Indirect haemagglutination (IHA) and immunoelectrophoresis in the diagnosis of hydatidosis in Sudanese camels

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L'efficacité de l'hémagglutination indirecte et de l'immunoélectrophorèse comme moyens de détection de l'infection hydatique chez les dromadaires a été recherchée. L'une et l'autre ont révélé de très faibles taux de détection des anticorps dans le sérum des dromadaires. L'immunoélectrophorèse montrait une spécificité de 84 p. 100 et une sensibilité à 36 p. 100 alors que l'hémagglutination indirecte montrait une spécificité de 69 p. 100 et une sensibilité à 43 p. 100. Ces résultats sont discutés. *Mots clés* : Dromadaire - *Camelus dromedarius* - Hydatidose - Test immunologique - Soudan.

INTRODUCTION

Camels and cattle have been shown to be important intermediate hosts for echinococcosis in the Sudan (7). A prevalence rate of 48 p. 100 in camels and 3.8 p. 100 in cattle was reported. In Tambool area (Central Eastern Sudan), the prevalence in camels and dogs was estimated to be 45 p. 100 and 51 p. 100 respectively.

An approach to controlling hydatidosis could include the elimination of the parasite in camels and other ruminants as well as dogs. If it were possible to identify camels, then the infected animals could be removed selectively. CONDER *et al.* (2) believed that the development of this type of control programme had been limited by the lack of sensitive and specific methods for diagnosing hydatidosis.

Due to recent advances in immunodiagnosis of hydatid disease in man, KAGAN (4) suggested that hydatidosis in domestic animals might be detected reliably by using immunodiagnostic techniques.

This study was designed to evaluate the potentiality of two immunodiagnostic techniques namely the indirect haemagglutination (IHA) and the immunoelectrophoresis (IEP) for identifying camels infected with hydatid cysts.

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MATERIALS AND METHODS

Serum samples

Sera were collected from camels at slaughter. Carcasses were then examined and positive camels identified. Seventy-six sera were collected of which 28 were from infected animals. Sera for the test were stored at -20 degrees Celsius until used. One ml serum samples aliquots were freeze-dried in an Edwards EFO3 centrifugal freeze-drying machine and stored in a refrigerator until used in the IEP test. When the freeze-dried sera were to be tested each sample was dissolved in 0.2 ml distilled water to have a 5-times serum concentration.

Testing of sera

The IHA and IEP were conducted and interpreted as described in the leaflet provided with the commercial antigens. Due to shortage of antigen only 25 negative sera were run in the IEP test.

All reagents for the IHA and IEP tests were commercially purchased from Bio-Mérieux Laboratory Reagents and Products Ltd., France.

RESULTS

When the IHA test was applied on the 28 sera from necropsy positive animals, 12 (43 p. 100) showed positive results and 16 (57 p. 100) were negative. In the case of sera from necropsy negative animals 15 (31 p. 100) were positive and 33 (69 p. 100) were negative (Table I). These results indicate a sensitivity of 43 p. 100 and a specificity of 69 p. 100.

Of the 28 sera from necropsy positive animals, 16 (57 p. 100) had a titre less than 1:100, 6 (21 p. 100) had a titre of 1:100, 3 (11 p. 100) had a titre of 1:200, 1 (4 p. 100) had a titre of 1:400 and 2 (7 p. 100) had a titre of 1:800. The necropsy negative animals showed slightly different results (Table II).

TABLE I Comparative results of gross examination and the indirect haemagglutination (IHA) test.

IHA test results	Necropsy results		Total
	Positive	Negative	
Positive	12	15	27
Negative	16	33	49
Total	28	48	76

TABLE II Indirect haemagglutination (IHA) titres of sera tested from both necropsy positive and necropsy negative camels.

Donors	IHA negative	IHA positive at titres			
		1 : 100	1 : 200	1 : 400	1 : 800
Necropsy positive	16 57 p. 100	6 21 p. 100	3 11 p. 100	1 4 p. 100	2 7 p. 100
Necropsy negative	33 69 p. 100	3 6 p. 100	7 17 p. 100	3 6 p. 100	2 4 p. 100

With the IEP test, necropsy positive animals showed 10 (36 p. 100) positives and 18 (64 p. 100) negatives. In case of necropsy negative animals, 4 (16 p. 100) were positive and 21 (84 p. 100) were negative (Table III). These results indicate a sensitivity of 36 p. 100 and a specificity of 84 p. 100.

TABLE III Comparative results of the necropsy examination and immunoelectrophoresis test (IEP).

