

## **BRUCELLOSIS IN A RURAL COMMUNITY**

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**S**TIMULATED by the interest aroused by the imminent introduction of the voluntary scheme for the eradication of brucellosis among cattle, I decided that it would be useful to establish the incidence of this infection in the population of the rural area in which I practise. Also, as a general practitioner, I was uncomfortably aware that, owing to the protean and nebulous character of the symptomatology of brucellosis, I might be missing cases. Some idea therefore of its incidence in this part of the country would provide a useful baseline for my 'suspicious index'.

In the United Kingdom, human brucellosis is always bovine in origin and is caused by drinking raw milk infected with *Brucellus abortus* or by direct contact through a break in the skin, or the conjunctiva or by the inhalation of infected dust, as is common in the veterinary profession. Kerr *et al.* (1960) examined 309 veterinary practitioners and found that 196, i.e. 63 per cent had serological evidence of infection with brucella organisms and 85 of 309, i.e. 27 per cent had symptoms and signs which, taken in conjunction with their serological results, might suggest a diagnosis of chronic brucellosis. Likewise, farmers, cattlemen and dairy workers who are in contact with calving cows may become directly infected.

It is estimated that 23 per cent of dairy herds in the North of Scotland are infected by *Br. abortus*. Brucellosis is not a notifiable disease so that the accurate incidence among the human population is not known; but it is likely that it varies from area to area dependent on the health of the dairy herds supplying the community. In the Orkney survey (Brodie and Gordon 1967), the sera from 100 consecutive blood samples submitted to the Aberdeen Blood Transfusion Centre during September 1965 to January 1966 for antenatal Rhesus testing or blood grouping, were examined by several tests for antibodies to *Br. abortus*. Some 39 gave results suggesting subclinical brucellosis, or at least past exposure to infection with *Br. abortus*. During the period October 1965 to August 1966, the milk from 107 dairy herds in the area were examined by the milk

ring test and culture method and 33 gave positive results and ten of these yielded *Br. abortus* by cultural or biological methods. There had been six acute cases of brucellosis in humans in Orkney in 1965 as compared with an average of one or two in previous years.

### Clinical features

Brucellosis, being so protean in its manifestations, presents the general practitioner with a diagnostic problem of the utmost difficulty. In the acute case, the classical symptoms of recurrent fever, lassitude and night sweats are seen. The disease may present as a single acute or subacute episode which may be succeeded by months or even years of chronicity with or without periodic flare-up of the infection. On the other hand it may develop insidiously in the chronic form without an initial acute attack. Weakness, malaise, headache, depression, anorexia, myalgia, arthralgia and gastrointestinal symptoms may all be complained of in varying degree and combination. Physical examination in the chronic case is likely to be unrewarding and a diagnosis of anxiety neurosis is apt to be made.

Brucellosis is said to be an uncommon infection in childhood but cases of monarticular arthritis caused by *Br. abortus* have been described recently by A. Adam *et al.* (1967) who suggest that local manifestations of brucella infection in children are much commoner than was previously thought.

A mortality of 1.6 per cent was given by Dalrymple-Champneys (1960) for his series and he added that brucella by itself was very rarely the sole cause of death. On the other hand, although the mortality is low, there is considerable evidence to suggest that brucellosis may be responsible for a great deal of chronic ill-health.

### The laboratory in diagnosis

In man, as in animals, isolation of the infecting organism is the only proof of brucella infection. This is difficult to achieve; and in chronic cases where the infection has become intracellular, positive blood cultures are seldom obtained. Diagnosis depends therefore on serological tests which, taken together with the clinical and epidemiological evidence, can substantiate a diagnosis of chronic brucellosis.

The conventional agglutination test is held to be of doubtful value when the disease has become chronic; the level of certain immune globulins may fall below a level at which they may be detected by this method.

The anti-human globulin (Coombs') test can detect non-agglutinating antibodies when they have fallen to a low level in chronic brucellosis.

The complement fixation test can also do this and furthermore it can detect the immunoglobulins that seem to be directly associated with the activity of the infection (Kerr *et al.* 1966).

A recent test demonstrating the presence of mercapto-ethanol-resistant

IgG-type, 7S immunoglobulins, may be useful in distinguishing the active from the inactive disease (Reddin *et al.* 1965).

In general, in order to confirm a clinical diagnosis of active brucella infection, the following titres are acceptable:

1. Direct agglutination test 1:320 or greater.
2. Complement fixation test 1:20 or greater.
3. Anti-human globulin (Coombs') test 1:320 or greater.

