

BOVINES AS A SOURCE OF BRUCellosIS IN EGYPT

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PREVIOUS studies at the U.S. Naval Medical Research Unit No. 3 (NAMRU-3) have shown that brucellosis is not uncommon in Egypt and usually occurs in persons having close contact with domestic animals, such as farmers and butchers (1-3). The type of animal usually associated with human brucellosis in Egypt was not known, but goats were suspected since all strains of *Brucella* isolated at NAMRU-3 behaved biochemically like *Brucella melitensis* (1). However, brucellae have been isolated from a variety of animals in Egypt, including ewes, camels, and pigs (4); goats and water buffaloes (5); and gazelles (6). The present study was therefore undertaken to determine which, if any, of these animals were important in transmission to humans.

Methods

Expeditions were conducted during 1961, 1962, and 1963 to areas of Egypt representing distinct ecological or sociological situations (fig. 1). In each area blood specimens were collected from humans or slaughtered domestic

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animals and were analyzed for *Brucella* agglutinins. Specimens were collected from apparently normal persons of both sexes and various ages so as to insure representative samples. Results of some of these surveys have been reported previously (table 1).

Serums were screened for *Brucella* agglutinins by the rapid slide method and positives checked for 50 percent end titers by macroscopic tube dilutions, using *Brucella abortus* antigens supplied by Lederle Laboratories and Walter Reed Army Institute of Research, respectively. Titers are expressed in terms of International Units (I.U.) of antibody per milliliter (7). In our hands, the *Brucella* agglutination test has been a sensitive and specific indicator of past exposure to brucellosis, particularly when more than 100 I.U. of antibody is found (1).

In addition, small outbreaks of brucellosis occurring near Cairo were investigated. Such outbreaks usually came to our attention when patients with brucellosis undergoing treatment at NAMRU-3 reported that others in their families or villages were sick. In these instances, such data and blood specimens as seemed appropriate were collected from the area.

Results

Distribution of brucellosis in Egypt. A review of records of patients with proved brucellosis admitted to NAMRU-3 wards during the past 10 years revealed that all cases were from Lower Egypt. All provinces of the Nile Delta, as well as Faiyum, Suez, Port Said, and Beni Suef were represented (fig. 1). Water buffaloes (gamooses) and cattle are found throughout these provinces, but are less common to the south and are absent in desert areas. Serologic

surveys showed elevated *Brucella* agglutinins in the serums of more than 7 percent of persons in areas near Cairo (8); but practically none in Egyptians from Upper Egypt (Luxor and Aswan), from the Western Desert (9), or from Siwa Oasis (10) (table 1). Results of serologic tests on abattoir blood specimens revealed *Brucella* agglutination titers of 100 I.U. or more in cattle and gamooses in both Upper and Lower Egypt and in a single camel in Cairo (table 2). The prevalence of positive tests in all areas tested was 4.8 percent in cattle and 1.9 percent in gamooses.

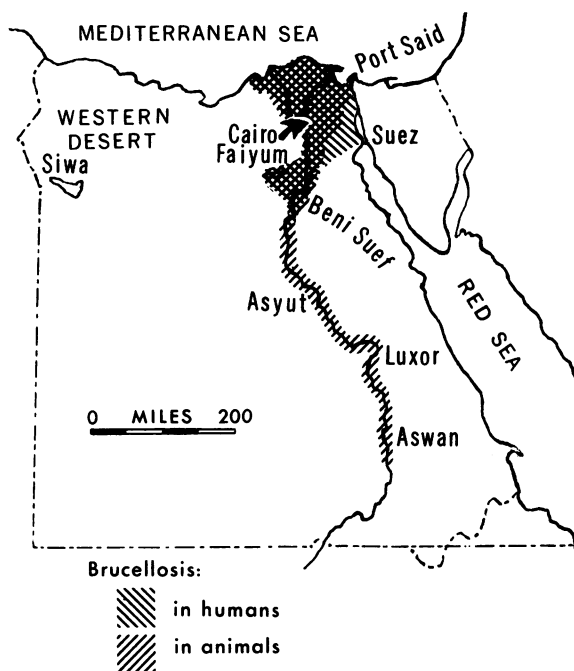
Brucellosis in a small village near Cairo. In the fall and spring of 1960, an outbreak of brucellosis occurred in Ezbet Emba, a small village of 120 persons 25 kilometers north of Cairo. Each of five families had one member with proved brucellosis. Of 32 additional persons in the families, 9 had *Brucella* agglutination titers of 100 I.U. or more, 17 were negative, and 6 were not tested. Specimens were taken from animals belonging to these persons with the exception of 2 gamooses and 3 donkeys. Eight goats, two sheep, two cows, and three donkeys had no antibodies, but three of eight gamooses had titers of more than 100 I.U. In one family, two of their gamooses had elevated *Brucella* agglutinins (1:160 and 1:320 I.U.), and one had aborted in the 7th month of pregnancy; in another family, a gamoos was also positive (1:100) and had aborted in the 8th month.

