis is an inflammation of the brain parenchyma, most commonly caused by viruses and associated with substantial morbidity and mortality. Worldwide, reported mortality ranges between 0–11%.[3,4,13-17] but was substantially higher in our study: 30% of children died during hospitalization, with about half of deaths occurring within 3–7 days after the onset of illness, and more than half affecting infants. Furthermore, 25% of surviving children suffered from mild to severe neurological sequelae at discharge (including: severe sequelae in 10%, moderate in 10% and mild in 5%). Several prognostic factors for death or severe outcome of acute encephalitis have been proposed.[14,15] Whereas, similar to other studies, univariate analyses in our study suggested associations between fatal outcome and age, convulsions at admission and limb weakness, GCS and age remained the only independent prognostic factors for fatal outcome in logistic regression analyses. [23].

CONCLUSION:

The results of this studies show the acute viral encephalitis in children risk factors. On the basis of findings and results this review found Homeless, Mosquitoes, litchi plantations older age, playing outdoors after dinner, pig ownership by the family or next-door neighbors, age and Glasgow Coma Scale on admission, are risk factors of acute viral encephalitis in children.

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