After treatment with mercapto-ethanol, a titre of 1:160 or over is significant.

#### Method of survey

When the Aberdeen Blood Transfusion Unit visited the area on 19 April 1967, specimens of blood were taken from 93 donors and submitted to the bacteriology department of Aberdeen Royal Infirmary. The number was made up to 100 by seven specimens taken from patients attending the surgery who appeared to fulfil the criteria of blood donors. Of the 100 samples, 24 were from females and 76 from males: 27 were farmers or farm workers and there was one butcher.

This sample represents a wide cross section of the community, but of course excludes those under 18 and over 65 years of age, in both of which age groups the incidence of brucellosis is reputed to be lower than in the age group investigated here. On the other hand, blood donors might be considered to be a section of the community in which one would not expect to find a high incidence of subclinical infection.

#### Incidence of acute cases and health of dairy herds in the area

During 1966, two cases of acute brucellosis in humans have been diagnosed in the area and two dairy herds have been found to be affected by *Br. abortus*. One herd was the regular milk supply to two of the patients whose cases are reported here and has now been cleared following the sale of those infected cows. The medical officer of health has no authority in the disposal of infected animals and they were sold in the open market, possibly to be bought by another farmer as milk cows. Milk from the other herd is being pasteurized. The farmer, however, is unwilling to incur the expense of employing his own veterinary surgeon to track down the infected animals and has not yet participated in the Accredited Herd Scheme.

Virtually all milk retailed in this area is unpasteurized.

*Results of serological tests.* Of the 100 sera tested, 12 showed positive titres in one or all tests indicating past or present contact with *Br. abortus* (table I). Of these 11 were males and one female, confirming the preponderance of males to females affected by this organism, a fact which may be related to increased occupational

**TABLE I**  
**SEROLOGICAL FINDINGS IN 12 CASES WITH POSITIVE TITRES, 19 APRIL 1967**

<i>Case no.</i>	<i>S. Ag.</i>	<i>C.F.</i>	<i>A.H.G.</i>	<i>ME. Ag.</i>
1 .. .. .	<20	5 Tr. 10	80 P. 160	N.D.
2 .. .. .	40	5 P. 10	160	N.D.
3 .. .. .	20 P. 40	Nil	80	N.D.
4 .. .. .	80 P. 160	10 P. 20	160 P. 320	40 P. 80
*5 .. .. .	640 P. 1280	160	1280	640 P. 1280
6 .. .. .	40 P. 80	20	160 P. 320	N.D.
7 .. .. .	<20	10 P. 20	320 P. 640	Tr. 80 Tr. 160
8 .. .. .	<20	P. 5	160 P. 320	N.D.
9 .. .. .	20 P. 40	Nil	Nil	N.D.
10 .. .. .	40 P. 80	10 P. 20	80	N.D.
*11 .. .. .	160 Tr. 320	40	640	160 Tr. 320
12 .. .. .	20	5	20	N.D.

ME.Ag.—agglutination after treatment with mercapto-ethanol.

\*Case diagnosed as clinical brucellosis.

risk. Also noteworthy in this respect was the fact that eight of the 28 people in the high risk occupations, as compared with four of the 72 others, gave positive titres.

Five (all males) showed values which, if supported by a positive case history, might indicate active brucellosis. These five cases were interviewed and their case histories are as follows:

**Case 4.** A farmer felt vaguely unwell and tired during March. About the same time his two children aged five and seven years were not thriving and were found to have positive titres. They were referred to hospital where it was

**TABLE II**  
**SEROLOGICAL FINDINGS IN THE FIVE CASES WITH THE HIGHEST TITRES—**  
**DECEMBER 1967**

<i>Case no.</i>	<i>S. Ag.</i>	<i>C.F.</i>	<i>A.H.G.</i>
4 .. .. .	40 P. 80	20	160 P.320
5 .. .. .	320	40	320
6 .. .. .	80	20	80
7 .. .. .	Nil	20	160
11 .. .. .	160	20 P. 40	320 P. 640

Numbers=reciprocals of dilutions.

S. Ag.=standard or direct agglutination.

C.F.=complement fixation.

A.H.G.=anti-human globulin.

decided that they were not in fact suffering from clinical brucellosis. Father and children are now well.

