Preliminary survey for antibodies against respiratory viruses among slaughter camels (*Camelus dromedarius*) in north-eastern Nigeria

O.D. OLALEYE *, S.S. BABA ** and S.A. OMOLABU *

Summary: A survey for complement-fixing (CF) antibodies against respiratory viruses in camels was carried out in the State of Borno in Nigeria. These antibodies were present in 92 (58.6%) of 157 sera tested.

Antibody prevalence against respiratory viruses was noted, as follows: adenovirus (1.3%), influenza A (0.6%), influenza B (12.7%), parainfluenza-1 (22.3%), parainfluenza-2 (2.5%), parainfluenza-3 (18.5%) and respiratory syncytial virus (0.6%). The difference in antibody prevalence between the different virus antigens was statistically significant. High antibody rates to influenza B, parainfluenza-3 and parainfluenza-1 indicate that respiratory viruses of camels might be of public health significance.

KEYWORDS: Camels - Nigeria - Respiratory diseases - Serological survey - Viral diseases.

INTRODUCTION

The economic and public health importance of camels has been extensively discussed by many workers (2, 5). In the past two decades, research on camels has increased tremendously (1). This has arisen in part from more veterinary research and an increased demand for camel meat (5). Drought and rinderpest have devastated livestock industries in most countries of the Sahel and North Africa (1, 5). The resultant decrease in livestock population has shifted attention to camels which are little affected by drought and rinderpest.

In Nigeria, research on camels is conducted in individual projects in universities and research institutes, but not as part of a well-defined and sustained research programme (1). The camel population in Nigeria is composed of slaughter stock which is usually imported from neighbouring countries (Chad and Niger) and countries further afield, like Sudan, Ethiopia, Burkina Faso and Mali (1, 5). Because of continued importation and its inherent epidemiological significance in diseases of domestic animals and man, there is a need to define the role of imported camels in the epidemiology of some diseases in Nigeria. This study was designed to establish the probable role of camels in the epidemiology of respiratory viruses.

* Department of Virology, College of Medicine, University of Ibadan, Ibadan, Nigeria.

** Department of Veterinary Microbiology and Parasitology, Faculty of Veterinary Medicine, University of Maiduguri, Maiduguri, Nigeria.
MATERIALS AND METHODS

Sera

Blood samples were collected from camels slaughtered in the Maiduguri municipal abattoir between November 1986 and March 1988. Serum was separated by centrifugation and stored at \(-20^\circ\text{C}\) until tested.

Antigens

Antigens used in the complement fixation (CF) test included adenovirus (Adeno), influenza A (Flu A), influenza B (Flu B), parainfluenza-1 (Paraflu-1), parainfluenza-2 (Paraflu-2), parainfluenza-3 (Paraflu-3) and respiratory syncytial (RSV) viruses. All antigens were obtained commercially from Behringwerke AG, Marburg, Federal Republic of Germany.

Complement fixation test

The modified microtitre technique of Sever (8) was used. Serum was diluted 1:4 and inactivated at 56°C for 30 minutes. Samples were tested against the optimum dilutions of the antigens, and controlled individually. The positive and negative control sera were obtained from the same source as the antigens, and used at optimum dilutions determined by chequer-board titration. Serum giving at least +++ fixation was taken as positive.

RESULTS

Complement-fixing antibody against all the test antigens was present in the camel sera (Table I). Of the 157 sera tested, 92 (58.6%) reacted with one or more antigens. There was significant difference (P < 0.05) in antibody prevalence for the different viruses used in the test. The highest prevalence of respiratory virus CF antibody (22.3%) was to Paraflu-1 virus. This was followed in decreasing order by Paraflu-3 (18.5%), Flu B (12.7%), Paraflu-2 (2.5%), Adeno (1.3%), Flu A (0.6%) and RSV (0.6%).

<table>
<thead>
<tr>
<th>No. tested</th>
<th>No. (%) CFT positive against</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Adeno</td>
</tr>
<tr>
<td>157</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 (1.3)</td>
</tr>
</tbody>
</table>

Sixty-eight (74%) of the positive sera showed mono-specific antibody reactions while the other 24 (26%) contained CF antibodies to two or more respiratory viruses (Table II). There was significant difference (P < 0.05) in the seasonal prevalence
TABLE II

Mixed infections and/or serological overlap with respiratory viruses in camel sera in Nigeria

<table>
<thead>
<tr>
<th>No. tested</th>
<th>No. (%) positive against</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>One virus only</td>
</tr>
<tr>
<td>92</td>
<td></td>
</tr>
<tr>
<td></td>
<td>68 (74)</td>
</tr>
</tbody>
</table>

of antibodies to respiratory viruses. Of the 74 sera collected during harmattan (dry) season, a total of 30 (40.5%) reacted with one or more antigens. The highest frequency was to Paraflu-1 (14.9%) during this period. A prevalence rate of 74.7% was observed for sera collected at the beginning of the rainy season, with highest frequency being 29% for Paraflu-1 (Table III).

