



## The first record of echinococcosis in a captive vervet monkey (*Chlorocebus aethiopicus*) in Kuwait

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### ABSTRACT

In 2019, a 3-years old zoo-raised female vervet monkey (*Chlorocebus aethiopicus*) was dead after showing progressive abdominal enlargement, apathy, and anorexia. At autopsy, large numbers of small cysts with different sizes in the abdominal cavity and retroperitoneum. Because of the morphology and the tumor-like proliferation of the causative agent, *Echinococcus multilocularis* was most probably involved in this case. Although it is evident that the monkey was exposed to *Echinococcus* eggs, it is not possible to know the route and source of infection. Examination of the zoo canids for taeniid eggs revealed a negative result. Properly, the animal was exposed to infection via the food (fruits and vegetables) brought from farms in remote areas in the desert. It is assumed that infected wild canids, which are common in Kuwait' desert, contaminate the environment in these areas. To the best of our knowledge, this report describes echinococcosis for the first time in the vervet monkey species in Kuwait.

**Key words:** echinococcosis, monkey, zoo, Kuwait

## INTRODUCTION

Echinococcosis is one of the most serious parasitic zoonosis, caused by the larval stages of *Echinococcus* species, which are different in their morphology, biology, and geographical distribution. They use canids and felids as final hosts and other mammals, including livestock, rodents as intermediate hosts. Humans and primates can be infected accidentally.

The liver is the main predilection site of the larval stages, but other organs can be involved. There are four species of *Echinococcus* namely: *E. granulosus*, *E. multilocularis*, *E. vogeli* and *E. oligarthus* which metacestodes cause cystic, alveolar, unicystic and polycystic hydatid disease, respectively in humans and primates.

*E. granulosus* is cosmopolitan and *E. multilocularis* is distributed in the northern region of the world, while *E. vogeli* and *E. oligarthus* are confined to the Neotropics. (Eckert and Deplazes, 2004; D'Alessandro and Rausch, 2008).

## CASE REPORT

A 3 year - old vervet monkey (*Chlorocebus aethiopicus*) was born in the zoo of Kuwait and kept in a cage with other 20 monkeys. In 2019, the animal showed slowly progressive abdominal enlargement, which was thought to be a

sign of pregnancy. when the abdomen became fully distended, it showed apathy and anorexia. The zookeeper isolated the monkey alone in a cage, where it was found dead (Fig. 1) in December 2019. At necropsy, the abdominal cavity and retroperitoneum were full of small vesicles of different sizes (fig. 2), with the involvement of liver, intestine, and lungs. Squashing some vesicles between 2 slides revealed that they contained protoscolices.

Hepatomegaly and hyperemia of other organs were observed. As it was not possible to perform serological and molecular studies, we depended on the morphological characteristics, clinical signs, and postmortem observations to identify the causative agent, which most probably *E. multilocularis*.

This work was done according to the regulations set by PAFR for conducting research work and with the approval of the technical committee of the animal resources sector.

## DISCUSSION

The case described herein is *Echinococcus* infection in a monkey. Out of the four *Echinococcus* species, two of them could be suspected to be the causative agent of this case namely *E. multilocularis* and *E. vogeli*, which can asexually reproduce to form a huge number of small cysts in a tumor manner

proliferation, invading the internal organs. As far as we know, *E. vogeli* has not recorded in monkeys, in contrast, *E. multilocularis* is well documented in the Old-World monkey species in many parts of the world e. g., France, Germany, Switzerland, Iran and Japan (Brunet et al., 2005; Tappe et al., 2007; Borji et al., 2012; Yamano et al., 2014). The antemortem and postmortem observations reported in different monkey spp. are comparable with the findings reported in our case. In addition, *E. vogeli* occurs in Central and South America.

Alveolar echinococcosis has been reported in humans and rarely in animals in the Middle East and North Africa, including neighboring countries of Kuwait (Sadjjadi, 2012). All fore-mentioned facts increase the probability that *E. multilocularis* was the causative agent.

Since the monkey described herein was born and raised in captivity, its infection with echinococcosis needs explanation. Although it is evident that the animal was exposed to *Echinococcus* eggs, it is not possible to know the route and source of infection. As the examination results of wild canids in the zoo were negative for taeniid eggs, probably the infection happened through contaminated food. To feed monkeys, private companies bring fruits and vegetable from local

farms in Abdali and Wafaa, the areas adjacent to the desert, where wild canids live. These animals are assumed to be the source of *Echinococcus* eggs. Neither other cases appeared in the zoo nor human cases reported in Kuwait since the discovery of alveolar echinococcosis. This paper reports echinococcosis in vervet monkey (*Chlorocebus aethiops*) for the first time in Kuwait and it can draw the attention of public health and veterinary authorities to the possibility of emerging this disease in humans and animals. We have started a study to investigate *E. multilocularis* in rodents, which play an important role in the epidemiology of the disease.

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**Fig. 1: A-3-years-old female vervet monkey with distended abdomen found dead in the zoo of Kuwait**



**Fig. 2: Small cysts filling up the abdominal cavity and retroperitoneum of the monkey**