



## Case Report

## First confirmed case of local human rabies in Saudi Arabia

Nabil S. Dhayhi<sup>a,\*</sup>, Haider M. Arishi<sup>a</sup>, AbdulAziz Y. Al Ibrahim<sup>b</sup>,  
Moawiah B. Khalaf Allah<sup>b</sup>, Abdu M. Hawas<sup>c</sup>, Halima Alqasmi<sup>d</sup>, Ibrahim Sairam<sup>e</sup>,  
Abdullah Thubab<sup>e</sup>, Mohammed Buraik<sup>f</sup>, Amer Alali<sup>d</sup>

<sup>a</sup> Pediatric Infectious Unit, King Fahad Central Hospital, Jazan, Saudi Arabia

<sup>b</sup> Pediatric Intensive Care Unit, King Fahad Central Hospital, Jazan, Saudi Arabia

<sup>c</sup> Pediatric Neurology Unit, King Fahad Central Hospital, Jazan, Saudi Arabia

<sup>d</sup> Pediatric Department, King Fahad Central Hospital, Jazan, Saudi Arabia

<sup>e</sup> Department of Infection Prevention and Control, King Fahad Central Hospital, Jazan, Saudi Arabia

<sup>f</sup> Dermatology Department, King Fahad Central Hospital, Jazan, Saudi Arabia



## ARTICLE INFO

## Article history:

Received 12 June 2019

Received in revised form 9 August 2019

Accepted 9 August 2019

Corresponding Editor: Eskild Petersen, Aarhus, Denmark

## Keywords:

Rabies

Dog bite

Milwaukee protocol

## ABSTRACT

Rabies is a common zoonotic viral infection worldwide. Numerous animals can transmit the virus to humans, but dogs are the main ones. Despite the high incidence of animal bites overall in Saudi Arabia, of which most are dog bites, no single case of confirmed local human rabies has been reported. This article reports the case of a 12-year-old boy who lived with his family in a village in Jazan region in the southeast area of Saudi Arabia. He presented with signs suggestive of rabies. Saliva testing by rabies PCR was positive, confirming this as the first case of local human rabies in Saudi Arabia. The management plan followed the Milwaukee protocol, but the patient unfortunately died after 13 days of admission.

© 2019 The Authors. Published by Elsevier Ltd on behalf of International Society for Infectious Diseases. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## Introduction

Rabies is a common zoonotic viral infection worldwide. The virus belongs to the *Rhabdoviridae* family, genus *Lyssavirus*. Numerous animals can transmit the virus to humans, but dogs remain the major source. In the Arabian Peninsula, rabies has been a known disease throughout history. In Saudi Arabia, rabies is endemic in various animals and has been confirmed in many canines and livestock animals such as camels, sheep, and goats (Al-Duraib, 2007; Kasem et al., 2019). Kasem et al. found that more than 79% of 199 suspected animals collected in Saudi Arabia between 2010 and 2017 were positive for rabies using the direct fluorescent antibody test (Kasem et al., 2019). The main reservoirs of rabies in Saudi Arabia are dogs and camels (Al-Duraib, 2007; Kasem et al., 2019). Despite the high incidence of animal bites overall in Saudi Arabia and of dog bites in particular, it appears that no single case of confirmed local rabies has been reported to date (Memish et al., 2015). This article reports the first confirmed case of local human rabies that resulted from a bite by a local stray dog inside Saudi Arabia.

## Case data

## History

On December 2, 2016, a 12-year-old male refugee from Yemen, who had lived with his family in a village in Jazan region in the southeast area of Saudi Arabia since birth, presented to the emergency room. The boy had appeared normal until 38 days ago, when he had reported a dog bite on his right forearm to his family, which had been caused by a stray dog that was never seen again. His family had not sought any medical treatment for the child at the time. After more than a month, he started to behave in an unusual manner, using meaningless words, shouting, suffering insomnia, and spitting. The family took him to a primary health care center, from where he was referred to a psychiatric hospital. He was then transferred to the emergency room at King Fahad Central Hospital.

## Examination

In the emergency department, the patient was noted to appear dehydrated. He was conscious but disoriented, with restlessness and episodic attacks of jerks and purposeless movements. He was also shouting meaningless words. Testing for hydrophobia and aerophobia was positive. The patient was febrile (temperature of

\* Corresponding author.

E-mail address: [Ndhyyh@moh.gov.sa](mailto:Ndhyyh@moh.gov.sa) (N.S. Dhayhi).

38 °C), with mild tachycardia and a normal respiratory rate, blood pressure, and oxygen saturation. Other than a healed lesion on his right forearm, all systems examinations were unremarkable.

### Investigations

Initial investigations showed hypernatremia (Sodium was 170 mmol/l) and high blood urea of 17 mmol/l.8. Calcium was 1.98 mmol/l, phosphorus was 1.84 mmol/l, and random blood sugar was 12.3 mmol/l. Levels of creatinine and all other serum electrolytes were normal.