IEP test results	Necropsy results		Total
	Positive	Negative	
Positive	10	4	14
Negative	18	21	39
Total	28	25	53

Twelve (43 p. 100) necropsy positive animals were negative by both serological tests, 8 (29 p. 100) were detected by both tests, 5 (18 p. 100) were detected by the IHA test only and 3 (11 p. 100) were detected by the IEP test.

Of the 28 necropsy positive animals, two had cysts located in both livers and lungs. Sera from these two animals were positive by the two tests used in this work.

DISCUSSION

From these findings, it was clear that a sensitivity rate of 43 p. 100 and 36 p. 100 for the IHA and IEP respectively were very low.

In other parts of the world higher sensitivity rates for the IHA were reported but most of the work was done on human sera. A sensitivity of 83.3 p. 100 was reported by MOCH *et al.* (6) and 83 p. 100 by SORICE and CASTAGNARI (8). In Nigeria DADA *et al.* (3) who tested 26 hydatid positive camel sera, showed that 72 p. 100 of these sera had diagnostic IHA titres.

With the IEP test, the sensitivity rate in this study was in close agreement with 38.9 p. 100 sensitivity reported by DADA *et al.* (3). Higher sensitivity rates of 75 p. 100 and 85.5 p. 100 were observed by SORICE and CASTAGNARI (8) and CAPRON *et al.* (1) respectively, but both authors were working with human sera.

A high rate of IEP specificity (84 p. 100) was observed in this study, a finding which is consistant with that reported by VARELA-DIAZ *et al.* (9) but the authors were still working with human sera.

The variation in the reported sensitivity of the IHA may well be due to differences in the biological interaction of the host with the local strain of *Echinococcus granulosus*. This might explain the low sensitivity rate encountered in this study.

Another possible reason for the low sensitivity is that in 26 hydatid positive camels, the cysts were located in the lungs. KAGAN *et al.* (5) concluded that cysts located in the lung generally provoked less immunological reactivity than cysts in other sites. WARNER and FELIZA (10) observed that the sensitivity of the test increased when both the liver and lung were infected. In this study, there were only two cases with both liver and lung infection, and both showed positive reactions with the IHA and IEP tests.

The highest titre recorded for the IHA test in this work was 1:800. According to CONDER *et al.* (2), such titres were more specific because they helped to eliminate cross reactions. Even this statement seemed to be controversial as we found that even at this high titre there was no significant difference between positive and negative sera.

The rate of IHA false positives was 32 p. 100. This could be attributed to the fact that during inspection in slaughterhouses one is liable to overlook some of the smaller cysts especially if they are located in organs other than the lung and spleen (the organs normally inspected). Gross inspection also will not detect the infection at its early stages prior to the development of cysts, a process which may take several months before the cysts attain palpable size.

Although many authors reported favourably on the high sensitivity and specificity of both tests, yet our report shows that the IHA is not reliable test for the diagnosis of hydatidosis in camels. The IEP on the other hand has got a high specificity but its sensitivity will require some improvement before it can be used to facilitate a prompt diagnosis of hydatidosis in camels.

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SAAD (M. B.), HASSAN (A. K. M.). Indirect haemagglutination (IHA) and immunoelectrophoresis in the diagnosis of hydatidosis in Sudanese camels. *Revue Élev. Méd. vét. Pays trop.*, 1989, **42** (1) : 41-44.

The efficiency of indirect haemagglutination (IHA) and immunoelectrophoresis (IEP) as means of detection of cystic hydatid infection in camels was investigated. Both IHA and IEP showed very low detection rates of antibody in camel sera. The IEP showed 84 p. 100 specificity and 36 p. 100 sensitivity while the IHA showed 69 p. 100 specificity and 43 p. 100 sensitivity. These results are discussed. *Key words* : Camel - *Camelus dromedarius* - Hydatidosis - Immunological test - Sudan.

SAAD (M. B.), HASSAN (A. K. M.). Hemaglutinación indirecta e inmunoelectroforesis en el diagnóstico de la hidatidosis de los dromedarios en el Sudán. *Revue Élev. Méd. vét. Pays trop.*, 1989, **42** (1) : 41-44.

Se averiguó la eficacia de la hemaglutinación indirecta y de la inmunoelectroforesis como medios para evidenciar la hidatidosis en los dromedarios. Ambas técnicas mostraron porcentajes muy reducidos de detección de anticuerpos en el suero de los dromedarios. La inmunoelectroforesis mostraba una especificidad de 84 p. 100 y una sensibilidad de 36 p. 100 mientras que la hemaglutinación indirecta mostraba una especificidad de 69 p. 100 y una sensibilidad de 43 p. 100. Se discuten dichos resultados. *Palabras claves* : Dromedario - *Camelus dromedarius* - Hidatidosis - Técnica inmunologica - Sudán.

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