TABLE III

Seasonal distribution of respiratory virus complement-fixing antibodies in camels in Nigeria

<table>
<thead>
<tr>
<th>Season</th>
<th>No. tested</th>
<th>Adeno</th>
<th>Flu A</th>
<th>Flu B</th>
<th>Para 1</th>
<th>Para 2</th>
<th>Para 3</th>
<th>RSV</th>
<th>Total positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harmattan (dry)</td>
<td>74</td>
<td>1 (1.4)</td>
<td>-</td>
<td>10 (13.3)</td>
<td>11 (14.9)</td>
<td>-</td>
<td>7 (9.5)</td>
<td>1 (1.4)</td>
<td>30 (40.5)</td>
</tr>
<tr>
<td>Rainy (wet)</td>
<td>83</td>
<td>1 (1.2)</td>
<td>1 (1.2)</td>
<td>10 (12)</td>
<td>24 (29)</td>
<td>4 (4.8)</td>
<td>22 (26.5)</td>
<td>-</td>
<td>62 (74.7)</td>
</tr>
</tbody>
</table>

DISCUSSION

The data obtained show the degree of activity of respiratory viruses among camels imported into Nigeria. The sera tested were obtained from slaughtered camels imported from countries where respiratory viruses are probably endemic, since such camels are held in cattle markets in Nigeria for a period not exceeding 48 hours before slaughter. The suggested prevalence in the exporting countries could be attributed to various stressors, such as starvation, old age, prolonged and exhausting journeys and the bringing together of camels in caravans, which commonly predispose to respiratory diseases (2).

The presence of antibodies to influenza virus types A and B and parainfluenza-3 virus was reported by Burgemeister et al. (3) in Tunisia and Semushkin (7) in the USSR. Little is known about the infection of dromedaries with other respiratory viruses, but the viruses have a wide host range and attack rates at times are high. The presence of respiratory virus antibodies in camels, particularly to Paraflu-1, Paraflu-3 and influenza B could be highly significant in the epidemiology of these viruses in man and domestic animals. Information on the epidemiology of respiratory viruses in Nigeria is scanty. An epidemic of influenza due to strain
A/Portchalmers/1/73 virus was reported among human beings in Ibadan in 1974 (4). This was confirmed by virus isolation and serology. In addition, Odelola and Fabiyi (6) reported the presence of influenza A antibodies in residents of two states in southern Nigeria. Since 1974, there has been no report of an epidemic of any respiratory virus in Nigeria, though the apparent absence of clinical episodes may be due to poor surveillance of respiratory viruses.

The combinations of viral antibodies observed in some of the positive sera may be due to immunological cross-reactions or multiple infections. Seasonal variation may also be an important epidemiological determinant of respiratory viruses in camels. We observed a significant difference (P < 0.05) in antibody prevalence in sera collected during the different seasonal periods. The prevalence rate was highest during the rainy season. This difference in incidence of infections may be related to the situation in neighbouring exporting countries, which share similar climatic conditions with northeastern Nigeria, where Borno State is located.

Consumption of camel meat is rising in Nigeria, and at least fifty camels are slaughtered daily at the Maiduguri municipal abattoir. It is suggested therefore that the role of camels in the epidemiology of respiratory viruses should be further investigated in Nigeria, and in neighbouring countries exporting camels to Nigeria.

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Résumé : Une enquête pour le dépistage d'anticorps fixant le complément, vis-à-vis des virus agents d'infections respiratoires, a été effectuée parmi des dromadaires dans l'Etat de Bornou, au Nigeria. Ces anticorps étaient présents dans 92 (58,6%) des 157 sérums analysés.

La prévalence des anticorps vis-à-vis de ces différents virus était la suivante : adénovirus, 1,3% ; influenza A, 0,6% ; influenza B, 12,7% ; parainfluenza-1, 22,3% ; parainfluenza-2, 2,5% ; parainfluenza-3, 18,5% ; virus syncytial respiratoire, 0,6%. La différence entre les taux de prévalence des anticorps vis-à-vis des différents antigènes viraux était statistiquement significative. Les taux d'anticorps élevés vis-à-vis des virus influenza B, parainfluenza-3 et parainfluenza-1 montrent que les virus agents d'infections respiratoires des dromadaires pourraient avoir une certaine importance pour la santé publique.


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Resumen: Se ha realizado una encuesta para detectar anticuerpos fijadores del complemento contra los virus agentes de infecciones respiratorias en los dromedarios en el Estado de Bornu, en Nigeria. Dichos anticuerpos se encontraban presentes en 92 (58,6%) de los 157 sueros analizados.
La prevalencia de los anticuerpos contra estos diferentes virus era la siguiente:
adenovirus = 1,3%; influenza A = 0,6%; influenza B = 12,7%;
parainfluenza-1 = 22,3%; parainfluenza-2 = 2,5%; parainfluenza-3 = 18,5%
y virus sincitial respiratorio = 0,6%. La diferencia entre las tasas de prevalencia
de los anticuerpos contra los diferentes antígenos virales era estadísticamente
significativa y la elevada tasa de anticuerpos contra los virus de influenza B,
parainfluenza-3 y parainfluenza-1 muestran que los virus agentes de infecciones
respiratorias de los dromedarios podrían tener importancia para la salud pública.

PALABRAS CLAVE: Dromedarios - Encuestas serológicas - Enfermedades
respiratorias - Enfermedades virales - Nigeria.

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