**Case 5.** A dairyman and milk roundsman—works in the family farm and drinks six to seven pints of milk daily. In the course of the investigation of an acute case of brucellosis in the district, the milk from this herd was found to give a positive milk ring test. Three milk cows were subsequently sold and the herd is now brucellosis free. He had an acute febrile illness on 20 May i.e. four weeks after he gave his blood sample. The illness lasted three to four days with headache, pain in left arm and both legs and he complained of tiredness and night sweats. He had diarrhoea for seven days prior to the onset of this illness. Before that he felt perfectly well and denies any symptoms since. He did not report to his doctor.

**Case 6.** A farm worker had a mildly febrile illness in December 1966, feeling unwell for two weeks, and complaining of headache, backache and fatigue. He continued at work and did not report sick. He has been well since.

**Case 7.** In January 1966, a carpenter consulted his doctor on account of tiredness and aching of calves of both legs. He was found to be hypertensive and referred for a medical opinion. He was thought to have intermittent claudication. He now feels well apart from tiredness at times. Anterior and posterior tibial arteries are palpable on both sides.

**Case 11.** In January 1967, a railway clerk began to be easily tired and, in April 1967, consulted his doctor on this account. He also complained of vague lower abdominal and low back pain. No abnormality was found and he was given a tonic. He continued to feel easily tired and complained of pain under the left lower ribs. When the results of his tests became known he was considered to be suffering from chronic brucellosis and observed with a view to antibiotic therapy. His health has improved over the past nine months, although he still complains of some lassitude and occasional pain under the left lower ribs.

All five cases interviewed gave a history of episodes of ill health which may have been caused by clinical brucellosis. This is at

variance with the Orkney and Oxford surveys, where questionnaires to those with positive titres were singularly unsuccessful in revealing any evidence of past clinical brucellosis.

Three of the five patients did not report to their doctors at the time of their illness. The remaining two did report but in neither case was brucellosis considered as a diagnosis at the time.

In only one case was it possible to substantiate a diagnosis of chronic brucellosis, but he was not considered ill enough to warrant antibiotic therapy.

In December 1967, the three tests were repeated on the five patients with high titres and the values over all showed a slight drop. In case 5 the fall was most significant, indicating that the acute illness he had in May was almost certainly an acute brucellar infection.

### Discussion

An incidence of 12 per cent giving titres suggestive of past or present infection and five per cent with titres sufficiently high to warrant a diagnosis of active brucellosis in the presence of a positive history, confirms that this infection is an important clinical and diagnostic problem in this area. Whilst the morbidity in this series is low, one must take into account that the small sample studied is of a well section of the community. That one person in a series such as this was found to be suffering from chronic brucellosis and another had in all probability an acute attack, reflects the gravity of the problem in the community at large.

The great majority of farmers and farm workers obtain their milk from retailers supplying the rest of the area. It seems likely, therefore, that the higher incidence of positive titres among farmers, farm workers and dairymen is attributable to direct infection. Although pasteurization of all milk would effectively stop milk-borne infection, direct infection of veterinary surgeons and those at risk on farms would continue to be a hazard which can only be dealt with by the eradication of brucella infection in beef and dairy cattle throughout the country. The voluntary Brucellosis (Accredited Herd) Scheme is slowly getting under way to achieve this end, but it looks as if the clinical and diagnostic problems of human brucellosis will be with us for some years to come.

### Summary

Sera from 100 adults in a rural community were submitted to serological tests for brucella antibodies. Titres suggestive of past or present infection with *Br. abortus* were obtained from 12 per cent. Five per cent gave results which, if supported by a positive clinical history, might suggest a diagnosis of clinical brucellosis. One case

of chronic brucellosis was diagnosed and it is probable that another patient had had an acute attack.

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#### Poets' Fancy

A stroke of personal ridicule is levelled at Dryden, when Bayes informs us of his preparations for a course of study by a course of medicine! "When I have a grand design," says he, "I ever take physic and let blood; for when you would have pure swiftness of thought, and fiery flights of fancy, you must have a care of the pensive part; in fine, you must purge the belly!" . . . "The thing that gives me the highest spirits (it seems absurd, but true) is a dose of salts; but one can't take them like champagne," said Lord Byron. Dryden's practice was neither whimsical nor peculiar to the poet; he was of a full habit, and, no doubt, had often found by experience the beneficial effects without being aware of the cause, which is nothing less than the reciprocal influence of mind and body.

*Curiosities of literature* by Isaac Disraeli. Volume 2. London. Frederick Warne and Co. 1839. Pp. 464 First published 1839.