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BRUCELLOSIS IN CAMELS AND ITS RELATION TO PUBLIC HEALTH

(With 3 Tables)

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مرض البروسييلوس في الجمال وعلاقته بالصحة العامة

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لتحديد مدى إصابة الجمال بمرض البروسييلوس في محافظة شمال سيناء، تم جمع ٥٩٢ عينة مصل من الجمال بمنطقة البحث وتم فحصها سيرولوجيا باختبار الكارت (التلبد السريع) واختبار التلبد البطيء الألبوبي. وجد أن النسبة الكلية للإصابة بمرض البروسييلوس في الجمال ١,٧%، وكان أعلى معدل للإصابة في الجمال التي أعمارها أكثر من ٥ سنوات (٣,٩٨%). وتبين أن معظم حالات الإصابة كانت بين الجمال التي في تلامس أو ترعى في نفس المكان التي كانت تعيش فيه الأغنام والماعز. وعلى الجانب الآخر تم جمع عدد ٣٣٠ عينة مصل من المرضى بمستشفى الحميات بالعريش وبعض الرعاة المتعاملين مع الجمال والأغنام والماعز بمنطقة البحث، وتم فحص هذه العينات بالاختبارات السيرولوجية السابقة. وجد ثلاث حالات فقط موجبة سيرولوجيا للبروسيلا (٠,٩%) وكانت هذه الحالات الثلاثة من الرعاة التي ترعى الجمال والأغنام والماعز. وبالنسبة لعزل البروسيلا، تم عزل عترة بروسيلا ميليتنس النوع الثالث من ألبان عدد ٢ أنتي الجمال الموجبة للاختبارات السيرولوجية السابقة. وأتضح من هذه الدراسة أن مصدر عدو الجمال بعترة البروسيلا ميليتنس في منطقة البحث هي الأغنام والماعز المصابة وهذا بدوره يشكل خطورة على الصحة العامة.

SUMMARY

Sera of 592 apparently normal camels (*Camelus dromedarius*) from North Sinai Province were examined serologically by the Card test and Standard tube agglutination test (STAT). The overall seroprevalence of brucellosis among tested camels was 1.7%. The high rate of *Brucella* infections was recorded among the age group over 5 years (3.98%). It was observed that most cases of infected camels with brucellosis were recorded in those living in contact or grazing in sheep or goat pastures. On the other hand, only three out of 330 human sera (0.09%) were

seropositive for brucellosis by the previous serologic tests. These human seropositive cases were nomads involving in caring of camels, sheep and goats. Two isolates of *Brucella melitensis* biovar 3, which was the only strain, isolated from the milk of two seropositive She-camels with STA-antibody titers of $\geq 1: 1280$. Generally, brucellosis in camels, in the investigated area, appeared to be connected with *Brucella melitensis* of sheep and goats and this constitutes a serious public health problem.

Key words: *Brucellosis, camels.*

INTRODUCTION

Up to the present time brucellosis remains as a major problem of Public health in many countries of the Middle East. Its prevalence has increased in recent years, especially in countries, which have promoted change from traditional low density to intensive methods of dairy farming (Refai, 1994 and Ahmed and Abdel-Aal, 1996). *Brucella* spp. are Gram-negative intracellular pathogens that cause disease in a variety of domestic and wild mammals (Nicoletti, 1989). Brucellosis in camels is prevalent in the countries surrounding Egypt particularly the Sudan, Libya and Saudi Arabia (Gameel *et al.*, 1993; Agab *et al.*, 1994 and Radwan *et al.*, 1995). Brucellosis in camels was reported for the first time in Egypt by Ahmed (1939) who published an incidence of 3.5%. Other studies in Egypt reported an incidence of brucellosis in camels, ranged from 2.02% to 10.29% (Hamada *et al.*, 1963; Fayed *et al.*, 1982; Zaghoul and Kamel, 1985 and Gadalla, 1991). Moreover, Atwa (1997) investigated the seroprevalence of brucellosis in 1258 camels imported from Kenya and Giputi at Suez quarantine and 116 she-camels from different governorates of Egypt. The incidence of brucellosis in imported camels and local camels were 4.05% and 7.75% respectively by using Rosal Bengal test.

Camel husbandry has been practiced in north Sinai, Egypt, in small farms and grassing animals. These animals and their products play an important part in the economy of this area and in the nutrition of the populace. In view of scarce information regarding brucellosis among camels in North Sinai Province. The present study was undertaken to determine the current status of prevalence of brucellosis among single humped camels (*Camelus dromedarius*) in this area with throwing the light on its public health significance.

MATERIAL and METHODS

Serologic examination:

A total of 592 blood samples were collected from single humped camels (*Camelus dromedarius*) from different areas of North Sinai Province.

On the other hand, a total of 330 blood samples were collected from patients of El-Arish fever hospital and others were involved in caring the examined camels. These individuals were requested to answer a series of questions in order to obtain more information such as name, address, age, sex, occupations and their feeding habits.

