Investigation of the Immune Status of Camels (*Camelus Dromedarius*) Against Some Viral Diseases

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**Key words:**
Dromedary camels, BRDC, BEF, SNT

**ABSTRACT:**
Serum samples from 165 unvaccinated male and female camels of different ages were randomly collected from the local abattoir in Cairo, Egypt during the period of April 2011 till April 2012. One hundred and seventeen serum samples were from camels locally raised in Egypt and 48 serum samples were from camels raised in Mogadishu-Somali Democratic Republic and came to the slaughterhouse in Cairo, Egypt. Serum neutralization test was run to determine the presence of antibodies against Bovine ephemeral fever (BEF), Bovine virus diarrhea (BVD), Bovine herpesvirus type 1 (BHV-1), and Parainfluenza type 3 (PI3) viruses. The overall results for the antibodies detection in serum samples were 12.72%, 14.54%, 27.87%, and 18.18% against BEFV, BVDV, PI3V and BHV-1 respectively.

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1- INTRODUCTION
In the Arab countries, camels are essential source for human food, transportation and entertainment. The habitat of the camel is the dry hot zones of North Africa, Ethiopia, the Near East and West Central Asia (Wilson, 1984). In Egypt their numbers were estimated as 102327 camels (GOVS, 1998), and nowadays are considered as one of the main sources of animal protein in some provinces in Egypt. Camel is a very hardy animal and well adapted anatomically as well as physiologically to harsh climatic conditions of desert. They are less susceptible to many of the diseases that affect other livestock species in the same areas. Despite that, camel may contract many other diseases (Dirie and Abdurahman, 2003) which cause substantial economic losses in terms of decrease in working capacity, growth and productivity.

On the contrary to the OIE rules, camels enter Egypt officially without any virological investigation, and even without maintaining for sufficient period in the quarantine facilities. The governments consider the long distance which the animals spent walking is enough for judging that they are free from the viral infections. The continuous importation of viraemic ruminants, especially camels, from Sudan was the main source of many critical outbreaks in Egypt (Abd-El-Rahim et al. 1999).
Bovine Ephemeral Fever virus (BEF) is a serious immunosuppressive pathogen and can cause economic impact to animal production and international trade. The first report of BEF was probably in mid-nineteenth century when the disease was first noticed in East Africa (Schweinfurth, 1867), then in Kenya (Kennedy, 1915), Egypt (Rabagliati, 1924), and Palestine (Rosen, 1931). The geographical distribution of BEF is considerable and spans the tropical regions of Africa, Australia and Asia with extensions into the subtropics and some temperate regions. Respiratory diseases have an important and serious impact on the meat industry, both for stocker and feedlot entities. Economic losses result from death, decreased performance of diseased animals, lowered weight gain, increased cost of gain, reduced carcass value and treatment costs (Fulton et al. 2002). Bovine virus diarrhea (BVD), Bovine herpesvirus type 1 (BHV-1), and Parainfluenza type 3 (PI3) viruses have all been incriminated in the etiology of acute respiratory diseases (Durham and Hassard 1990) and they are causing serious losses each year due to the control programs.

Paling et al. (1979) said that the only indication that the camel might be susceptible to the BHV-1 comes from Burgemeister (1975) who reported antibody in three of 52 camels in Tunisia. Antibodies to IBR were not found in the 37 camels tested on Galana Ranch - Kenya. Thedford and Johnson (1989), Afzal and Sakkir (1994), Zaghawa (1998), Elhakim (2004), Alfaleq et al. (2007), Intisar et al. (2009 & 2010) and Raoofi et al. (2010) all conducted serological surveys to detect the presence of antibodies against the BVD, PI3, and BHV-1 viruses -alone or in combinations- in the serum of camels in their countries. They all reported the presence of considerable antibody titers for these viruses in the blood of non-vaccinated camels with no evidence of gross symptoms or lesions.

Therefore, the goal of this study was to examine the extent of exposure of the camels to BEF, BVD, PI3, and BHV-1 viruses reflected by presence or absence of antibodies against these diseases in serum samples collected from a number of camels from different localities, in Egypt and imported from Somalia.

2- MATERIAL AND METHODS
2-1 Camel’s history
During the study, routine diagnostic work and interviews with camels keepers were conducted according to normal veterinary practice. Interviews included information about case histories for sick camels, livestock keeper descriptions of clinical signs if found, and local views on epidemiology, treatment and prevention. Complete records of the number of camel herds examined and keepers interviewed were not kept, but the interviews of key respondents were recorded. Physical examinations of the clinically healthy and sick camels were carried out whenever possible.

2-2 Camels’ population, temporal and spatial sampling
The study comprised 165 unvaccinated male and females camels of nomadic and intensively reared animals, which represented different husbandry and management systems. The samples included 117 serum samples from camels locally raised in Egypt and 48 serum samples from camels raised in Mogadishu-Somali Democratic Republic and came to the slaughter house in Cairo, Egypt. The age of the animals ranged from 1-12 years old.