Brucellosis in a single family. Three mem-

Table 1. *Brucella* agglutination tests in Egyptians

Area	Number tested	Positive			
		40 I.U. or more		100 I.U. or more	
		Number	Per cent	Number	Per cent
Villages near Cairo (8) ----	1,046	157	15.0	77	7.4
Luxor (present study) ----	190	0	0	0	0
Aswan (present study) ----	219	5	2.3	1	.5
Western Desert (9) ----	572	0	0	0	0
Siwa Oasis (10) ----	197	0	0	0	0

Figure 1. Map of Egypt showing distribution of brucellosis



bers of the same family living on the outskirts of Cairo were admitted to NAMRU-3 with proved brucellosis in 1960. When it was learned that other members of the family living under the same roof had symptoms suggesting brucellosis, histories and blood specimens were taken, and it was found that all but one of the remaining seven persons in the family had a history of illness and *Brucella* agglutination titers from 160 to more than 5,000 I.U. (fig. 2). The distribution of onsets of illness in family members suggests a common time of exposure, probably in early January. This family had no domestic animals other than chickens and ducks but often drank gamoos milk or ate white cheese made from it.

Infection in dairy farm laborers. Four laborers working in a dairy farm about 40 miles north of Cairo were admitted to NAMRU-3 with proved brucellosis within one month. There was no illness in other members of their families, and none owned domestic animals. In two families, it was possible to test for *Brucella* agglutinins: none were present. All of the laborers worked with dairy cattle at the farm and drank their milk. Unfortunately, it was not possible to bleed the cattle, but *Brucella* milk

ring tests on 80 milk samples from the farm showed two positives, using antigen from the U.S. Department of Agriculture.

Discussion

Since most Egyptians do not wander far from their villages, the location of their homes probably coincides with areas where the disease was acquired. Patients admitted to NAMRU-3 with proved brucellosis were all from Lower Egypt. Results of surveys for *Brucella* agglutinins indicate that the disease in humans is not prevalent outside this area (fig. 1). The apparent absence of brucellosis in desert areas is considered to be due to the absence of an infected animal reservoir. Gamooses and cattle are not found away from the Nile (9, 10). Results of examination of abattoir blood specimens showed serologic evidence of brucellosis in cattle and gamooses throughout the Nile Valley, but, although all domestic animals are quartered together in Egypt, sheep and goats were seronegative in areas where they were tested (table 2).

Gamooses are further incriminated in transmission of brucellosis to humans by results obtained from Ezbet Emba, where serum *Brucella*

agglutinins were found only in such animals. In the case of the dairy workers, the fact that they had no animals of their own suggests that they acquired their infection from dairy cattle. In the heavily infected family on the outskirts of Cairo, times of onset of illness are compatible with a common time of exposure. This family had no domestic animals, and of the common vehicles usually associated with brucellosis transmission, only gamoos milk and white cheese made from it are consumed in any quantity in Egypt.

Sheep and goats do not appear to be involved in transmission of brucellosis to Egyptians, despite the fact that strains of *Brucella* isolated at NAMRU-3 have all been classified as *Brucella melitensis*. Although the organisms grew without carbon dioxide and in the presence of dyes, it is possible that they might resemble *Brucella intermedius* serologically, but such serologic differentiation was not possible at this time.

Conclusions

Human brucellosis in Egypt appears to be limited to Lower Egypt, but *Brucella* agglutinins were found in the blood of cattle and water

Figure 2. Findings on outbreak of brucellosis in one family, showing for each member, age, sex, month of onset of illness, and results of laboratory studies

Male, age 57			Female, age 45		
Onset March			Onset February		
Culture Positive, May 11			Titer 1:640, May 3		
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Male, age 25	Female, age 20	Male, age 20	Female, age 18	Male, age 15	Female, age 12
Onset February	Not sick	Onset March	Onset February	Onset February	Onset May
Culture Positive, May 11	Titer Negative, December 8	Culture Positive, July 29	Titer 1:1280, December 8	Titer 1:5000, May 2	Titer 1:2560, July 29
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Male, age 4		Female, age 6			
Onset February		Onset January			
Titer 1:640, December 8		Titer 1:160, December 8			

Table 2. Brucella agglutination tests in domestic animals in Egypt, by abattoir

Animal	Cairo			Asyut			Luxor			Aswan			Total		
	Number tested	Positive ¹		Number tested	Positive ¹		Number tested	Positive ¹		Number tested	Positive ¹		Number tested	Positive ¹	
		Number	Percent		Number	Percent		Number	Percent		Number	Percent		Number	Percent
Cattle.....	102	6	5.9	112	2	1.8	35	2	5.7	129	8	6.2	378	18	4.8
Gamooses.....	99	0	0	139	6	4.3	31	0	0	96	1	1	365	7	1.9
Sheep.....	101	0	0	76	0	0	10	0	0	106	0	0	293	0	0
Goats.....	62	0	0										62	0	0
Camels.....	65	1	1.5							20	0	0	87	1	1.1

¹ 100 I.U. or more.

buffaloes (gamooses) in both Upper and Lower Egypt.

Investigations of small outbreaks of brucellosis, including one in a family where 9 of 10 persons were affected, suggest that cattle and gamooses, or their milk, are involved in transmission of the disease to humans.

No evidence was found to associate sheep or goats with human brucellosis in Egypt.

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Operation of Homemaker Services

"How To Operate a Community Homemaker Service" is a new manual prepared by the Woman's Auxiliary to the American Medical Association. The publication, which suggests efficient administrative techniques and procedures in operating a community homemaker service, is a companion piece to the auxiliary's earlier publication, "How To Plan a Community Homemaker Service." The manuals are available without charge from either the Woman's Auxiliary to AMA or the Council on Medical Service, both at 535 North Dearborn Street, Chicago, Ill.