Each sample was marked and identified, then transferred to the laboratory of the Faculty of Vet. Med, Suez Canal University for preparation and maintenance of the serum.

All serum samples were first screened for *Brucella* antibodies using Buffered *Brucella* antigen (Card test), produced by veterinary Services, Animal and Plant Health Inspection Services (APHIS) U.S. Department of Agriculture. Then followed by Standard tube agglutination test (STAT) (Serum and Vaccine Res. Inst. Abbasia), in which a titer of 1/40, i.e. 50% agglutination (80 I.U./ml) or above indicates positive reaction (Alton et al., 1975).

Bacteriological examination:

Milk samples were collected aseptically from *Brucella* seropositive She- camles and also human blood samples were collected aseptically from positive reactors. These milk and blood samples were bacteriological examined for *Brucella* organisms using direct culture. *Brucella* agar medium containing antibiotics was used, incubated at 37 °C in an atmosphere of 10% CO₂ for 6 days then examined for *Brucella* colonies. Isolates were identified as *Brucella* species by their colony morphology, Gram stain, urease and oxidase reactions, H₂S production, growth on dyes; thionin & basic fuchsin, and agglutination with *Brucella* specific antisera (Central Vet. Lab. Weybridge, England) (Alton et al., 1988).

RESULTS

The prevalence of *Brucella* infections among the examined camels according to their age summarized in Table (1). Of 592 camel sera tested, 6(1.01%) and 10 (1.7%) samples were found positive for brucellosis with STAT and Card test respectively. The high rate of

Brucella infections was recorded among age group over 5 years (3.98%). It was recorded one case of *Brucella* infection among age group 4-5 years and another case of *Brucella* infection in the age group less than one year as tested by Card test. In *Brucella* STA-antibody titers of seropositive camels; two had titers of 1:80, one had a titer of 1:320 and three had titers of $\geq 1:1280$.

In Table (2); distribution of brucellosis among the examined camels according to their contact or grassing with sheep and/or goats. There was only one case of *Brucella* infections among the camels which were not live in contact with sheep and/or goats (0.8%). While, 9 (1.97%) out of 458 camels, which were in grassing with sheep and/or goats, were infected with brucellosis.

On the other hand, the prevalence of brucellosis among the examined human beings according to their age and sex illustrated in Table (3). It was found that 3 (0.9%) out of 330 human sera were positive for brucellosis by STAT and Card test. Two of the *Brucella* seropositive cases (age group 20-30 years) were females (8.7%); one had a STA-titer of 1:320 and the other had a titer of 1:640, and the third was male, aged 18 years (2.04%), had a STA-titer of 1:160. The three positive human cases were nomads involving in caring of camels, sheep and goats.

Bacteriologically, two *Brucella* isolates were obtained from the milk of two She-Camels and identified as *Br. Melitensis* biovar 3. These She-Camels were given positive serological reaction to all the previously mentioned tests with *Brucella* STA-antibody titers of $\geq 1:1280$. It was failed to isolate *Brucella* organisms from human blood samples of seropositive cases.

Table 1): Prevalence of brucellosis among the examined camels according to their age.

Age / year	Total No. examined	Positive			
		STAT.		Card test	
		No.	%	No.	%
Less than 1 year	43	0	0.0	1	2.3
- 2	61	0	0.0	0	0.0
- 3	83	0	0.0	0	0.0
- 4	99	0	0.0	0	0.0
- 5	105	1	0.95	1	0.95
Over 5	201	5	2.5	8	3.98
	592	6	1.01	10	1.7

Table 2: Brucellosis among camels according to their living in contact or grassing with sheep and /or goats.

Living or grassing of camels	Total No. examined	Positive	
		No.	%
In contact with sheep and / or goats	458	9	1.97
Without contact with sheep and /or goats	134	1	0.8
	592	10	1.7

Table 3: Prevalence of brucellosis among the examined human beings according to their age and sex.

Age /year	Male		Female		Total	
	No.	+ve(%)	No.	+ve	No.	+ve(%)
Less than 10	28	0 (0.0)	21	0 (0.0)	49	0 (0.0)
20	49	1 (2.04)	35	0 (0.0)	84	1 (1.2)
30	55	0 (0.0)	23	2 (8.7)	78	2 (2.6)
40	25	0 (0.0)	18	0 (0.0)	43	0 (0.0)
Over 50	29	0 (0.0)	47	0 (0.0)	76	0 (0.0)
	186	1 (0.5)	144	2 (1.4)	330	3 (0.9)

