



# Rift Valley fever among children and adolescents in southwestern Saudi Arabia

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## KEYWORDS

Infectious diseases;  
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## Summary

**Purpose:** Rift Valley fever (RVF) virus has expanded its geographical range, reaching Asia in 2000. This work investigated RVF seroprevalence among children born after the 2000–2001 outbreak in Saudi Arabia and compared it with the seroprevalence of adolescents born before the outbreak.

**Design:** In a seroepidemiological study in southwestern Saudi Arabia (Jazan, Aseer, and Al-Qunfuda), a random sample of 389 children and adolescents was investigated. Data were collected regarding the subjects' sociodemographic status, housing conditions, and animal contact. Blood samples were collected and tested for RVF-specific IgG and IgM.

**Results:** None of the study samples were found to be seropositive for anti-RVF virus IgM. None of the study subjects aged 1–8 years (born after the outbreak) were positive for RVF-specific IgG. In contrast, 14 subjects (4.8%) aged 9–19 years (born before the outbreak) were positive for RVF-specific IgG. Among adolescents in our study, 4.9% were positive for anti-RVF IgG. This study showed that among adolescents, a history of contact with aborted animals (aOR = 13.361, 95% CI = 5.091–35.072) and transporting aborted animals (aOR = 18.861, 95% CI = 11.125–31.622) were significant risk factors.

**Conclusions:** Despite the low virus activity recently reported among animals, neither clinically apparent RVF infections nor outbreaks among humans have been documented, indicating that the control measures taken by the Ministry of Agriculture and Ministry of Health are effective.

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## Introduction

Rift Valley fever (RVF) is an acute zoonotic viral disease that affects ruminant animals and humans. The disease is named after the Rift Valley of East Africa, where the etiologic virus was first isolated in 1930 during an investigation into an epidemic of infections among sheep on a farm in the Rift Valley in Kenya [1]. On 11 September 2000, the Ministry of Health (MOH) of the Kingdom of Saudi Arabia received reports of unexplained severe hepatitis in 7 patients from the Jazan region near the southwestern border of Saudi Arabia. On 15 September 2000, laboratory tests performed at the CDC confirmed the diagnosis of RVF. By the end of the outbreak (22 September 2001), the total number of hospitalized cases was 884, of which 843 were laboratory confirmed [2]. No RVF outbreaks or human cases have been reported in the Kingdom of Saudi Arabia since then.

The objectives of the present study were to determine the seroprevalence of RVF virus infection among children born after the outbreak and compare it with the seroprevalence of adolescents born before the outbreak in the southwestern regions of Saudi Arabia. This study also aimed to identify potential risk factors leading to RVF virus infection.

## Materials and methods

### Ethical statements

The protocol for this study was reviewed and approved by the ethical committee of King Khalid University. Written informed consent was obtained from each individual (or his/her guardian for children).

### Study area

The study area included the Jazan and Aseer regions and the Al-Qunfuda area in the Makkah region. The Jazan region is located in southwestern Saudi Arabia, bordering the northwestern region of Yemen. The climate is hot and humid most of the year. The majority of the local inhabitants work as farmers and raise domesticated animals for their livelihood. Electricity is not yet available in the vast majority of the remote villages. The Aseer region extends from the high mountains of Sarawat (at an altitude of 3200m above sea level) to the Red Sea. This region borders Jazan and is located to its northeast. Al-Qunfuda is further northward along this coastal plain in the Makkah region. The social and

environmental conditions in the three study areas are similar. The health care facilities in the study areas include 13 hospitals and 134 primary health care centers (PHCCs) in Jazan, 17 hospitals and 253 PHCCs in Aseer, and 1 hospital and 29 PHCCs in Al-Qunfuda [3].

### Sampling procedures

Five areas in the Jazan region (Jazan, Baysh, AboArish, Al Ardah, and Samtah), four areas in the Aseer region (Al Birk, Al Gahma, Muhayeel, and Al Majardah) and the Al-Qunfuda area in the Makkah region were selected as target sites for the present study. The selected areas reported Rift Valley fever cases during the 2000–2001 outbreak. In late 2008, a random sample of children and adolescents attending the outpatient clinics of these hospitals for any reason was included in the study.

### Questionnaire-based interviews

A comprehensive questionnaire-based interview was offered to all children (or guardians) and adolescents. The questionnaire included questions on sociodemographic data, environmental and housing conditions, and exposures during the previous 6 years.

### Blood sampling

Venous blood samples (approximately 5–10 ml) were collected from each participant in plain tubes and allowed to clot at room temperature (range 18–20 °C). The samples were then centrifuged at 10,000 rpm for 10 min, and the separated sera were aliquoted into two portions and stored at –20 °C until they were transported in Styrofoam boxes containing dry ice (solid carbon dioxide, –40 °C) to the Virus Lab of the Abha College of Medicine. All samples were received in a frozen state and grouped by the area of collection. The samples were stored in labeled boxes in deep freezers at –20 °C.

### Testing for serum anti-RVF IgG and IgM antibodies

RVF kits were provided as bulk reagents to be further processed prior to testing. The RVF IgG ELISA kit (batch # 2007) was manufactured, standardized and provided by the National Institute of Communicable Diseases, Special Pathogens Unit, Johannesburg, South Africa. All relevant reagents, including the controls, were supplied with the kits. RVF-IgM assays were performed using these kits

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