

Anthrax in humans and camels in the Sudan with reference to the disease in the country

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Les auteurs dressent un tableau épidémiologique de la fièvre charbonneuse au Soudan, après l'apparition d'un foyer concernant six dromadaires et dix personnes, en 1988, à la frontière avec le Tchad.

Mots clés : Dromadaire - Charbon bactérien - *Bacillus anthracis* - Vaccination - Épidémiologie - Zoonose - Soudan.

Introduction

Anthrax in the Sudan was first recognized in 1917 (1) and was then annually reported nation-wide affecting many kinds of domestic animals and wildlife (2). In 1946 (3), it was decided to vaccinate all export animals, hence the disease was controlled in quarantines where it was predominant. Mass vaccination of animals in the field was started in 1951 (4), however the disease is still sporadically occurring throughout the country. Similarly, it was found widely spread in West Africa (19, 20).

The habits of Sudanese of slaughtering sick animals for meat and skins have caused many hazards to the people (5, 6, 7, 8, 9, 10, 11, 12, 13, 14) and might also have played a role in further dissemination of the disease from the soil (15).

The present paper reports an outbreak of anthrax in camels causing human infections in the Northern Darfur Province of the Western Sudan.

History

In February 1988 anthrax outbreaks flared up near Kulbus town at the borders with Chad, involving six camels

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and ten persons. The disease was first observed in a female camel shortly after returning from water. The next day it was slaughtered for meat. Consequently, ten people, seven men and three women and later another five camels were infected.

Materials and Methods

In the outbreak area, the infected people were examined and questioned. Dried meat samples from two dead camels were collected for the detection of *Bacillus anthracis*, the suspected cause of the disease. In the laboratory, two grams of the meat were used for the recovery of the bacterial spores according to BUXTON and FRASER method (17).

The presence of the spores was confirmed microscopically by preparing slides stained with Methylene blue. The filtrates containing the spores were heated to kill the vegetative forms of bacteria (17) and amounts of 0.5 ml were used to inoculate semi-solid agar media, plates were poured, incubated at 37°C overnight and examined for cultural characteristics of *B. anthracis* (17). According to the same authors two grams of the dried meat were used to extract *B. anthracis* antigen for Ascoli's test employing antianthrax hyperimmune serum manufactured by the Pasteur Institute Paris, 1972. A positive control antigen was included in the test.

Results

Symptoms of the disease in humans and camels were characteristic for anthrax. The duration of illness in the first infected camel was less than 24 h and the prominent symptoms were salivation, bloody anal discharge and dark unclotted blood observed in the heart and intestines. Ten persons who either participated in the slaughtering, cooking, eating or who had come in contact with the infected meat and effluent, were infected and signs of the disease appeared 36-48 h after slaughter of the animal. Some people who only ate the meat were unaffected, which might be due to differences in cooking. The first infected person showed inflammation and itching of the arm on the second day after slaughter and his condition was misdiagnosed as allergy. He died on the third day of the disease signs. The rest of the patients showed varied symptoms and lesions which were cutaneous, respiratory and intestinal forms exhibited by malignant carbuncles, cough with bloody sputum and both bloody diarrhoea and haemoptosis, respectively. Lymphadenitis was observed in some people. One patient showed a laryngeal oedema probably due to swallowing of *B. anthracis* spores. Pyrexia was common and in one person the temperature was 106°F. The patients were treated with ampicillin and septrin, but four of them did not respond to the treatment and died, probably due to some serious complications and the use of antibiotics alone rather than comple-

ting them with cortisone (20). The course of the disease in the survivors was long (19-30 days).

Immediately after the infection of the first camel, another four became ill, had symptoms similar to those of the former and died. A month later a sixth camel showed elevation of temperature (105.8°F) and was suspected for anthrax, and treated with oxytetracycline.

Two foxes were also found dead near the outbreak site. Their cause of death was alleged to be due to scavenging in the premises of the dead camels.

Laboratory tests results

The dry meat samples contained bacterial spores which had typical characteristics of *B. anthracis*. Ascoli's precipitin test was positive confirming the disease as anthrax.

Control

The area of the tragedy was proclaimed a high risk site. Consequently the animal market was closed, offtake of livestock prohibited and slaughter banned for one month. The remnants and premises of the dead camels and trees on which the meat was dried were burned. Camel owners were evacuated to new settlements and put under surveillance. 7,000 camels, 31,000 cattle, sheep and goats and a few equines were vaccinated against the disease.

Discussion

In Africa, anthrax frequently affects livestock and people coming in contact with the sick animals or handle their by-products. Many such outbreaks were reported in Senegal, Côte d'Ivoire and Mali (19) and the neighbouring Chad (20). In the Sudan anthrax is enzootic (18) and it is believed that soil is acting as a focus for dissemination of the disease in nature (15). Opposite to what was reported elsewhere (20) many cases of anthrax were diagnosed in humans, but could not be detected in animals (5, 9, 11, 12). In Eastern Sudan where the disease is endemic, it is thought that River Gash is distributing anthrax spores from slaughtered sick animals along the course of the river during summer. There the incidence of anthrax in humans exceeded those of animals (12) and the Aroma district on the west bank of Gash was reported to be a persistent site of the disease (14).

In Darfur Western Sudan, the disease is sporadic but was found to cause considerable losses in the Southern part of the region. In 1951, a severe outbreak occurred resulting in deaths of 310 cattle, nine horses, nine donkeys in one area and 71 cattle, 33 donkeys in another. During the following year, a serious outbreak occurred in cattle and several cases of anthrax in humans were reported (16). In Northern Darfur, however, reports about the disease are scarce.

The source of the present outbreak was suspected to be a water dam contaminated from a focus of the disease or the field where the first camel picked up the infection which thereafter spread through the water effluents. Migration of animals from Chad might also have influenced the outbreak.

Routine vaccination of camels should be practised especially when they are migrating southwards where the disease is known to occur. Nomads should be informed about the serious zoonotic diseases.

Conclusion

Anthrax in humans and camels in the Sudan was investigated. Five camels and five people infected died, and the rest was treated successfully. The disease was symptomatically diagnosed in humans and definitely by Ascoli's precipitin test. Control of the disease was achieved by mass vaccination of the animals in the area.

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The situation and epidemiology of anthrax in the Sudan is reviewed after an outbreak involving 6 camel and 10 human cases in 1988 at the Chad border.

Key words : Dromedary - Anthrax - *Bacillus anthracis* - Vaccination - Epidemiology - Zoonosis - The Sudan.