DISCUSSION

Brucellosis is widely regarded as an extremely insidious disease demanding the most exhaustive care in diagnosis. No single test is capable of giving conclusive diagnosis in picking up of all positive cases (Morgan *et al.*, 1978 and Sutherland, 1980). So, in the present study, Card test and standard tube agglutination test (STAT) were used to detect *Brucella* antibodies among the examined sera of camels and man. The overall *Brucella* seroprevalence estimates in camels, in this study, were nearly similar to those reported by Gadalla (1991) in Upper Egypt (2.02%) and Afzal and Sakkir (1994) in United Arab Emirates (1.5%). However, it was lower than those reported in other areas of Egypt by Hamada *et al.*, 1963 (10.29%); Fayed *et al.*, 1982 (8.3%); Zaghoul and Kamel, 1985 (8.1%); Atwa, 1997 (7.75%), and Soliman, 1998 (8%). Moreover, this result was lower than those reported in the neighboring countries by Yagoub *et al.* (1990) in the Sudan (7%); Gameel *et al.* (1993) in Libya (4.1%) and Radwan *et al.* (1995) in Saudi Arabia (8%).

These serological variations in frequency percentages reported in the available literature may be attributed to age, sex, the areas from which animals were examined and different techniques adopted.

Regarding the age of the tested camels, the highest positive reactors were recorded among the age group over 5 years (3.98%). This finding supports the view of Shakya *et al.* (1995) and Kadohira *et al.* (1997) who reported that brucellosis is the disease of sexually mature animals.

Camel scum samples positive to Card test and negative to STAT, in the present study, could mean that these animals were suffering from chronic brucellosis. This is due to the fact that Card test is highly sensitive test and can detect low titer as in case of chronic brucellosis, that can not be considered positive by the quantitative test (Nicoletti, 1969; Bassiony and Ibrahim, 1997 and Seddek, 1999).

It is significant to observe that most cases of infected camels were recorded in those living in contact or grazing in sheep and goat pastures. In view of, *Brucella* infections of sheep and goats with an incidence 7.9% and 8.6% respectively as recorded by Soliman (1998) in Suez Canal area and North Sinai. These findings suggest that the continuous movement of infected sheep and /or goats searching for suitable pastures and where veterinary sanitary measures are more or less lacking, constitute favorable conditions for the creation of super infection and a source of infection for other animal species (Luchsinger and Anderson, 1979; Abou-Eisha, 1986 and Mrunalini and Ramasastry, 1999).

From the aforementioned results, older age and free grazing camels were associated with higher *Brucella* seroprevalence. The probability of disease transmission within and among animals increases with the frequent animal movements in semi-arid areas where extensive pastoralism is practiced (Thimm and Wundt, 1979 and Crawford *et al.*, 1990).

Concerning brucellosis in man, in this present study the seroprevalence of human brucellosis was lower than those reported in other areas of Egypt by Amer, 1989 (18.75%) and Soliman, 1998 (10.6%). This result indicate that the rate of incidence of the disease in human is greatly affected by the rate of the disease in animals (Alton, 1990).

In contrast to other studies (Spink, 1956 and Buchanan *et al.*, 1976) both the exposure rate and the proportion of active disease were

higher among females (1.4%) than males (0.5%). This may reflect cultural and social behavior patterns where the female is actively involved in caring for domestic animals (Alballa, 1995). It was observed that seropositivity was significantly associated with occupational exposure through direct contact with infected animals and also raw milk ingestion where the feeding habits, in the investigated area, were drinking the milk of camels without boiling. This is consistent with the findings of others (Young, 1983; Mousa et al., 1988; Gameel, 1993; Radwan, 1995 and Soliman, 1998).

Regarding the bacteriological isolation of *Brucella* organisms from the seropositive camels in this study. Two *Brucella* isolates of *Brucella melitensis* biovar 3, were isolated from the milk of two She-camels which had STA-antibody titers of $\geq 1:1280$. While, it was failed to isolate *Brucella* organisms from human blood of seropositive cases. This may be attributed to the wide spread use of antibiotics and the low STA-*Brucella* antibody titers among the human seropositive cases. This result revealed that the best chance for isolation could be obtained from man and animals with high blood titers (Shini and Tabatabaz, 1981 and El-Gibaly, 1993).

Brucella melitensis is primarily found wherever intensive sheep and goat cultures exist (Metcalf et al., 1994). Moreover, It is considered the indigenous strain prevalent in sheep and goats in Egypt (EL-Gibaly et al., 1993). These data suggest that brucellosis in camels, in this study, is connected with *Brucella melitensis* of sheep and goats (Radwan et al., 1992). This finding should draw the attention to the serious role played by sheep and goats in transmission of the disease to camels. In turn, the infected camels may act as disseminator of *Brucella melitensis* and this constitute a serious public health problem since *Brucella melitensis* is more pathogenic strain for man.

Generally, this work has provided evidence that the prevalence of brucellosis, in the investigated area, calls for strict measures to be taken to combat the spread of this disease. This situation requires in our opinion to give more attention to sheep and goats with regard testing, slaughtering and vaccination in order to eliminate the hazard of infection among camels and possibly man with species.

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