All animals were clinically normal at the time of sampling. Serum samples were collected over one year, April 2011 till April 2012, which was representing different seasons. Numbers of animals according to the age and seasons were recorded in table (1 & 2) respectively.
Table (1): Scheme of Sampling according to the Age

<table>
<thead>
<tr>
<th>Total Number</th>
<th>Less than 2 Years Old</th>
<th>More than 2 Years Old</th>
</tr>
</thead>
<tbody>
<tr>
<td>165</td>
<td>38</td>
<td>127</td>
</tr>
</tbody>
</table>

Table (2): Scheme of Sampling according to the Season

<table>
<thead>
<tr>
<th>Total Number</th>
<th>April 2011 – October 2011</th>
<th>November 2011 – April 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>165</td>
<td>95</td>
<td>70</td>
</tr>
</tbody>
</table>

2-3 Serum samples collection
Plain vacutainer and labeled tubes without anticoagulant were used to take 5-7 ml of blood from the jugular vein. Blood samples were centrifuged (1500×g for 10 min) and the serum divided into aliquots and stored at –20°C until needed. Sera used in SNT were inactivated for 30 minutes in a water bath at 56°C (Edwards et al. 1986).

2-4 Bovine Ephemeral Fever virus (BEFV)
BEF/Abbasia/2000 strain

2-5 Bovine Virus Diarrhea virus (BVDV)
BVD virus, Iman strain (10^{6.5} TCID_{50}/ml).

2-6 Bovine Herpes Virus type 1 (BHV-1)
BHV-1 virus, Abou Hammad strain (10^{7.5} TCID_{50}/ml).

2-7 Parainfluenza Virus type3 (PI3V)
PI3 virus, strain 45 (10^8 TCID_{50}/ml).

2-8 Serum neutralization test (SNT)
It was carried out as described by Fulton et al. (1995). Plates were examined daily by the microscopy to detect specific CPE for each virus.

2-9 Statistical analysis
Data were analyzed using an analytical software program SPSS version 8.0 for Windows (SPSS science, Chicago, II, USA) by using the non-parametric Mann-Whitney U test.

3- RESULTS
3-1 Detection of antibodies in sera of camels
All investigated camels showed specific antibodies against BEF, BVD, PI3, and BHV-1 viruses as follows, 12.72%, 14.54%, 27.87%, and 18.18% respectively (Fig 1). Serum samples which were collected from camels its age were less than 2 years old are showing 21.48%. On the other hand, camels which were more than 2 years old had 78.51% (Fig 2). Serum samples which were collected from camels in winter show higher percentage of antibodies of viruses than that collected in summer, 73.55% and 26.44% respectively (Fig 3).
3-2 Statistical analysis

Group of camels which age are more than 2 years old show significant level of antibodies against viruses than the other group, age less than 2 years old. Sera which were collected in winter show significant level of antibodies against viruses than that collected in summer.

4- DISCUSSION

One hundred and seventeen serum samples were collected from local market in Egypt including Marsa Matrouh, New Valley and Aswan governorates and forty eight samples were collected from camels raised in Somalia and imported to be slaughtered in local abattoir in Cairo, Egypt.
Serological evidence of the four viruses, included in the study, is reported, yet the description of clinical signs is rare or shows no signs. Some authors mentioned subclinical or mild forms or even the capacity to carry the virus without clinical signs (El Hakim, 2004 and Raoofi et al., 2010) like in BVD virus. They indicated an increased frequency of infection rate for BVD virus with increasing age of camels.

Regarding the BHV-1 and PI3 viruses, many authors (Intisar et al. 2009 & 2010, Afzal and Sakkir, 1994 and Thedford and Johnson, 1989) from different countries near or on the border of Egypt reported a detectable level of antibodies against these viruses in sera of camels. They found the percentage of antibodies were closer of what we detect in our study.

Regarding the BEF virus and its infection in camels, after many searches locally and internationally, we can’t find many references reporting the disease except the report of Dirie and Abdurahman (2003). They reported a disease called Lahaw-Gaal which translates as camel fever, in the Horn of Africa, which includes Somalia and other countries, affects herds in north-eastern Kenya. This disease occurs during the rainy season when there are large populations of mosquitoes. The disease affects mostly adult animals. The illness is only marked for three to seven days but the effects last longer. The main signs of Lahaw-Gaal are high fever, lameness, swollen feet, swollen eyelids, and rough coat. Lahaw-Gaal has many similarities with and is closely related to or identical to the cattle disease which is bovine ephemeral BEF or three-day fever.

5. CONCLUSION

Therefore, camels may transmit such viruses to contact farm animals and remain infective for long time without detectable clinical signs. Thus, camels may play a role in the persistence and transmission of infectious diseases.

6. ACKNOWLEDGEMENT

I would like to acknowledge the effort of Dr. Samira Said Taha, Head researcher in Rinderpest Like Diseases Department, Veterinary Serum and Vaccine Research Institute, Agricultural Research Institute, for her help in writing and reviewing the manuscript and scientific support to add to this work.

7. REFERENCES