A blood cell count and blood smears showed hypochromic microcytic anemia with leukocytosis (mainly neutrophils). Albumin was 15 g/l, total protein was 59.8 g/l, and lactate dehydrogenase was 379 U/l. There was no growth in bacterial blood cultures. Saliva testing by rabies PCR was positive, while testing of other blood and cerebrospinal fluid samples by rabies PCR was negative. All other bacterial and viral studies on cerebrospinal fluid samples returned negative results. A tissue biopsy from the nape of the neck was rejected because of a leaking container. Plain brain computed tomography showed normal findings.

### Hospital course

After admission to a single room in the pediatric intensive care unit to minimize stimuli, the patient was electively intubated, sedated, and paralyzed, and managed according to Milwaukee Protocol. All other suspected bacterial and viral infections were excluded by workup. The patient remained intubated and paralyzed for the first 6 days with no unusual events. However, within the next few days, he developed attacks of dysautonomia with fluctuating blood pressure and heart rate, which were treated accordingly. On day 11, his pupils became fixed and dilated, and he died on day 13.

### Discussion

Dogs are the most common source of human bites in Saudi Arabia. A total of 11 069 animal bites in humans were reported from 2007 to 2009, and dogs were responsible for most of them, followed by cats (Memish et al., 2015). Despite hundreds of animal bites annually and the endemicity of rabies among various types of animal in the Middle East, and Saudi Arabia in particular, no confirmed case of local human rabies has been reported in Saudi Arabia over the last 15 years (Memish et al., 2015; Seimenis, 2008).

The clinical scenario in this patient is typical of rabies, starting from the incubation period after the bite until the time of symptom appearance, and in the following prodromal stage, which can last as little as 2 days, characterized in our patient by changes in behavior, fever, and jerking movements. The furious stage, with its characteristic hydrophobia, aerophobia, aggressive behavior, and rare dysautonomia, also presented in this patient.

The lack of awareness of the clinical presentation of rabies, the underestimation of this public health problem, and perhaps the lack of experience in transportation and processing of rabies samples may explain the underreporting of human rabies in many Middle Eastern countries (Seimenis, 2008).

In 2018, Alkenawi et al. published the first confirmed case of human rabies in Saudi Arabia, which occurred after a stray dog bite in Morocco (Alkanway et al., 2018). This case did not confirm local human rabies inside Saudi Arabia, as the bite happened outside the country. The present report confirms the first case of human rabies in Saudi Arabia that was caused by a stray dog bite inside Saudi Arabia.

The Milwaukee protocol first emerged as a lifeline for rabid patients after the survival of one girl with rabies secondary to a bat bite (Willoughby et al., 2005). Critical appraisal of the Milwaukee protocol by Zeiler and Jackson, who reviewed many rabies cases treated with the Milwaukee protocol, found that this protocol failed to save the lives of the vast majority of the included patients (Zeiler and Jackson, 2015).

As there is no effective treatment for rabies, and currently no prospect of one on the horizon, an active national rabies prevention program is crucial. This plan should start with the education of the population about the nature of rabies, its mode of transmission, and ways of protection by animal vaccination, and include first-aid steps after an animal bite. Furthermore, post-exposure prophylaxis with human rabies immune globulin (HRIG) and rabies vaccines should be made readily available after an animal bite, if indicated according to local data and World Health Organization recommendations (Rabies Vaccines, 2018).

In conclusion, human and animal rabies in Saudi Arabia remains a public health challenge. This necessitates the formulation of robust national plans to control the disease. Increasing the awareness of the population and health care workers about the disease is the cornerstone of such plans.

### Funding source

Self-funded by the authors.

### Ethical approval

Approved by the Hospital Ethics Committee.

### Conflict of interest

No conflict of interest.

### References

- Al-Duraib AM. Rabies in camels at Qassim region of central Saudi Arabia. *J Camel Pract Res* 2007;1:101–3.
- Alkanway M, Mohammed SK, Ulla SN, Al Aboud A. First confirmed case of human rabies in Saudi Arabia. *ID cases* 2018;12: 29–13.
- Kasem S, Hussein R, Al-Doweriej A, Qasim I, Abu-Obeida A, Almulhim I, Alfarhan H, Hodhod AA, Abel-Latif M, Hashim O, Al-Mujalli D, Al-Sahaf A. Rabies among animals in Saudi Arabia. *J Infect Public Health* 2019;12(May–June (3)):445–7.
- Memish ZA, Assiri AM, Gautret P. Rabies in Saudi Arabia: a need for epidemiological data. *Inter J Infect Dis* 2015;34:99–101.
- Rabies Vaccines. WHO position paper, April 2018 -Recommendations. *Vaccine*. 2018 36; September (37):5500–5503.
- Seimenis A. The rabies situation in the Middle East. *Dev Biol (Basel)* 2008;131:43–53.
- Willoughby Jr RE, Tieves KS, Hoffman GM, Ghanayem NS, Amlie-Lefond CM, Schwabe MJ, et al. Survival after treatment of rabies with induction of coma. *N Engl J Med* 2005;352:2508–14 PMID: 15958806.
- Zeiler Frederick A, Jackson Alan C. Critical appraisal of the milwaukee protocol for rabies: this failed approach should be abandoned. *Can J Neurol Sci* 2015;43 (December):44–51, doi:http://dx.doi.org/10.1017/cjn.2015.331.